CRANFIELD UNIVERSITY

Yngve Mikkelsen

Exploring physicians' decision making and perception of quality in health care delivery

School of Management
International Executive Doctorate (DBA)

DBA
Academic Year: 2009 - 2013

Supervisor: Dr. Javier Marcos
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ABSTRACT

The importance of health and quality health care in people's daily lives is widely recognised. Physicians play a key role in delivering quality health care and improved patient outcomes. However, the evidence regarding physicians' decision making and their perception of quality of health care delivery and its influencers is inconclusive. The overall aim of this thesis is to increase the understanding of quality in health care delivery and the factors that influence it from a physician's perspective. This aim is fulfilled by conducting three interlinked research projects.

The first research project comprises a systematic review of the literature that identifies the factors, contexts and theoretical underpinnings influencing physician decision making. The synthesis of 160 studies reveals two main categories of influencing factors. The first is 'Contexts', which refers to the set of circumstances or facts surrounding a particular event or situation. The second category is 'Interventions', which are the techniques, processes or actions introduced to create changes in how physicians make decisions while performing their clinical duties. Although extant literature provides ample evidence on factors influencing physician decision making the link to quality in health care is under researched.

In the second research project, the author explores how physicians construct quality of health care delivery by means of investigating 162 clinical cases with 27 repertory gird interviews that yield eleven key constructs representing a classification of physicians' conception of quality.

The third research project examines physicians' perceptions of enablers and barriers to quality in health care delivery, employing semi-structured interviews. Findings indicate that physician's effort in delivering quality health care is largely influenced by factors affecting behavioural control (freedom to act).

This research makes five contributions to knowledge. First, a novel classification of factors influencing physician decision making when prescribing is developed, providing new understanding of the link between these factors and quality of health care. Second, the systematic review shows an innovative application of factor analysis to structure the findings of a complex phenomenon. Third, the study presents a new conceptualisation of physicians' construction of quality in health care. Fourth, the research provides a categorization of physicians' perceived enablers and barriers to quality health care and the mechanisms by which they operate. Finally, this research develops a theoretically-grounded and empirically-informed conceptual model that incorporates three hitherto separate domains: agency, planned behaviour, and decision theories. This model provides a new integrated lens to better understand the complexities influencing quality in health care delivery.

This study also makes two significant contributions to practice. First, the findings have helped initiate a transformation in the pharmaceutical industry's business model, evolving from business-to-person to business-to-business. Second, the findings serve as a catalyst to drive organizational changes at Norway's largest emergency hospital. As a result, a national debate was initiated, involving the Prime Minister and Minister of Health, on how hospital emergency care can best be provided at a national level.

Keywords: agency, behaviour, context, control, interventions, mechanism, outcome, uncertainty

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The members of the DBA cohort 09-13 and Cranfield faculty have contributed immensely to my personal and professional time at Cranfield School of Management. The cohort has been a source of friendships as well as good advice and collaboration. I am especially grateful for the clear guidance provided by the cohort leader, Dr. Carlos Mena.

In my early work exploring medical decision-making, I am particularly indebted to Dr. John Towriss. He provided me with a personal copy of the “Adaptive Decision Maker” by Payne (1993) which has been central to my understanding of this particular theoretical domain.

I am a physician with a strong positivist background, which brings with it some possible biases. However, I have been mindful of my position and feel that this particular combination provides added benefit, and contributes to a deeper understanding of the schism between medicine and management when it comes to physician decision making and its influence on quality of health care delivery. The review process of this research challenged my pure positivist position and enriched my understanding of what constitutes knowledge. Therefore, the consequence of the journey undertaken is that I am no longer a purist and feel more accomplished as a scientist.

Intellectually, I have struggled with articulating the link between the two projects. At the same time, I feel this to be a positive challenge as it has forced a more conversational approach to the research than I have adopted previously. This has given me a clear understanding of the value of academic conversation. Given the time constraints of a busy work schedule combined with doctoral research I have realized that I have given too little priority to time spent on academic conversation.

Personally, I feel I have developed and been able to put research tools into practice and at the same period strategy as a result. Qualitative research tools are not only for the academically inclined, but also well suited for the practitioner as it can become an integral part of the business process. Therefore, I would argue for a transitional scholarship in the same vein as Bass and Avolio (1990) suggest different leadership styles dependent on the requirement of the people to be lead. My ambition is not to be a pure academic, but a scholar. Thus, the experience of this research project has brought me a little closer to my goal of being a practicing scientist.

I cannot conclude this thesis without thanking Professor Allan Harrison, the programme director during the first half of my doctoral research at Cranfield. He

was inspirational until the end and instrumental in making this research journey possible.

I am grateful for the support my previous and current employer has provided in order for me to undertake this doctoral research.

For this thesis, I would like to thank my proof-reader Dr. Mark Stelling for his time, interest, and helpful comments.

Lastly, and most of all for my loving, supportive, encouraging, and patient wife and daughter whose faithful support during all stages of this DBA is so appreciated. Thank you.

Yngve Mikkelsen
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LIST OF ABBREVIATIONS

This section provides a list of abbreviations for the reader. The intention is to provide a quick reference for commonly used abbreviations used throughout the review to enhance readability and accuracy of interpretations.

AHUS	Akershus University Hospital
ANV	Average normalized variance
APO	The Audit Project Odense
AT	Agency Theory
B2B	Business-to-business
B2P	Business-to-person
BIPAP	Bi-level positive airway pressure
BMD	Bone mineral density
CDSS	Computerised clinical decision support systems
CI	Confidence Interval (statistics)
CIMO	Context, Intervention, Mechanism and Outcome
CME	Continuous medical education
CMS	Centres for Medicare and Medicaid Services
COX	Cyclooxygenase
CV	Cardiovascular
DBA	Doctor of Business Administration
Df	Degrees of freedom (statistics)
Dr	Doctor
DTC	Direct-to-customer (patient)
DTP	Direct-to-physician
EBSCO	Online research database
EFPIA	European Federation of Pharmaceutical Industries and Associations
EMBASE	International biomedical database (Excerpta Medica Database)
ER	Emergency room
ERIC	Education Resource Information Centre
FDA	Food and Drug Administration (US regulatory agency)
Freq	Frequency
GBP	Pound sterling
GP	General practitioner (physician)
GWTG	Get With The Guidelines
HCO	Health-care organization
HCP	Health care professional (nurse, physician, etc.)
HMO	Health maintenance organization
HTA	Health technology assessment
ICU	Intensive care unit
ID	Identification
IOM	Institute of Medicine
KOL	Key opinion leader
LMI	Norwegian Pharmaceutical Industry Associations

MATCH	Management of Atherothrombosis With Clopidogrel in High-Risk Patients
MEDLINE	Database with health information from the National Library of Medicine
Mix	Mixture
NHS	National Health Services (UK)
NOK	Norwegian crowns
NSAID	Non-steroidal anti-inflammatory analgesic
NV	Normalized variance
NVIVO	Qualitative data analysis computer package from QSR International
OR	Odds ratio (statistics)
PCP	Pneumocystis pneumonia
PCT	Personal Construct Theory
PDA	Personal digital assistant
PDL	Preferred drug list
Prof	Professor
PROQUEST	Online research database
PsycINFO	Research database for behavioural sciences and mental health
Ref	Reference
Res	Respondent
RGT	Repertory grid interview technique
ROW	Rest of the World
RQ	Research question
SAPS	Simplified Acute Physiology Score (severity of disease classification system)
Sig	Significance (statistics)
SPSS	Statistical package for social sciences
SSRI	Selective serotonin reuptake inhibitor
TPB	Theory of Planned Behaviour
TRA	Theory of reasoned action
USD	United States dollar
VAR	Variance
WHO	The World Health Organization
XLS	Microsoft Excel

GLOSSARY OF TERMS

This section provides a glossary of terms for the reader. The intention is to provide a definition of commonly used terms used throughout the review to enhance readability and accuracy of interpretations.

Academic detailing: visits by academic peers imparting scientific information in an objective and balanced manner.

Academic literature: scholarly and often peer reviewed publications including a variety of media such as a theses, books articles and abstracts.

Age: age of a physician or patient in years.

Agency Theory: the basis for agency is that one party (principal) delegates work to another (agent), and Agency Theory is concerned with two problems occurring in agency relationships (Eisenhardt, 1989). The first problem relates to conflict of interest (moral hazard) and the second to risk sharing (adverse selection).

Attitude: represents an individual's degree of like or dislike for something thus affecting their 'propensity' to behave in certain ways.

Audit: evaluation of a person, organization, system or process; often involving feedback.

Behaviour: an observable action taken by an individual. For example, prescribing a medicine, reading a scientific article, attending to an invited conference.

Biomedical: the application of the principles of biology and physiology to clinical medicine.

CIMO: context, intervention, mechanism outcome framework posed by (Pawson et al. (2004), Pawson, 2006).

Clinical study participation: when a physician is an investigator involved in a clinical study of medicines.

Concordance: involvement of patients in decision-making to improve patient adherence to medical advice

Context: a set of circumstances or facts surrounding a particular event or situation.

Continuous medical education (CME): refers to a specific form of education that helps physicians maintain competence and learn about new and developing areas in their field.

Control: the ability to purposefully direct, or suppress, change.

Construct: the basic terms that the respondent uses to make sense of the elements.

Cost: the totalling up of expenditures associated with the decisions and their consequences of prescribing medicines.

Detailing: visits by sales representatives is an important part of pharmaceutical promotion.

Doctor: a qualified and certified medical doctor also denoted as physician.

Drug: is a legally prescribed substance that affects physiology at a functional level. The terms “drug” and “medicine” are used interchangeably.

Dyad: a group of two people

Elements: examples of the topic of interest.

Expectation: presumed degree of probability of an occurrence.

Experience goods: is the delivery of health care service where characteristics such as quality or price are difficult to ascertain before consumption, however, characteristics can be assessed after consumption.

Financial incentives: include the use of increased financial accountability using budgets and performance-based payments.

Formularies: committees that specify which medicines are approved for prescription under a set of given circumstances.

Gender: distinguishes between male and female.

Guideline: a statement by which to determine a course of action with the aim to streamline a particular process according to a set routine, based on medical evidence.

Industry: the pharmaceutical industry develops, produces, and markets medicines licensed for use as medications.

Intervention: technique, process or action introduced to create change.

Habit persistence: residues of past behaviours and experiences that leads to habitual rather than reasoned responses.

Journal advertising: communication in the form of adverts used to persuade the readers of medical journals to prescribe the medicine being advertised

Legal concerns: concerns about legal action, such as litigation, as a result of decisions made during the practice of medicine.

Managed care: represents systems designed to finance and provide health care to patients enrolled in the programme with the intent to reduce cost of health care delivery.

Medicine: is a legally prescribed substance that affects physiology at a functional level. The terms “drug” and “medicine” are used interchangeably.

Peer effect: the positive and negative impact of colleagues (peers) in a variety of choice contexts

Personal Construct Theory: is a psychological theory of human cognition and personality developed by George Kelly in the 1950s.

Physician: a qualified and certified medical doctor also denoted as physician.

Practice type: the way the physician's practice is organized.

Preference: an individual's attitude towards a set of objects in a decision-making process.

Preferred drug list (PDL): a list of preferred medications based on clinical efficacy and safety as well as cost.

Price: the quantity of payment given by one party to another in return for medicines.

Regulation: is administrative legislation that constitutes or constrains rights and allocates responsibilities associated with the prescribing of medicines.

Reimbursement: compensation for an expense associated with prescription medicines.

Repertory grid: the repertory grid is a technique for identifying the ways that a person construes (interprets/ gives meaning to) his or her experience.

Samples: represents free samples of medicines provided to physicians by the pharmaceutical industry.

Social factors: factors that affect or direct our lifestyle through choice, such as religion, family, ethnicity, education and marital status.

Social norm: the perception of what is expected from health care stakeholders and society in general.

Speciality: formal medical education after medical school leading to a medical speciality such as internist and surgeon.

Stakeholder: a person, group or organization that influences or can be affected by physician prescribing.

Technology: is the usage of information technology tools and techniques in the decision process governing physician prescribing of medicines.

Theory of Planned Behaviour: is a theory about the link between attitude, intent, perceived control and behaviour.

Theory of reasoned action: is the precursor theory to Theory of Planned Behaviour.

Wallace and Wray framework (Wallace and Wray, 2006 pp. 99-100):

Knowledge-for-understanding: "attempting to develop theoretical and research knowledge from a relatively impartial standpoint. The rationale is to understand (rather than change) practice and policy or underlying ideologies".

Knowledge-for-critical review: "attempting to develop theoretical and research knowledge from an explicitly negative standpoint towards existing practice and policy. The rationale is to criticize and expose the prevailing ideology, arguing why it should be rejected and sometimes advocating improvement according to alternative ideology".

Knowledge-for-action: "attempting to develop practice-relevant theoretical and research knowledge, taking a positive standpoint towards practice and policy. The rationale is to inform efforts to bring about improvement within prevailing ideologies".

Instrumentalism: "attempting through training and consultancy, to impart practice knowledge and associated skills, taking a positive standpoint towards practice and policy. The rationale is directly to improve practice within the prevailing ideology".

Reflexive action: "practitioners attempting to develop and share their own practice knowledge, taking a constructively self-critical standpoint. The rationale is to improve their practice, either within the prevailing ideology or according to an alternative ideology".

Volition: the cognitive process of deciding and committing to a particular action.

CHAPTER ONE: LINKING COMMENTARY

The purpose of this Linking Commentary is to synthesize and integrate the scoping study and three research projects that have been completed as partial fulfilment of this Doctorate in Business Administration (DBA) at Cranfield School of Management. These projects build on each other and constitute the milestones required by the DBA process; see Figure 1-1 DBA milestones.

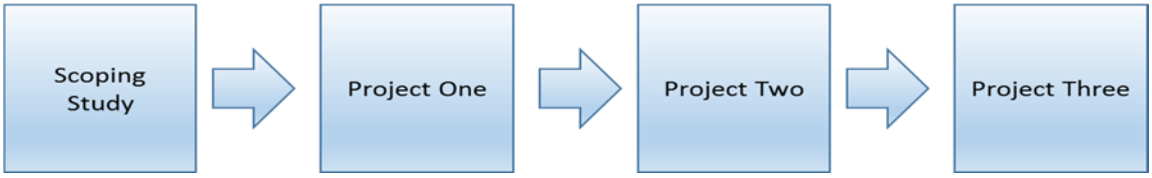

Figure 1-1 DBA milestones

The linking commentary is structured as follows. It starts by providing a structure of the thesis, before describing the background and motivation for the research. Next, it addresses the importance of the physician to the research and theoretical position. It then provides an overview of the research process and interlinked projects, followed by an overview of research methods. A summary of the key findings is then provided, followed by a discussion, before elaborating the research's contributions to knowledge and practice. The commentary closes with a discussion of limitations and opportunities for further research.

The overall aim of this thesis is to gain an understanding of quality in health care delivery adopting the physician's perspective.

Specifically, the objectives of the thesis are:

1. To explore physicians' decision making and prescription behaviour
2. To identify how physicians construct and perceive quality of health care
3. To explore the enablers and barriers to the delivery of quality health care

1.1 Structure of the Thesis

For purposes of clarity, a roadmap will be provided for the presentation of the research contributing to this thesis. The thesis is structured as follows:

Chapter 1: Linking Commentary - Provides a synthesis and integrate the scoping study and three research projects.

Chapter 2: Scoping Study – Provides a high level review of literature to identify relevant domains of literature and theory.

Chapter 3: Project One (systematic review) – Provides a systematic review of the literature exploring factors influencing physician decision making employing prescribing as a proxy.

Chapter 4: Project Two (empirical project 1) – Empirically explores how physicians construct quality of health care while delivering care to patients.

Chapter 5: Project Three (empirical project 2) – Empirically explores physicians' perception of enablers and barriers to quality of health care while delivering care to patients.

References: There are a large number of references to published work in the thesis. References are shown in the text by the author(s) and the year of publication and then listed in alphabetical order by author.

Appendices: There are a number of appendices related to each of the individual projects of the thesis. Appendices for each project are presented in separate sections A, B and C (A=Project One, B=Project Two and C=Project Three).

It is important to note that this thesis integrates stand-alone documents submitted as milestone requirements for the DBA. The documents have therefore been developed during the time period 2009 – 2013, and reflect the development of the author's skills as a researcher and writer during this period. The documents that constitute Chapters 2 – 5 are largely unchanged; however, changes have been made to the projects to improve general readability of the thesis as a whole.

1.2 Background and Motivation for the Research

The research presented in this thesis has one overarching objective: to develop the understanding of quality in health care and factors influencing it, as well as its contexts and the underpinning mechanisms. The finding of this thesis contributes to academic research, as well as providing novel insights to stakeholder groups in health care, with an interest in influencing its practice.

When making policy, structural or operational changes influencing health care delivery, it is important that decisions are not based on mere assumption, but informed by quality research. The disconnection between academic management research and practice has been addressed by Starkey and Madan (2001) p. S3, who conclude that "bridging" this gap does not only require changes in the academic mind-set. Managers and firms also need to rethink their involvement in the research process".

Although the author of this thesis had been involved in clinical research in his past jobs, he had not had the opportunity to conduct research at a doctoral level. He wanted to become an accomplished academic for two main reasons. First, medicine is research driven, and as a top level executive in a health care organization, he felt it necessary to acquire the skills of an accomplished researcher. Second, as a manager, he needs research based tools and skills to drive change; in other words, "bridging" the gap.

When he first embarked on the doctoral journey, the author was working for Pfizer as a medical director. His interest and motivation to undertake this research was the realization that the industry spends billions of USD every year on direct to physician (DTP) promotion (Gagnon and Lexchin, 2008), without sufficiently considering the potential consequences for overall health care outcomes. Thus, sparking an interest in further exploring quality in health care. The Scoping Study

revealed that the link between pharmaceutical promotional efforts and quality in health care was lacking in the literature, and calls for new promotional models for the pharmaceutical industry had already been advocated (Illert and Emmerich, 2008). Speaking with top executives about his findings was discouraging. Interest was shown, but willingness for change was not present. He believes that this is partly due to the internal training of pharmaceutical managers and executives, where a long history of success with focus on DTP promotion is a central predictor of future choice (Bandura, 1986). He perceives that the current business model of the pharmaceutical industry does not focus on how DTP promotion contributes to overall health care outcomes.

The author decided to change jobs and currently holds the position of director of a medical division and Chief Medical Officer at Akershus University Hospital in Norway. In other words, he has made the change from producer (pharmaceutical industry) to provider (hospital); one step closer to the patient. In his current role, as a potential target customer for the pharmaceutical industry, he is invited to speak in fora where future industry policy and practice is being debated.

In his current role, the author has also had the opportunity to directly influence how health care delivery is being organized in Norway's largest emergency care hospital. He has implemented research findings which have started a debate at a national level, including the (former) Prime Minister and the Minister of Health, on how best to organize emergency care in hospitals in the country.

The author's interest in health care and quality can be traced back to the moment when he decided that he wanted to become a physician. When he was 18 years old, his father took him on a trip across the US, which ended with a 10 day cruise. On the cruise ship, the father and son shared their dinner table with a physician. One night, one of the guests at a neighbouring table choked on a piece of meat. The physician seated at the author's table promptly got up and executed a perfect Heimlich manoeuvre; the piece of meat was "un-delicately" ejected from the unfortunate passenger. A life was saved! Witnessing this episode unfold, the author decided there and then that this was what he wanted to do; and at the age of 26, he graduated from medical school. This episode illustrates a relentless and genuine passion for helping and caring for patients, which represent the values he relies on when making choices today, whether they be personal or professional.

Overall, the author is pleased with his accomplishments and with how the research has provided insights for his management practice within health care, as well as contributing to academic research in the field.

1.3 Defining Quality in Health Care

In this section, the reader is provided with definitions from the health care literature and the adopted definition employed for this research.

Several definitions of quality can be found in the literature, but agreement on one grand definition of quality does not exist. Below are provided examples of definitions, which can be grouped into three main categories representing the

main approach to quality in health care: efficacy and safety, outcomes and systems approach.

Patient safety has become increasingly important in health care given the number of identified injuries and fatalities as a result of preventable medical errors (Kohn et al., 1999). Thus, efficacy and safety is an important aspect of medical practice and is reflected in the examples of definitions provided below.

> "Clinically effective, personal and safe." (Cave et al., 2008)

> "Health care should be safe, effective, patient-centred, timely, efficient and equitable." (Institute of Medicine, 2001)

Health care is designed around the provision of interventions designed to change, prevent or stabilize the health status of individuals or populations. The results of these interventions are known as health outcomes. Some definitions adopt an outcomes perspective, and some examples are given below.

> "The degree to which health services increase the likelihood of desired health outcomes and are considered consistent with current professional knowledge." (Kohn et al., 1999)

> "Medical quality is the degree to which health care systems, services and supplies for individuals and populations increase the likelihood for positive health outcomes and are consistent with current professional knowledge." (American College of Medical Quality, 2010)

> "That which consistently contributes to improvement or maintenance of the quality and/or duration of life." (American Medical Association, 1986)

A systems approach to defining quality in health care takes on the task of trying to understand how elements and factors within the system influence one another. The author argues that this is a better approach to quality of healthcare as a scaffold on which to extend the understanding of the intrinsic complexities of influencers and mechanisms by which quality is affected. Some examples are provided below.

> "That kind of care which is expected to maximize an inclusive measure of patients' welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all ill parts." (Donabedian, 1966, Donabedian, 1979, Donabedian, 1988, Donabedian, 2005)

> "Quality of care is the level of attainment of health systems' intrinsic goals for health improvement and responsiveness to legitimate expectations of the population." (Evans et al., 2000)

Taking on a quality assessment perspective, (Donabedian (1979), 1988) proposed a model of quality comprised of three elements: structure, process and outcome.

Structure refers to stable, material characteristics (infrastructure, tools, technology) and the resources of the organizations that provide care and the financing of care (levels of funding, staffing, payment schemes, and incentives).

Process is the interaction between caregivers and patients, during which structural inputs from the health care system are transformed into health outcomes.

Outcomes can be measured in terms of health status, deaths, or disability-adjusted life years—a measure that encompasses the morbidity and mortality of patients or groups of patients. Outcomes also include patient satisfaction or patient response.

Donabedian's quality model is widely used and cited in the literature concerned with quality in healthcare. Other notable names concerned with the topic are Codman and Berwick (Powell et al., 2009). Codman, a practicing surgeon in the early part of the last century, is generally accepted as the father of outcomes based medical practice after publishing a study on hospital efficiency (Codman, 1916). Berwick, on the other hand, has focused his attention on the application of industrial models of quality in health care. In this thesis, the systems approach to quality, as proposed by Donabedian (1979), is adopted; however, it was chosen to widen the scope of structure to context. The argument for this choice is laid out in Section 1.9.1 on page 33. For the purpose of this research, a systems approach is adopted, and quality is defined as comprising of context, process and outcome.

1.4 Importance of Physicians

Having worked as a physician in general practice and in specialist health care as an anaesthesiologist, the author has had many opportunities to see and experience first- hand the patient-physician encounter and its challenges. The importance of this interaction in the delivery of quality is based on two key phenomena. First, patients' access to health care requires a physician's concurrence and initiative (McGuire, 2001). Second, physicians make decisions on behalf of patients while performing their clinical duties (Vogel et al., 2003). These phenomena are central to this research and subsequent parts of the thesis will make reference to them.

Several stakeholders have a vested interest in influencing physician decisions, as they are made on behalf of patients and other stakeholders in health care. Initially working in the pharmaceutical industry, the author was struck by the debate on whether pharmaceutical promotion was information or persuasion. Internally in the industry it was considered information, but the seminal work of Hurwitz and Caves (1988) concluded that it was predominantly persuasion (i.e. practices designed to influence choice in favour or a particular alternative). This research was found to be of particular interest, as the pharmaceutical industry spends over 40 billion USD per year in the US alone persuading physicians to change their clinical decisions in favour of a particular company or brand (Gagnon

and Lexchin, 2008). Therefore, within the factors that affect physician decision-making, emphasis is made in including pharmaceutical promotion.

The literature on physicians' prescribing is relatively abundant. However, a synthesis of factors influencing physician prescribing, and a coherent understanding of the role of context and underpinning mechanisms are missing. Gallan (2005), attempted such a review, but did not adopt a systematic approach nor frame the review as a realist synthesis. Thus, the scientific value of this work and its contribution to knowledge, policy and practice could be questioned. Physician prescribing behaviour is widely framed as choice behaviour (Lilja, 1976, Coscelli, 2000, Venkataraman and Stremersch, 2007, Janakiraman et al., 2008, Zerzan et al., 2011). In this thesis, therefore, physicians' prescribing behaviour is adopted as a proxy for physicians' decision making.

Physicians engage with patients and act as expert agents. McGuire (2001) has written an extensive review of physician agency. This author suggests that the patient-physician interaction takes place in the context of information asymmetry, and thus uncertainty, which is suggested to be a strong driver of physician behaviour in a seminal work by Arrow (1963), is present. Literature on medical decision making is heterogeneous, and no grand theory of medical decision making has been formulated (Reyna, 2008). Medical decisions are made under uncertainty, and physicians may adopt several strategies when deciding. The author found the book by Payne et al. (1993) insightful, in that deciding how to decide is an important decision in itself. The authors claim that decision makers balance effort and accuracy considerations (effort-accuracy framework) and that this is predictive of which decision strategy is used. However, deciding on how to decide is not predictive of observed behaviour. In a seminal work, Ajzen (1991) developed the Theory of Planned Behaviour, which has later proven to have the highest predictive power of any behavioural theory employed in a health care delivery context (Godin et al., 2008). These studies significantly informed and motivated the research presented in this thesis, and are discussed in depth in subsequent chapters.

1.5 Theoretical Positioning

The theoretical positioning has been described in detail in the Scoping Study (see Chapter 2), and further detailed in Project Two, from page 169. Three hitherto separate theoretical domains are integrated to provide a lens to better understand the complexities of the phenomenon of physician decision making and their role in delivering quality health care (see Figure 1-2 Theoretical domains). Agency Theory, or more specifically physician agency, is concerned with the assumption of conflicting interest between a principal (patient) and an agent (physician) (McGuire, 2001). Conflict of interest may lead to conditions of moral hazard or adverse selection. Moral hazard refers to a condition where an agent will make decisions based on self-interest. Adverse selection refers to a condition where poor choices are being made due to inadequate information. The mechanism for both conditions is information asymmetry. Behavioural theories are abundant, but the Theory of Planned Behaviour has received most attention, and was found in a meta-analysis to have the highest predictive power of physician behaviour in

health care (Godin et al., 2008). Medical decisions are made under uncertainty, and no grand theory of medical decision making has yet been formulated (Reyna and Rivers, 2008). Physicians may adopt several strategies when making medical decisions. Rather than the decisions themselves, deciding how to decide (e.g. whether primarily based on judgement or closely following available guidelines) is important (Payne et al., 1993).

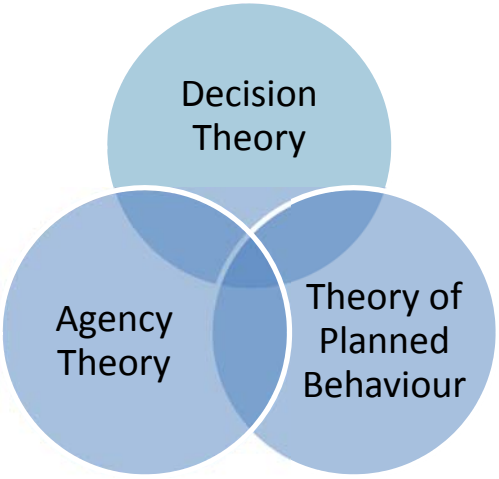

Figure 1-2 Theoretical domains

Agency theory, decision theory and behaviour theory form a theoretical lens in order to improve our understanding of quality in health care. In this section interlinks and the relative contribution of each of the theories employed is discussed.

The author argues that Agency theory is a useful framework for understanding the context of physicians' supply of effort into the delivery of health care. Agency theory helps understand the basis of the dyadic patient-physician relationship; however, it is necessary to view agency in a wider context to fully understand the complexities of health care delivery. Physicians make decisions on behalf of patients and stakeholders when performing their clinical duties and consequently, multiple agency relationships exist and influence physicians' effort supplied into the delivery of health care. However, physicians' exhibit a greater sense of loyalty to patients than to other stakeholders. Two central assumptions of Agency theory are relevant in in the physician-patient interaction context. First, there is a conflict of interest between the principal and agent. Second, information asymmetry exist between the agent and principal. The information asymmetry makes it impossible to predict in advance physicians' supply of effort, thus providing an opportunity for moral hazard to occur. Information asymmetry also implies that the physician does not have perfect information and adverse selection may result. Furthermore, information asymmetry results in uncertainty for both the principal and agent. Delivery of health care relies on the physician to decide the clinical content. Thus, Agency theory provides a useful theoretical framework to contextualise physician decision making

The second theoretical framework, physician decision making is the most underdeveloped part of evidence-based medicine and a grand theory of medical

decision-making is lacking. However, the contextual framework provided by Agency theory indicate that decisions are made under conditions of information asymmetry and hence uncertainty. In addition, physicians have a variety of strategies to choose from when making decisions. The effort-accuracy framework suggested by Payne et al (2003) posits that physicians must first decide on which decision strategy to employ before making decisions in a clinical setting. Thus, the chosen strategy for decision-making influence physician supply of effort balanced against accuracy of decisions, and hence quality.

It is possible to make decisions without acting on it. For example, many new years' resolutions do not translate into changed behaviour. Thus, behavioural intent is not enough, but argued by Ajzen (1991) to be a strong predictor of actual behaviour. Uncertainty predicted by agency is a strong influencer of physician behaviour (Arrow, 1963) and may therefore influence behavioural intent.

The theory of planned behaviour formulated by Ajzen (1991) is the behavioural theory with the best prediction value in health care (Godin et al., 2008). Therefore, the Theory of planned behaviour is the third theoretical lens employed in this research.

None of the theories alone has the power to explain the complex and cloaked moments defining physician supply of effort into the delivery of health care. However, combining the theories provide a powerful theoretical lens to further our understanding of the complex phenomenon of quality in health care delivery. The relative contribution of the individual theoretical frameworks is difficult to quantify, as the explanatory power of the combined theoretical lens is greater than the sum of each individual component. Therefore, a rank order of the individual frameworks contribution seems counterproductive.

1.5.1 Conceptualization and Theoretical Underpinning

Physicians supply effort into the delivery of health care (McGuire, 2001). Effort in this context is considered equal to quality of health care delivery (Ma and McGuire, 1997); thus, a focus on physician effort is necessary when attempting to extend the understanding of quality in health care delivery. Understanding quality in health care is not easy for three main reasons. First, medical practice is complex due in part to the presence of multiple principal agent relationships. Second, effort supplied into the delivery of health care is both unpredictable and un-observable. Finally, medical decisions are made under uncertainty.

Medical practice is complex due to multiple principal agent relationships. Physicians must not only relate to patients, but also to other stakeholders such as hospital management, payers, etc., when performing their clinical duties. From an agency perspective, this introduces a situation defined by multiple principals. Agency Theory is primarily designed to deal with dyadic agent-principal relationships; thus, Agency Theory does not fully explicate the complexities inherent in the multiple principal-agent relationships that characterize health care delivery. It is therefore necessary to complement Agency Theory in order to fully understand how the supply of physician effort in health care delivery is influenced and how this influences quality.

Physician effort supplied into the delivery of health care is both un-observable and unpredictable. Physicians act as experts on behalf of patients and stakeholders when delivering health care (McGuire, 2001). The physician's expert role implies that that the physician has superior knowledge, so a situation of information asymmetry exists. Due to information asymmetry, it is not possible to know what the physician knew when decisions were made. Medical decision making is therefore not observable, and outcomes cannot be predicted in advance, but only observed retrospectively.

Health care is a service that is experienced by the patient. Both patient experience and clinical excellence constitute quality in health care delivery (McGuire, 2001). Furthermore, quality is likely to vary across physicians, as well as from day to day, making it difficult to predict prospectively. Thus, in addition to being un-observable, the effort supplied is also unpredictable. Quality in health care delivery is heavily dependent on the physician's effort devoted to patient care. Since effort supplied by physicians is both un-observable and unpredictable, quality in health care delivery is therefore prospectively non-observable and unpredictable. As such, it is necessary to employ a theoretical framework to better predict actual behaviour and hence quality of care prospectively. Godin et al. (2008) found that the Theory of Planned Behaviour has the highest prediction rate of the behavioural theories when applied to health care professionals. Thus, the Theory of Planned Behaviour is adopted to further extend the understanding of the supply of physicians' efforts into the delivery of health care.

It is widely stated that medical decisions are made under uncertainty (Croskerry, 2005). Even though the physician takes on the role of the "expert", he/she does not hold all available information. For example, the patient may not divulge all necessary information, or there is uncertainty about the effect of prescribed treatment; thus, medical decision making takes place under uncertainty. Uncertainty is described to be a strong influencer of physician behaviour (Arrow, 1963), and physicians may adopt several heuristic strategies when making decisions. Therefore, it is important for physicians to choose which strategy to follow; in other words, deciding how to decide (Payne et al., 1993).

In order to discuss the findings in full, a theoretical lens is employed, combining three hitherto separate theoretical domains; see Figure 1-2 Theoretical domains. First, Agency Theory, specifically physician agency (McGuire, 2001). Second, the Theory of Planned Behaviour. Ajzen (1991) proposed the Theory of Planned Behaviour (TPB), where behavioural intent is a predictor and direct precursor of actual behaviour. Godin et al. (2008) have shown that TPB is strongly predictive of actual behaviour in a health care context. The elements of TPB are shown in Figure 1-3 Theory of Planned Behaviour (Ajzen 1991). The final theoretical domain is medical decision making, specifically adaptive decision making (Payne et al., 1993).

Next, the research process followed is described, including summaries of each of the major milestones in the development of this thesis.

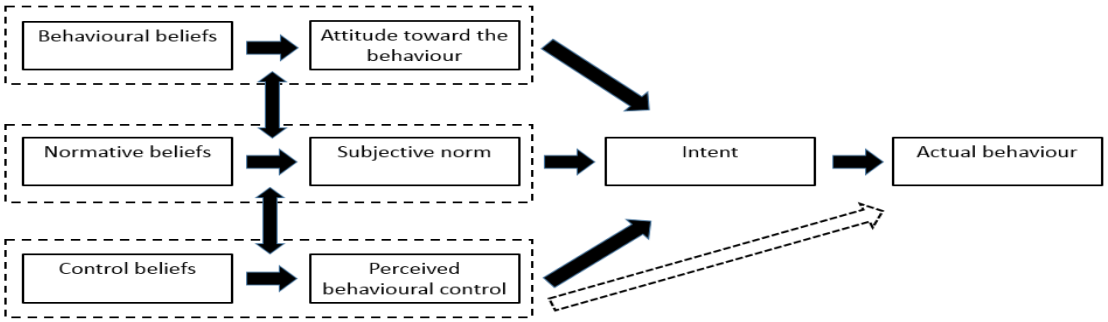

Figure 1-3 Theory of Planned Behaviour (Ajzen 1991)

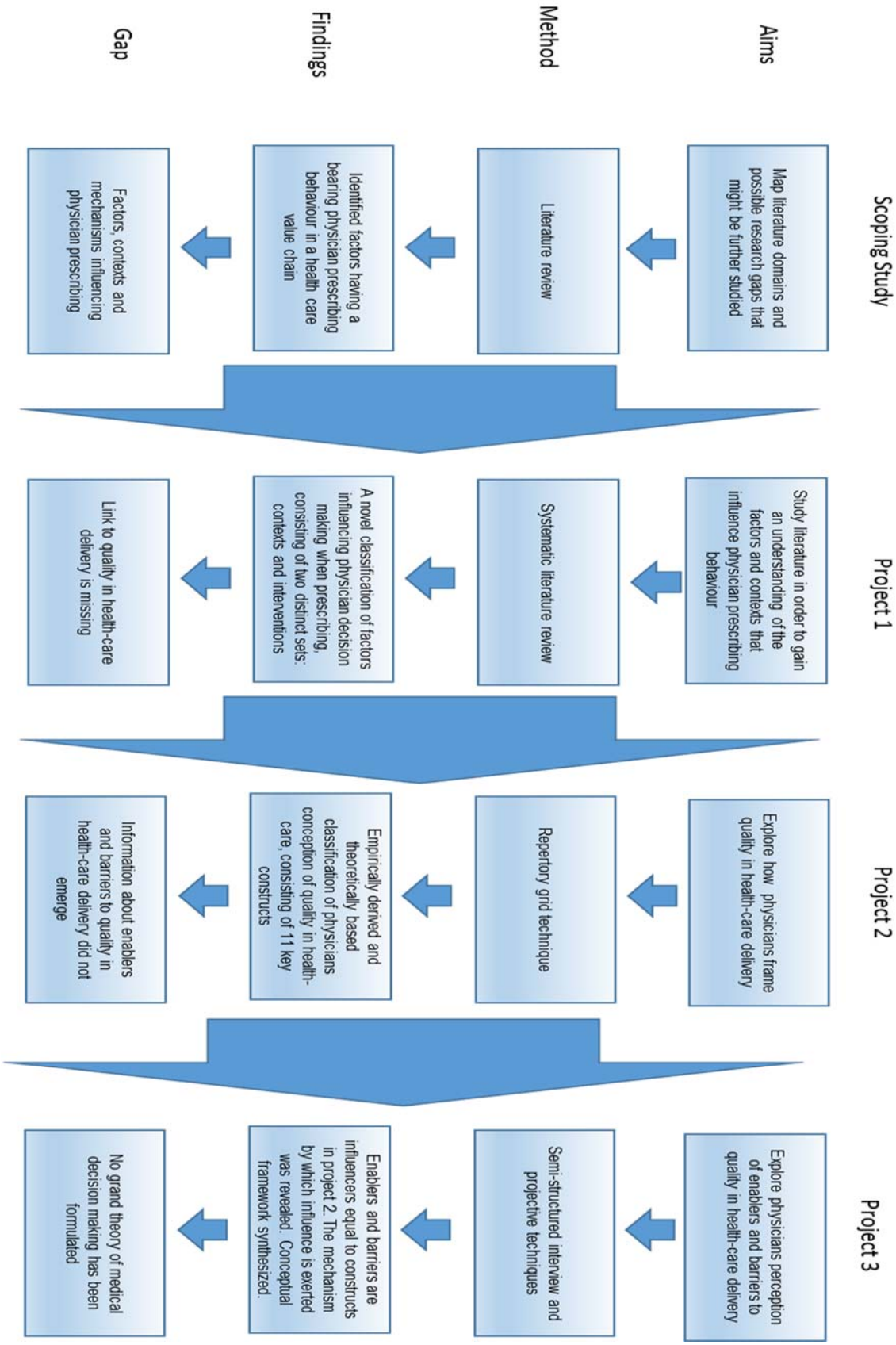

Figure 1-4 Research process

1.6 Overview of the Research Process and Interlinked Projects

This section describes the research process followed during the time period 2009-2013, to conduct the research covering the Doctor of Business Administration (DBA) at the Cranfield School of Management. The process is structured and milestone driven, with each step building on preceding work. The milestones are scoping study, literature review and two empirical projects, as shown in Figure 1-4 Research process. A summary of each of the elements is presented in the following subsections.

1.6.1 Scoping Study

The Scoping Study is a high level review of relevant literature, aimed at mapping literature domains and possible research gaps that might be further studied. The initial interest was about factors influencing physician prescribing behaviour. Thus, the Scoping Study is concerned with the influences on physician prescription behaviour from a health care value chain perspective, in order to identify stakeholders and points of influence.

The literature reviewed for the Scoping Study suggests that physician education and training, control and regulatory measures, peer effect, promotion, price clinical trial participation and drug characteristics impact the quality and quantity of prescribing in the short term. The Scoping Study revealed that little is known about how factors influence prescribing behaviour. However, the Scoping Study found that source, message, receiver and contextual factors have all been postulated to have persuasive effects on the physician. Thus, the study has identified factors having a bearing on physician prescribing behaviour in a health care value chain context, but there is still a need to understand how factors affect physician prescription behaviour, in which contexts and with what results.

The Scoping Study concludes that the purpose of the systematic review is to study literature in order to gain an understanding of the factors and contexts that influence physician prescribing behaviour.

1.6.2 Project One

As described above, the Scoping Study showed that there is still a need to understand how factors affect physician prescription behaviour, in which contexts and with what results. Therefore, a systematic review of the literature has been conducted with the purpose of gaining an understanding of the factors and contexts that influence physician prescription behaviour. Specifically the review identifies and maps factors and contexts having a bearing on physician decision behaviour when prescribing, and provides a synthesis of what is known about these issues. The systematic review addresses the following research question.

> RQ: What are the factors, contexts and mechanisms which influence physician prescribing behaviour?

This systematic review adopted the approach outlined by Tranfield et al. (2003), drawing on elements taken from Huff (2009) and Fink (2010). Data extraction followed the methodology described by Wallace and Wray (2006). Synthesis of

the data adopts a realist synthesis approach, as proposed by (Pawson et al. (2004), Pawson (2006)), in order to ensure a strong link with practice and policy.

Prior to conducting the review, a systematic review protocol was devised; see page 317 in Appendix A. The protocol is used to limit the scope of the study and to predefine the search strategy. The systematic search identified 3030 studies that, after filtering, included 160 studies for review, as shown in Figure 1-5 Systematic review search flow chart. The review revealed two categories of influencers: interventions, in other words, proactive techniques, processes or actions introduced to create change in physician prescribing behaviour; and contexts, a set of circumstances or facts surrounding prescription events.

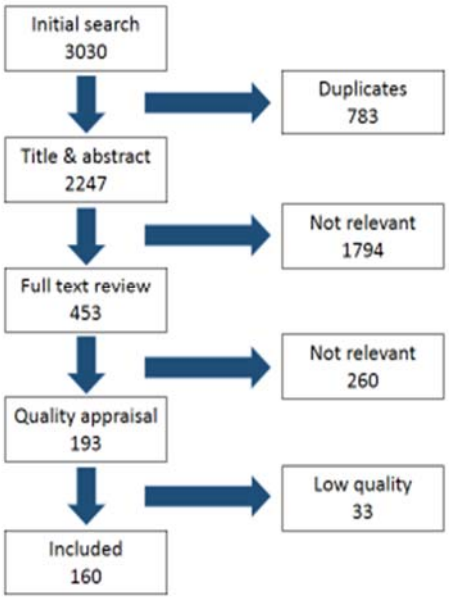

Figure 1-5 Systematic review search flow chart

Overall, this systematic review contributes to the current literature by showing that interventions that limit the spectrum of choice are the most effective, followed by face-to-face information and persuasion efforts. Furthermore, selective contextual factors related to the physician (habit persistence), patient (bio-medical) and medicine attributes are important influencers of physician decision making when prescribing, and modulators of interventions designed to create change in said behaviour. Interventions limiting the spectrum of choice were found to be most effective. The predominant mechanism of influence was found to be physicians' perception of behavioural control. However, information about the overall effects on outcomes was found to be missing in the reviewed literature.

1.6.3 Project Two

Project One revealed gaps in the understanding of how factors which influence physician decisions influence quality of health care delivery from a physician perspective. Thus, the purpose of the second project of this doctoral study is

concerned with exploring how physicians frame quality in health care while performing their clinical duties.

Physicians, in performing their duties of patient care, can adopt several approaches; thus, they must decide how to decide. Information is not equally shared between physicians, patients and the stakeholders. The physician has far more information than the patient and stakeholders, so physician decisions are made in the context of information asymmetry. However, physicians rarely have perfect information about clinical work (diagnostic, interactions, response to treatments), so decisions are also made under uncertainty. Physicians rely heavily on past experience, forming constructs that guide future choice and action (Ajzen, 1991 p. 203). As such, physicians' decisions can be investigated adopting experiential constructivism (Jankowicz, 2004) and personal construct theory (Kelly, 1955).

Physicians' decisions are driven toward the delivery of quality of health care. Given physicians' impact on quality of health care, Project Two seeks to understand how quality of health care is perceived by them. The following research question (RQ) is addressed:

> RQ: How do physicians construct quality of health care delivery in a hospital setting?

A total of 27 repertory grid interviews were performed to explore how physicians construct quality in health care delivery. The analysis of data closely followed established practice in the literature, and yielded eleven key constructs. Key constructs were identified on the basis of assigned high importance, differentiated strongly and were frequently mentioned. These key constructs are communication, continuity of care, cooperation, correct interpretation of information, early diagnosis and treatment, effect of therapy, experience, responsibility for care provision, resource availability, and resource utilization and time.

The findings from this research project provide insight into how physicians construct quality while performing their duties. Drawing on the findings from the preceding literature review (Project One) and this study, a conceptual framework for quality of health care services is proposed; see page 221. Project Two contributes to the understanding of quality in health care delivery by providing a theoretically grounded and empirically informed classification of physicians' conception of quality that goes beyond prior related studies. Theory in this area is advanced by exploring how physicians construct quality of health care delivery in a hospital setting. The model presented, Figure 4-5 Conceptual framework, integrates the study findings with elements of theory from different academic areas, such as medicine, economics, management and psychology.

1.6.4 Project Three

From Project Two emerged a static classification of physicians' conception of quality. In order to extend the understanding of the dynamics of quality in health care, Project Three explores enablers and barriers from a physician perspective,

using real patient cases. Thus, Project Three adopts a dynamic approach, extending the picture revealed in Project Two.

Physicians are primarily dedicated to the process of diagnosing and treating patients; during this process, decisions are being made. Physician decision making during the process of diagnosing and treating patients has direct and indirect influences on the patients' health. It is therefore important that these decisions are of high quality. Thus, it is of interest to understand what enablers and barriers of quality of health care delivery are perceived to exist.

Physicians' decisions are driven toward the delivery of quality of health care. Given the physician's impact on quality of health care, Project Three seeks to extend the understanding of quality from a physician's perception, by exploring enabler and barriers of quality in health care delivery. The following research question is addressed:

> RQ: What are the enablers and barriers physicians perceive *in their role of* providing health care?

Each patient-physician encounter is different and forges a set of temporal experiences unique to each physician. In order to explore and identify enablers and barriers for high quality health care service delivery, a semi-structured interview technique was adopted to address the research question.

Project Three revealed three important findings. First, it was revealed that enablers and barriers largely overlap with the constructs identified in Project Two (10 out of 11 constructs). In addition, two further constructs were identified in Project Three. Thus, the findings of Project Two were validated and extended. Second, the data suggest that physicians do not formally evaluate quality in health care delivery, but often rely on their own experience; feedback from peers and patients. Finally, the study showed that physicians' efforts in delivering quality health care is largely influenced by factors affecting behavioural control.

The author advances theory in this area by exploring how physicians perceive enablers and barriers of quality in health care delivery in a hospital setting. The model presented in Project Three, as illustrated in Figure 5-6 Proposed conceptual framework on page 279, extends the model presented in Project Two; see Figure 4-5 Conceptual framework on page 221.

In the next section, research methods employed in the research contributing to this thesis are presented.

1.7 Research Methods

In this section, the research design used in the thesis is detailed. First, the author states his ontological position, epistemological assumptions and, hence research paradigm. Next, the unit of analysis is addressed, before the methodological approaches for each of the interlinked projects are outlined.

1.7.1 Ontology, Epistemology and Research Paradigm

Ontology is concerned with the philosophy of existence and the assumptions and beliefs that the researcher holds about the nature of being and existence (Blaikie, 2007 p. 13). Having a medical background, the author entered this research project with a shallow realist ontological position. However, through the training provided by the DBA programme at Cranfield, he has learned that valuable information may be missed by purely relying on objective reality. Exploring quality in health care delivery involves looking into the complexities of the patient-physician interaction. This is where realist and idealist ontologies meet; technical medicine meets with patients through the physician acting as an agent. Thus, it is felt that a stratified ontology is best suited for understanding the "moment of truth" in medicine. Blaikie (2007) p. 16, holds that "the aim of science based on depth realist ontology is to explain observable phenomena with reference to underlying structures and mechanisms". The depth realist ontology is in line with this DBA researcher's changed position, and is therefore adopted as the basis for this study.

Epistemology is the theory of knowledge and the assumptions and beliefs that people have about the nature of knowledge. By convention, the epistemological assumption associated with neo-realism follows the depth realist ontology (Blaikie, 2007). Proponents of neo-realism hold that establishing regularities within phenomena or between events is only the beginning, thus rejecting the pattern model of explanation associated with empiricism. It is necessary to follow up by locating structures or mechanisms that produce the regularities (Blaikie, 2007), p. 22. Thus, in this DBA study, the depth realist ontological position leads to the adoption of a neo-realism epistemology.

Paradigms are models or frameworks that are derived from a worldview or belief system about the nature of knowledge and existence (Easterby-Smith et al., 2008 pp. 57-58). Paradigms are shared by a scientific community and guide how a community of researchers act with regard to inquiry.

The physician supplies effort into the delivery of health care; however, this effort is non-observable due in part to information asymmetry (Ma and McGuire, 1997, McGuire, 2001). In order to unpack the phenomenon of interest, it is therefore necessary to rely on physicians' perceptions based on examples of clinical patient-physician interaction. Thus, an interpretive approach is necessary. The research paradigm is therefore that of interpretivism, as described by (Blaikie, 2007) pp. 124-131.

Research design must address the issue of quality assurance in addition to bias (Flick et al., 2004). Miles and Huberman (1994) propose to include qualitative criteria into the schema of quantitative criteria (objectivity, reliability and validity). This is an issue of trustworthiness in qualitative research, and encompasses credibility, transferability, dependability and confirmability (Robson, 1993 pp. 402-407). Credibility is about demonstrating that the inquiry was carried out in a manner which ensures that the phenomenon of interest is accurately described. Transferability corresponds to external validity. Dependability is about ensuring

that the processes followed are clear, systematic and well documented. Confirmability is about ensuring an audit trail.

The challenges of quality have been addressed in the following ways:

- Protocols describe methods and procedures in detail
- Description of how data was collected, analysed and transformed is presented
- Researcher's assumptions and biases are addressed
- Audit trail is ensured by SPSS, NVIVO, Xls files, and transcripts available for inspection
- Quotes are used extensively to ensure authenticity

1.7.2 Research Strategy

For the empirical projects, retroduction has been chosen as a research strategy. Retroduction, in contrast to deduction and induction, does not follow a linear logic, but rather constitutes a cyclic process. According to Blaikie (2007) p. 83, the chosen research strategy of retroduction follows from the depth realist ontology and epistemology of neo-realism.

Pawson and Tilley (1994) and Layder (1993) have argued that both structures (contexts) and mechanisms must be incorporated in order to provide explanations. The aim of this research is to discover underlying mechanisms to explain observed regularities. Thus, the retroductive research strategy suits the purpose of the research and is in alignment with the researcher's stated ontological position and epistemological assumptions.

Bias is an important consideration in research strategy, as the process of conducting interviews might influence the responses given (Easterby-Smith et al., 2008 p. 147). Bias is defined as any tendency which prevents unprejudiced consideration of a question (Kvale and Brinkmann, 2009). There are potentially a number of biases in this research. The author's own reference frame may be imposed on the interviewees both when asking the questions and when answers are provided; the author is a physician and holds views about the phenomenon of interest. One strategy to counteract this potential bias is the use of open ended questions (Project Three). The author's own frame of reference and consequent perspectives will inevitably influence data collection, analysis and process of synthesis (James and Vinnicombe, 2002), so he has attempted to adopt a reflexive approach as one way that he can challenge his frame of reference and thereby increase the chance of recognizing the influence and limitations that these have on the research (Cunliffe, 2003). Reflexivity is a conscious effort to view the subject matter from different angles and to avoid a favoured angle a priori (Alvesson et al., 2008). It is important to note that adopting a reflexive approach does not lead to improved research outcome (Johnson and Duberley, 2003). The author has endeavoured to maintain an awareness of these factors during the data collection, analysis and synthesis, as advised by Kvale and Brinkmann (2009), and Lofland et al. (2006).

1.7.3 Unit of Analysis

According to Easterby-Smith et al. (2008) p. 103, it is important to be clear about the unit of analysis in advance, as this is the basis for collating the data and subsequent analysis. The term “unit of analysis” in this context refers to the distinct unit about which data is gathered. This is distinct from the level of analysis, which refers to a set of relationships. Together, the terms help define the population of this research. In this research, the unit of analysis is the physician-patient interaction and the level of analysis is the physician.

Next the methodological approaches for each of the interlinked constituent projects of this doctoral research are discussed.

1.7.4 Methodological Approaches for Each Project

In this section, the methodological approaches chosen for each of the interlinked projects are summarized. A multi-methodological approach, suited to the particulars of each individual project, is used. The different methodological approaches are listed below:

Project One:	Systematic review – see Section 3.2 from page 85
Project Two:	Repertory grid technique – see Section 4.3 from page 178
Project Three:	Semi-structured interview technique – see Section 5.3 from page 230

1.7.4.1 Systematic Literature Review

The purpose of Project One is to study the literature in order to gain an understanding of the factors and contexts that influence physician prescription behaviour. Ample literature exists on the topic, so a systematic review of the literature is conducted. Specifically, the review will:

- Explore and map the key issues, frameworks and theoretical underpinnings of physician decision behaviour
- Investigate factors that influence physician decision behaviour when prescribing
- Investigate which factors, under which contexts, may affect prescription behaviour, and in what ways

Following a systematic review process to address the review question provided a rigorous and transparent process to identify gaps in knowledge and to frame the empirical research projects. Systematic literature review originated in medical research and is described as the process to locate and critically appraise scientific evidence in a transparent and replicable manner {Tranfield, 2003 #533} . For a detailed description of search and assessment criteria, please see Appendix A.1 Protocol, page 317. Applying a proven, systematic methodology to the literature review has resulted in a rigorous and reliable analysis of the extant literature to inform this study.

1.7.4.2 Repertory Grid Technique

The purpose of Project Two is to explore physicians' conception of quality. The effort physicians undertake in the delivery of health care is not directly observable due to information asymmetry. Much of what physicians do rely on tacit knowledge forged by years of experience. Understanding how physicians construct the environment in which they operate enables a glimpse into the hitherto un-observable. Thus, personal construct theory is adopted as the research strategy for this project. Repertory grid technique, based on Kelly (1955) personal construct theory, is used to elicit the constructs physicians use to characterize quality in health care.

Repertory grid interviews, providing elements to compare and contrast, has been found to be a powerful tool in management research to bring out deep meanings and unobservable phenomena surfacing low awareness verbalization of how a respondent makes sense of a topic without imposing the researcher's perspective (Goffin, 2002). Furthermore, the technique is useful for limiting jargon and social desirability (Goffin, 2002, Szwejczewski et al., 2005, Lemke et al., 2011). In this study, repertory grid is used to gain a deeper understanding of physicians' perception of quality of health care delivery. In particular, repertory grid is used to identify the constructs physicians employ in characterizing quality in health care delivery.

The overall advantage of the repertory grid technique is its flexibility, as it can be used for many different purposes (Jankowicz, 2004 p. 27). The Interview guide was validated and modified through the use of pilot interviews. A more detailed description can be found in Chapter Four, starting on page 183.

1.7.4.3 Semi-Structured Interview Technique

The purpose of Project Three is to extend the findings of Project Two and to gain a fuller understanding of quality by exploring physicians' perception of enablers and barriers of quality in health care delivery. Interviews are an effective means to explore physicians' experiences when delivering health care services. Kvale and Brinkmann (2009) p. 1, claim that "the qualitative research interview attempts to understand the world from the subjects' points of view, to unfold the meaning of their experiences, to uncover their lived experiences prior to scientific investigation". In order to get insights about the physicians' perceptions of enablers and barriers to quality in health care, semi-structured interview technique has been employed, as it was deemed suitable for the purpose of this project. Semi-structured interviews allow the researcher to both gain insights about the phenomenon of study, and to keep open the opportunity for the participant to add experiences not pre-determined in the interview guide.

The interview guide includes an outline of topics to be covered during the interview (Kvale and Brinkmann, 2009 p. 130). Interview guides were validated and modified through the use of pilot interviews, which are described in detail in Chapter Five, on page 234.

Next, a summary of the main findings and their links to existing research and literature are presented.

1.8 Summary of Findings and Linkages to Existing Research

A number of key findings emerged from the research reported in the thesis. First, addressing the research question of the factors that influence physician prescription behaviour, the systematic review revealed a novel classification, including two sets of factors influencing physicians' decision making when prescribing. The two sets are contexts and interventions. Second, addressing the research question 'how do physicians frame quality of health care delivery", an empirically derived and theoretically grounded classification of how physicians construct quality of health care delivery emerged. Third, addressing the research question of enablers and barriers to quality in health, it was revealed that physicians' conception of quality is closely related to enablers and barriers; and the mechanism by which influence on physician decision making and hence supply of effort into the delivery of health care was revealed. Finally, a summary and conceptual framework is offered.

The findings are presented in the following sections, and a link to existing research is made to contextualise the findings, pointing at where they extend or complement current knowledge.

1.8.1 Factors Influencing Physician Decision Making

Factors influencing physicians' decision making and behaviour impact the level of effort supplied into the delivery of health care, and hence influence quality of health care offered to patients. The systematic review identified two sets of influencing factors: contexts (Table 1-1) and interventions (Table 1-2).

1.8.1.1 Contexts

Contexts are considered to be a set of circumstances or facts surrounding a particular event or situation. These contexts are present at the time of clinical decision making and modulate the level of uncertainty, so influencing physicians' decisions. Characteristics of patients, physicians, practice and medicine attributes are all contextual factors that influence physician decisions. In general, the evidence of such influence is limited, but three components stand out in that evidence of influence is found to be high: physician habit persistence, biomedical factors, and efficacy and safety of medical interventions.

Contexts are considered to be a set of circumstances or facts surrounding a particular event or situation. These contexts are present at the time of clinical decision-making and modulate the level of perceived uncertainty, thus influencing physicians' decisions. Characteristics of patients, physicians, practice and medicine attributes are all contextual factors with a bearing on physicians' decisions. Overall, the systematic review revealed that there is limited evidence of such influence. However, there seems to be conclusive evidence about the high influence physician habit persistence, biomedical factors, and efficacy and safety of medical interventions have on physicians' behaviour (please see **Error! Reference source not found.**).

Table 1-1 Contextual factors influencing physicians when prescribing

Contextual factors and components consistently present				
Factor	Component	Mechanism	Theory	Evidence of influence
Physician characteristics	Specialty	Specialty can be considered a temporal accumulation and synthesis of information which in combination with experience and social contexts provide a basis for habit persistence and modulation of uncertainty	TPB	Low
	Age	Age is considered to be a temporal axis for the development of habit persistence	TPB	Low
	Time in practice	Time in practice is considered to be a temporal axis for the development of habit persistence	TPB	Low
	Habit persistence	Habit persistence is a residue of past behaviour and experience	TPB	High
	Gender	No credible evidence to support physician gender as an independent factor has been found; however, it should be noted that women are increasingly entering the medical profession.	TPB	Low
Practice characteristics	Degree of urbanization	No credible evidence to support degree of urbanization as an independent factor has been found. Degree of urbanization is tightly linked with bio-medical influencers and no attempt to separate this aspect has been made.	TPB	Low
	Organization	No credible evidence to organization of practice as an independent factor has been found.	Agency	Low
	Academic status	No credible evidence to support academic status of practice as an independent factor has been found.	TPB Agency	Low
Patient Characteristics	Age	No credible evidence to organization of practice as an independent factor has been found. Age is tightly linked with bio-medical influencers and no attempt to separate the two has been made	TPB	Low
	Gender	No credible evidence to support patient gender as an independent factor has been found. Gender is tightly linked with bio-medical influencers and no attempt to separate the two has been made.	TPB	Low
	Expectation	No credible evidence of patient expectation as an independent factor has been found; however, the physicians' perception of patient expectation may be an influencing factor.	TPB Agency	Low
	Bio-medical	Bio-medical factors lie at the core of any medical decision as is evident in the medical literature and is tightly linked with uncertainty.	TPB	High
	Social	No credible evidence of patient social status as an independent factor has been found. Social status is tightly linked with bio-medical influencers and no attempt to separate the two has been made	TPB	Low
Medicine attributes	Efficacy and safety	Modulate uncertainty	TPB	High

Table 1-1 describes contextual factors identified as influencers of physician decision making when prescribing. Four factors were identified. These factors have been further sub-divided into components. The mechanism column describes the mechanism by which influence is exerted, and its link to theory is captured in the "Theory" column. Evidence of influence is rated by the researcher on a scale low-medium-high.

1.8.1.1.1 Physician Habit Persistence

Physicians, in the course of performing their clinical duties, develop certain ways in which to practice medicine; in other words, physicians are subject to habit formation while practicing. Furthermore, physicians' established practice has been suggested to be subject to persistence of habit (Hellerstein, 1998, Alexander and Tseng, 2004, Janakiraman et al., 2008). Habit persistence in this context refers to choices made without cognitive involvement, and has for example been found to influence physicians' decisions when prescribing (Zerzan et al., 2011). Physicians typically practice medicine in a stable context (Godin et al., 2008), and Verplanken and Wood (2006) demonstrated that habitual behaviour performed in a stable context is more difficult to change. Thus, physician habit persistence may act as a barrier to the improvement of health care provision (Danzon and Furukawa, 2001).

1.8.1.1.2 Biomedical Factors

In general, it can reasonably be argued that the clinical practice of medicines is concerned with how bio-medical factors affect the physical and psychological wellbeing of patients. In this review, however, the quantity of literature addressing this very issue is limited. That said, a few publications included in the systematic review do address the question (Cettomai et al., 2010, Choudhry et al., 2005, Schneeweiss et al., 2005, Blix et al., 2011, Crawford et al., 2011).

The limited evidence found in support of bio-medical factors as an influencer on physician prescribing behaviour can be argued to be because such influence is presumed. In fact, medical literature in general is focused on patient level bio-medical factors as a cause of disease, focus for diagnosis and treatment, and ultimately lies at the core of decisions relevant to the practice of clinical medicine. Therefore, bio-medical factors can reasonably be argued to figure prominently among influencers of physician prescribing behaviour.

1.8.1.1.3 Medicine Attributes

Bradley (1991) found that a physician's concern about medicines was a factor influencing physician prescribing behaviour. Several authors have since investigated the origin of these concerns, and found that efficacy and safety are the main constituents, so addressing the benefit-risk profile of medicines. Uncertainty is stated as the main driver of physician behaviour (Arrow, 1963), and it is therefore unreasonable to expect the benefit-risk profile of a medicine not to influence physician prescribing behaviour. Whilst physicians emphasise clinical efficacy, they seem willing to take risk under certain conditions. Thus, the benefit-risk evaluation is dynamic and contextually contingent.

1.8.1.2 Interventions

Interventions are considered techniques, processes or actions introduced to create change. Four types of interventions were synthesised from the 160 studies included in the systematic review: pharmaceutical promotion, regulation and control, economic and non-economic factors. The four types of factors emerged from a factor analysis of the data. Nomenclature chosen for factors follows that

found in previous literature (Gallan, 2005); please se Table1-2 Interventional factors influencing physicians when prescribing for details.

Table 1-2 Interventional factors influencing physicians when prescribing

Interventional factors and components						
Factor	Component	Effect	Mechanism	Theory	Influence	Evidence of influence
Pharmaceutical promotion	Detailing	Increase demand Decrease price sensitivity	Modulate uncertainty	TPB Agency	Low	High
	Sample	Increase demand Decrease price sensitivity	Modulate uncertainty	TPB Agency	Low	High
	Academic journal advertising	Increase demand Decrease price sensitivity	Modulate uncertainty	TPB	Low	Low
Regulation and control	Audits	Increase guideline adherence and quality Decrease prescribing	Modulate perceived control and subjective norm	TPB Agency	Medium	Medium
	Formulary/PDL	Limit choice and decrease prescribing of branded medicines	Modulate perceived control	Agency	High	Medium
Economic	Price/Cost	Influence demand	Modulate perceived control and moral hazard	TPB Agency	Low	High
	Reimbursement	Limit choice and decrease prescribing of branded medicines	Modulate perceived control and moral hazard	Agency	High	Medium
	Financial incentives	Shift prescribing in line with incentives	Modulate self interest	Agency	Low	Low
	Managed care	Limit choice Decrease prescribing of branded medicines	Modulate perceived control	TPB Agency	High	High
Non-Economic	Peer effects	Influence prescribing in line with peer practice and guidance	Modulate uncertainty and provide a social network context for legitimate information sharing and experience	TPB	High	Medium
	Academic detailing	Increase guideline adherence	Modulate uncertainty and perceived control	TPB	High	High
	Guidelines	Improve quality of prescribing in line with available evidence	Modulate uncertainty and limit choice	TPB	Low	Medium
	Academic literature	Increase guideline adherence	Modulate uncertainty	TPB	Medium	Low
	Bio-medical	Central to all medical decisions and is the basis for uncertainty	Modulate value of belief and control belief in addition to uncertainty	TPB	High	High
	Clinical study participation	Increase prescription of study medicine and other medicines in sponsor portfolio	Modulate uncertainty and habit persistence	TPB Agency	Medium	Low
	Technology	Increase guideline adherence	Limit choice and modulate normative beliefs	TPB	Low	Medium
	Legal concerns	Limit perceived control and choice	Modulate perceived subjective norm	Agency	Low	Low

Table 1-2 describes interventional factors identified as influencers of physician decision making when prescribing. Four factors were identified. These factors have been further sub-divided into components. The “Effect” column describes the outcome of the intervention, whereas the “Mechanism” column describes the

mechanism by which influence is exerted, and its link to theory is captured in the "Theory" column. Level of influence is rated by the researcher on a scale low-medium-high, as is the evidence of influence.

The most effective interventions are those that influence the physician's perception of control (ability to choose freely), followed by social norm (perception of expectation from significant others, such as family, friends and colleagues) and attitude formation (expression of favour or disfavour), respectively. Perception of control was found to be most affected by implementing choice limiting measures, such as formularies, preferred drug lists, managed care and reimbursement, thus affecting the spectrum of choice available for the physician when prescribing. Social norm was found to be most affected by interventions making use of bio-medical factors, academic detailing and peer effects, respectively. Physician attitude toward prescribing was found to be relatively resistant to interventions, and consequently, the effect of pharmaceutical promotion was found to be modest. However, face-to-face interventions such as detailing were found to be more effective than less direct measures, signalling a relationship effect often exploited by the pharmaceutical industry.

1.8.1.2.1 Pharmaceutical Promotion

Detailing increases the likelihood of a particular prescription at the physician level (Gönül et al., 2001, Manchanda and Chintagunta, 2004). Aggregate sales or prescription data suggests that promotion increases prescribing (Narayanan et al., 2005, Narayanan et al., 2004, Rizzo, 1999, Chintagunta and Desiraju, 2005); this is why, traditionally, the pharmaceutical industry invests heavily in the use of this promotional instrument. The review showed the significant influence that promotion has on physician prescribing behaviour (Kremer et al., 2008). However, the understanding of the link between promotion and prescription is far from complete. The effects of promotion on physician prescribing behaviour can loosely fall into two categories: increased prescribing and mixed effects. Also, the components of contextual circumstances under which this influence is exerted lack solid evidence, with the exception of physician-level habit persistence, patient-level bio-medical factors and medicine attributes; see Section 3.4.1 on page 104 for further details.

Moreover, the effect of promotion on prescription is not linear and shows diminishing returns (Manchanda and Chintagunta, 2004) and heterogeneity in physician responsiveness to promotion (Narayanan and Manchanda, 2005, Janakiraman et al., 2008). Diminishing returns, in this context, simply imply that the increased promotional investment does not produce a proportional increase in prescriptions. In the mixed effects category, several authors also found that promotion increases prescribing, but that the effect is small (Mizik and Jacobson, 2004, Kremer et al., 2008).

Some authors have found no significant effect of promotion on physician prescribing (Rosenthal et al., 2003), and others have even found a negative effect (Parson and Abeele, 1981). Although there exists a general consensus that promotion increases prescribing, the effect is modest (Kremer et al., 2008).

1.8.1.2.2 Regulation and Control

The analysis of studies included in the systematic review showed that audits and feedback are significant factors influencing physician decisions when prescribing. The purpose of audits is to form an opinion on whether clinical practice reflects best practice. Feedback includes feedback from patients and next of kin, peers and own experience. Audits and feedback provided by regulators and colleagues give the physician summary information on clinical practice. Even though the evidence of audits and feed-back influence is inconclusive and level of influence low, audits and feed-back information serve as a means for physicians to evaluate their own practice. Indeed, empirical evidence from Project Three (Section 5.5.1.6.1 Feedback, page 247) revealed that feed-back from colleagues and patients is an important means for physicians to evaluate the quality of their practice. Prescribing reports influence the physicians' perception or subjective belief of what is acceptable, both from a medical and regulatory perspective, thus influencing the attitude and subsequently the physicians' behaviour when prescribing.

1.8.1.2.3 Economic Factors

Economic interventions, such as reimbursement and managed care, focused on limiting choice are in general more effective than those that do not limit choice. Price/cost of prescriptions is widely studied, but physicians in general exhibit a low degree of price sensitivity given they are often not held accountable for financial costs. However, reimbursement is an important and strong influencer of physician prescribing, indicating that physicians' price sensitivity is related to the patient (affordability for the person) rather than at the system level (cost containment at the level of the organization) - i.e., at the patient level. Furthermore, this implies that the principal-agent relationship between physician and patient may be stronger than that between physician and payer.

The review showed that balancing the triad of (economic) interests defined by the key stakeholders (payer, provider and patient triad) is a complex and arduous task. Conflict of interests may emerge within the triad of stakeholders; loyalty to the principal may be challenged in the context of a principal-agent relationship. Findings from the review indicate that assessing optimal economic decisions and effective resource allocation in health care is important for the resulting quality of health care delivered.

1.8.1.2.4 Non-Economic Factors

The plethora of non-economic factors influencing physician decisions when prescribing speaks to the complexities surrounding control of factors influencing quality of health care. Non-economic factors influencing physician decision making when prescribing have been widely investigated, but given the large number of factors with such potential effects, evidence of the influence of each of them is mostly inconclusive. However, three factors emerged from the systematic review as highly influential: peer influence, academic detailing and bio-medical factors.

Peers' opinions, beliefs and practices are powerful influencers on physician prescription and decision making behaviour. Clinical decisions are informed by peer interactions and provide authoritative influence through the interchange of insights, thus enabling the acquisition of knowledge and experience of new drugs. The extent to which peers influence prescribing is related to the level of uncertainty associated with prescribing certain medicines.

Academic detailing is widely stated to influence physician prescribing and is the most potent influencer identified in this review. However, the subtle mechanisms by which academic detailing exert influence on physician prescribing is not sufficiently covered in the literature. The review enabled the researcher to find that academic detailing operates through three parameters: firstly, as an information provision channel; secondly, enhancing peer interaction; and finally, academic detailing transferring and communicating guidelines, the key mechanism of evidence-based practice (Sackett et al., 1996).

Bio-medical factors such as patient characteristics and disease severity are natural influencers of physician decision making. As noted, physician decision-making is characterised by a great degree of uncertainty about the outcome of any therapeutic intervention. This means that uncertainty is consistently present. Uncertainty is considered the main driver for physician behaviour in general (Arrow, 1963).

1.8.2 Physicians' Conception of Quality

The second research project of the DBA (Project Two) addresses physicians' conception of quality. In this project, grounded in personal construct theory (Kelly, 1963), 27 repertory grid interviews were conducted. The result of this project was an empirically-derived and theoretically-grounded classification of physicians' conception of quality in health care delivery. Eleven key constructs representing how physicians frame the conception of quality in health care emerged; see Table 1-3 Key constructs by quality elements and relation to theory. The significance of these constructs is that no such classification has yet been made available in the literature. Table 1-3 "Quality element" follows the model devised by Donabedian (1979), and is subdivided by empirically-derived constructs. The "Theory" column refers to the construct's connection with theory, and "Theoretical construct" refers to how the empirically-derived constructs link with theoretically derived constructs. The last column provide links to literature references. In addition, two further constructs, standards of care and evaluation, were identified in Project Three through employing a semi-structured interview technique.

In the following three sub-sections, these findings are briefly presented. Full details of the research project can be found in Chapter 4. To further categorize the constructs that emerged from the repertory grid, the model devised by Donabedian (1979) is used: structure, process and outcome (see Figure 1-6 Elements of quality (Donabedian 1979)). Structure refers to the attributes of the setting in which health care is delivered. Process refers to what is actually done when delivering or receiving health care. Outcome refers to the effects health care has on the health status of patients and populations.

Table 1-3 Key constructs by quality elements and relation to theory

Quality element	Construct	Theory	Theoretical construct	Reference example
Process	Communication	TPB	Attitude	Ajzen 1991, p. 198
		Agency	Risk: monitoring and negotiation	Conlon & Parks 1990, p. 607
	Correct interpretation of information	TPB	Control belief	Ajzen 1991, p. 204
		Decision	Causal vs. diagnostic interpretation	Einhorn & Hogarth 1981, p. 65
	Continuity	TPB	Control belief	Ajzen 1991, p. 199
	Responsibility for provision of care	TPB	Control belief & Social norm	Ajzen 1991, p. 199
Context	Resource availability	TPB	Control belief	Ajzen 1991, p. 188
	Resource utilization	TPB	Control belief	Ajzen 1991, p. 188
	Time	TPB	Control belief	Ajzen 1991, p. 188
		Agency	Moral hazard & adverse selection	Conlon & Parks 1990, p. 619; Eisenhart 1989, p. 70
	Cooperation	TPB	Control belief	Ajzen 1991, p. 188
		Agency	Moral hazard & adverse selection	Eisenhart 1989, p. 72
	Experience	TPB	Control belief	Ajzen 1991, p. 203
		Agency	Adverse selection	Eisenhart 1989, p. 61
		Decision	Habit persistence	Ajzen 1989, p. 203
Outcome	Early diagnosis and treatment	TPB	Control belief	Ajzen 1991, p. 204
		Agency	Risk: random market effect	Conlon & Parks 1990, p. 610
	Effect of therapy	TPB	Control belief	Ajzen 1991, p. 204
		Decision	Reinforcement: positive outcome feedback	Einhorn & Hogarth 1981, p. 79

Figure 1-6 Elements of quality (Donabedian 1979)

1.8.2.1 Process

Process is defined as one of three elements of quality in health care (Donabedian, 1979). In this study, five constructs emerged to comprise the process element of quality of health care. These constructs are: communication, correct interpretation, continuity of care, physician attitude and patient.

1.8.2.1.1 Communication

In this study, communication is found to represent an important aspect of physicians' conception of quality in health care delivery, confirming previous research on the importance of communication on health outcomes (Jensen et al., 2011) and the correlation between effective physician-patient communication and improved patient health outcomes. Stewart (1995) p. 1423, concludes that "most of the studies reviewed demonstrated a correlation between effective physician-

patient communication and improved patient health outcomes". This is further supported by the findings in this study, as correlation between effective physician-patient communication and improved patient health outcomes has been demonstrated; see Section 4.5.3.1 on page 190. Jensen et al. (2011) further demonstrate that training in medical communication can improve physician communication skills and thus improve physician-patient interaction. Furthermore, a model for effective communication exists, and training based on the model is both suitable and effective when applied to physicians in a hospital setting. The study confirms previous theory and supports previous findings on the importance of good quality physician-patient communication.

1.8.2.1.2 Correct Interpretation of Information

The analysis of empirical data showed that correct interpretation of information is central to the process of diagnosing and deciding on the appropriate therapy. Focus of attention on what the physician prefers results in differential weighting of information features. For naturally occurring phenomena, it is not clear whether people do consider the likelihood of an event occurring without intervention (base rate) (Goldsmith, 1980). However, information that receives a causal interpretation is weighted more heavily in judgment than information that is diagnostic (Einhorn and Hogarth, 1981 p. 65). Thus, correct interpretation of information is found to be dependent on the physician's preference of information features.

1.8.2.1.3 Continuity of Care

The results of this study reveal that continuity of care is an important factor influencing quality of health care delivery. Definitions of continuity of care are numerous, but are exceeded by the number of techniques used to measure continuity (Jee and Cabana, 2006). Saultz (2003) proposed a hierarchical definition of continuity, ranging from informational to longitudinal to interpersonal. {Freeman, 2003 #1749@@author-year} and {Haggerty, 2003 #1750@@author-year} described continuity of care from the patient perspective. However, attempts at providing a uniform definition and technique for measurement of continuity of care has yet to be accomplished (Adler et al., 2010). Thus, as a global definition is lacking and numerous techniques are used to measure continuity, it is not surprising that the effect has been found to be variable. Physicians referred to the ideal continuity of care as one physician who follows the patient through the care process. However, it emerged from the data that this is not the norm. On the contrary, breach of continuity is the norm in an ever increasingly specialized health care service.

Providing quality health care in an environment characterized by ever increasing demands on specialized disciplines makes modern medicine a complex exercise in logistics. For example, patients are often transferred between different medical services during care provision, and physicians are individuals who interact in different ways, etc. Health care systems evolve to account for the complexities, and continuity of care is challenged as a result (Adler et al., 2010).

This study provides confirmation of previous evidence, as it is widely stated that continuity is important for quality in health care delivery; however, the effect is found to be variable (Adler et al., 2010).

1.8.2.1.4 Physician Attitude

From the repertory grid data, it is revealed that physicians' construct of quality includes their attitude. Physician attitude can broadly be categorized into three aspects: respect, humbleness and interest. Respect is suggested to be an element of physician attitude that may influence quality of health care provision. Being humble is suggested to be another element of physician attitude that may influence quality of health care provision by physicians. Showing interest in the patient and expressing empathy is another element that is suggested to influence quality of health care provision from a physician perspective.

1.8.2.1.5 The Patient's Role

The patient plays a central role in the provision of health care. This construct did not meet the minimum criteria to be considered a key construct, according to the methods used to analyse repertory grid data. However, it is felt necessary to include the topic in this section in order to ensure a complete set of findings. The role of patients in quality of health care delivered has three aspects: firstly, patients exhibit state dependence; secondly, patient expectations influence physician decisions; and thirdly, patient delay is related to the ability to recognise symptoms as disease.

Patients exhibit state dependence. In this context, state dependence is a form of "loyalty" to, for example, a particular physician or course of treatment. Patients therefore behave as if there is a cost to switching from past behavioural patterns.

Patient expectations influence physicians' decisions. However, the systematic review revealed that it is not the patients' expectations directly, but the physicians' perception of the patients' expectations that influence decisions. The review also revealed that there is a gap between actual patient expectation and physician perceived expectation.

Time to diagnosis and treatment is an important factor in quality of health care delivery. Patients' ability to recognize symptoms as disease is found to be a determining factor of time to diagnosis and hence treatment.

1.8.2.2 Context

The context element of quality is found to be comprised of seven constructs: resource availability and utilization, time, cooperation and organization, competency, standards of care and evaluation.

1.8.2.2.1 Resources

In this study, resources and resource utilization are found to be key constructs, as the respondents rate these factors as high. Physicians claimed that resources and the use of resources influence quality of health care. Resources refer to tangible items such as buildings, medical equipment, medicines, health care

professionals, etc. Physicians also claim that availability of resources is not enough, so appropriate utilization is also an influencer of quality.

1.8.2.2.2 Time

Time is an important factor in medicine, and in this study, time is related to two other key constructs. First, time is related to early diagnosis and treatment. In this context, time is the time it takes from when symptoms are recognized until treatment starts. Second, time is related to resources, as it is a function of resources available per unit time; for example, the number of physicians available in the emergency room (ER) at any given time will define the physician resource available to treat patients at that time.

1.8.2.2.3 Cooperation and Organization

Cooperation amongst physicians and health care workers emerged as a key construct. Physicians claim that quality is dependent on a team approach and its synergies of effect. Cooperation, therefore, is an important element in how physicians construct quality of health care delivery.

1.8.2.2.4 Physician Experience

Experience, in this research, is found to be central to quality in health care delivery. Physicians claim that experience has a positive influence on quality of health care delivery; specifically, physicians claim that more experience is better. In other words, the more experienced physician will be in a position to provide better quality health care than a less experienced colleague.

1.8.2.2.5 Standards of Care

With the advent of evidence based medicine, standards or clinical guidelines have become an increasingly important part of medicine and are often referred to as standards of care. Standards of medical practice also emerged as a significant construct of quality in health care. This is an echo of the central aspect of evidence based medicine (Sackett et al., 1996). Standards are also a way of ensuring quality control, as quality is defined by how close to the standard clinical medicine is being practiced. Standardized operating procedures are found to be an aspect of quality in this study. Procedures define the standard of care and may be a useful tool for quality control and improvement.

1.8.2.2.6 Evaluation

When asked about how they evaluate quality of health care delivery, physicians referred to feedback from colleagues and patients as the primary source of information. Being able to evaluate health care delivery is found to be a construct of quality in this study. From this data set, evaluation can be divided into three categories: measures, feedback, documentation and control.

Measurements are an element that the data in this study suggest may influence quality of health care provision. Measure may be anything that is measurable, such as outcomes, readmission rates, hospital infection rates, etc. Feedback is suggested to influence quality of health care provision by the respondents in this

study. The feedback may be own experience, feedback from patients and next of kin, and outcome. Documentation and control is suggested to influence quality of health care provision by the respondents in this research. Evaluation is found to relevant in relation to quality in health care. Measurements and evaluation of different aspects of health care may contribute to continuous improvement, both on an individual as well as on a system level.

1.8.2.3 Outcomes

The outcome element of quality is found to be comprised of two constructs: early diagnosis and treatment; and effect of therapy.

The respondents in this study claim that early diagnosis and treatment is an important factor influencing quality of health care delivery. Physicians also claim that the effect of therapy influences quality of health care, and associate effective therapy with quality of care. The main premise is that there is a correlation between the availability of effective therapy and quality of care.

1.8.3 Enablers and Barriers to Quality of Health Care Delivery

Project Two produced a theoretically-grounded, empirically-derived classification of physicians' conception of quality in healthcare. However, information about enablers and barriers was missing. This project was limited in providing an understanding of the physicians' role and perception of influencers of quality in health care. Following from Project Two, the third project therefore looked at the physicians' perspective of enablers and barriers in healthcare delivery.

Barriers and enablers of quality health care service delivery emerged as opposite phenomena in this study. Thus, the presence or absence can turn a barrier into an enabler, and vice versa. For example, availability of time may be considered an enabler, and lack of time a barrier. Availability of time takes on the dimensions high (enabler) and low (barrier). Availability of time may therefore be considered an influencer, so the sub-categories of barriers and enablers in this data set may be considered influencers.

There are six categories that are found to be relevant barriers and enablers: time, resource, competency, organization, physician and communication. The two last categories (physician and communication) come through as enablers, but in this context, all six categories are defined as barriers and enablers, based on the finding of the categories being mutual opposites.

When considering the elements of quality as defined by Donabedian (1979), the data suggest that time, resource, competency and organization are all structural (context) quality elements. Physician and communication, on the other hand, are process elements of quality.

A tabulated summary of the sub-categories suggested to be associated with quality in health care, influencers of health care and patient case validation, is provided in Table 1-4 Summary of findings of Project Three. The two empirical studies showed that physicians' conception of quality and influencers of quality are identical. This is relevant because medical care belongs to the category of

commodities for which the product and the activity of production are identical (Arrow, 1963 p. 949).

Table 1-4 Summary of findings of Project Three

Sub-category	Property	Dimension	Quality	Influencers of quality	Patient case validation	Element
Competency	Availability of necessary competency (knowledge, experience and skill)	High - Low	X	X	X	Context
Communication	Ability to communicate, get and give necessary information in a tailored manner	High - Low	X	X	X	Process
Continuity	Level of continuity of care	High – Low	X		X	Context
Diagnostics	Ability to correctly diagnose patients without delay	High - Low	X	X	X	Process
Evaluation	Ability to evaluate and learn	High – Low	X			Process
Organization	Organization of work that support delivery of health care	High – Low	X	X	X	Context
Patient	Willingness to cooperate and adhere to medical advice given	High - Low	X	X	X	Process
Patient satisfaction	Level of experiential quality	High - Low	X			Outcome
Physician attitude	Ability to show and real interest and level of curiosity	High - Low	X	X	X	Process
Resources	Availability of necessary technical, building and human resources	High - Low	X	X	X	Context
Standards of care	Availability and adherence to guidelines	High Low	X			Context Process
Therapy	Ability to correctly treat patients without delay	High - Low	X	X	X	Process
Time	Availability of time to do what is necessary	High - Low	X	X	X	Context

The column labelled “Quality” in the table indicates the sub-categories associated with how physicians conceptually frame quality in health care (derived from Project Two). The column labelled “Influencers of quality” indicates the sub-categories associated with influencers (barriers and enablers) of quality in health care (found in Project Three). The column labelled “Patient case validation” indicates which sub-categories were validated from data in the 54 patient cases included in the data set. There are four sub-categories where the patient cases in the data set do not provide validation: evaluation, patient satisfaction, standards of care and time. Time, may be considered a subset of resource, as it is associated with the temporal availability of the physician as a resource in the delivery of health care. Thus, evaluation, standards of care and patient satisfaction are not validated sub-categories.

Furthermore, the data revealed that influencers of quality in health care exert influence by modulating the perceived behavioural control of physicians while supplying effort into the delivery of health care.

According to the findings of Project Three, continuity of care is not considered to be an influencer. Furthermore, the respondents claim that discontinuity is the rule rather than the exception in the dataset.

> "Theoretically, one could imagine that organisational issues could have an impact, if for example several physicians were involved creating a breach of continuity in the treatment. We have to admit that breach of continuity in treatment is the norm in the Norwegian health care system rather than the exception." (ID #: 15)

Evaluation is not considered to be an influencer and is not validated by patient cases. This may indicate that evaluation is necessary for developing quality in health care, but does not influence quality directly. However, logically, feedback should provide real time learning and be a basis for experience. This researcher's personal experience is that feedback is received on an infrequent basis, and may therefore be missed during sampling. The same arguments can be made for patient satisfaction; another subcategory not considered to be an influencer, and not validated by patient cases.

Also, standards of care (guidelines) was found not to be an influencer. This finding may be due to the fact that the link between standards of care and quality is by way of adherence.

> "Quality is then defined as how well you managed to live up to the standard defined by the medical community. Decisions take place continuously and it is about how close to the standard you manage to practice." (ID #: 13)

In order to gauge adherence, it is necessary to evaluate or measure. The data in this study indicate that physicians do not formally measure quality. Thus, it may be argued that physicians do not measure guideline adherence. The results for standards of care, therefore, follow those of evaluation. Full details of Project Three can be found in Chapter 5 from page 227.

1.9 Discussion

In this section, the aim is to discuss what this research has revealed about the role of the physician in quality of health care delivery, and how it extends, support or otherwise existing evidence. In so doing, findings from the two empirical projects (Project Two and Three) are compared and integrated with the results of the systematic review (Project One).

1.9.1 Elements of Quality

Health care delivery is synonymous with medical intervention, and may be considered as any measure whose purpose is to improve health or alter the course of disease. Therefore, from a realist perspective, medical intervention consists of a chain of steps or processes (Pawson et al., 2004). The link between medical intervention as a process and quality of health care is provided by Donabedian (1979), who claims that quality of health care consists of three elements: structure, process and outcome; see Figure 1-6 Elements of quality (Donabedian 1979), and Section 1.3 on page 3 for a definition.

Pawson and Tilley (1994) argue that in order to understand the mechanism by which an intervention results in an outcome, it is necessary to consider the context under which the intervention is applied. Donabedian (1979) has collectively defined medical interventions as a process; one of three elements of health care quality. Structural elements of quality in health care are part of the setting under which health care is delivered, and it is therefore reasonable to argue that structure is a sub-set of context; see Figure 1-7 Revised quality elements. Below, the basis for this argument is set out.

Figure 1-7 Revised quality elements

In Project One, context emerged as a set of influencers of physician decision making, and three important components were revealed to be highly influential; see **Error! Reference source not found.**. Furthermore, Project Three revealed that bio-medical factors contextualise decision making by physicians. Diagnosis, signs, symptoms and disease severity across therapy areas all predict medical prescriptions (de Jong et al., 2009). For example, psychiatric co-morbidities in patients with anxiety may influence prescribing by physicians (Smolders et al., 2007) as well as physicians' willingness to address treatment failures (McGregor et al., 2007). On the basis of the systematic review and empirical findings, context is found to be an important element of quality.

Donabedian (1979) defines structure in a similar way to how Pawson (2006) defines context, but both authors omit bio-medical factors in their definitions. This may in part be due to the fact that it is an integral part of the practice of medicine and is assumed. Nonetheless, a synthesis of extant literature and empirical evidence strongly suggest that bio-medical factors contextualize physician decision making. The findings therefore suggest that context extends beyond structure, and it is therefore posited that context is an important influencer of physician supply of effort in the delivery of health care, and that structure as defined by Donabedian (1979) is a sub-set of context.

1.9.2 Ambiguity of Quality

Although Donabedian (1979) claims that structure and process are no doubt related, he acknowledges that these relationships are characterized by complexity and ambiguity. Some scholars, for example (Ma and McGuire, 1997) and (McGuire, 2001), claim that that the supply of physician effort is intrinsically un-observable; hence, quality of health care cannot be predicted in advance, but only observed in retrospect. This would explain the observed ambiguity in the relationship between structure and process, as noted by Donabedian (1979). The research presented in this thesis supports this notion of ambiguity, as the systematic review revealed that a link between influencing factors of physician decision making and quality (outcomes) is missing in extant literature. Furthermore, from Project Two, it emerged that standards of care (guidelines) is

an important construct of quality. However, Project One revealed that the level of guideline adherence is variable (Smolders et al., 2007, Lagerlov, 2000, Chauhan and Mason, 2008, Nast et al., 2009, Rashidian and Russell, 2011). In fact, it has been found that in some cases, more than 50% of decisions resulting in a prescription contradict clinical practice guidelines (Ventelou, 2010). Furthermore, outcomes measures of guideline implementation is largely lacking (Gill et al., 1999). It is therefore proposed that the supply of effort by physicians when delivering care is not fully and accurately predictable.

Ambiguity in the relationship between context and process is therefore dependent on the argument that physicians' supply of effort in health care delivery is both un-observable and unpredictable. Thus, it is concluded that quality in health care is contingent on the unpredictable supply of un-observable physician effort. Herein lies the challenge for anyone hoping to understand and influence quality in health care.

1.9.3 Point of Influence

Interventions emerged as a set of factors influencing physician decision making in Project One, and the link to quality was found to be missing. One reason for this ambiguity is because the point of influence is not explicitly stated in the literature. In order to address this question, the view of Pawson (2006) is adopted, who claims that intervention is a product of its context. Empirically, Project Three revealed that physicians perceive quality by what defines the spectrum of physicians' choices when making decisions. Thus, the point of influence of interventions which emerged in Project One may reasonably be argued to be context; see Figure 1-8 Point of influence for interventions.

In conclusion, it is posited that the point of influence for interventions is context. Hence, interventions influencing physicians' supply of effort do so by altering the context under which effort is supplied. In other words, context predefines the spectrum of choices available to physicians when engaged in health care delivery. Thus, bounded decision making is the result.

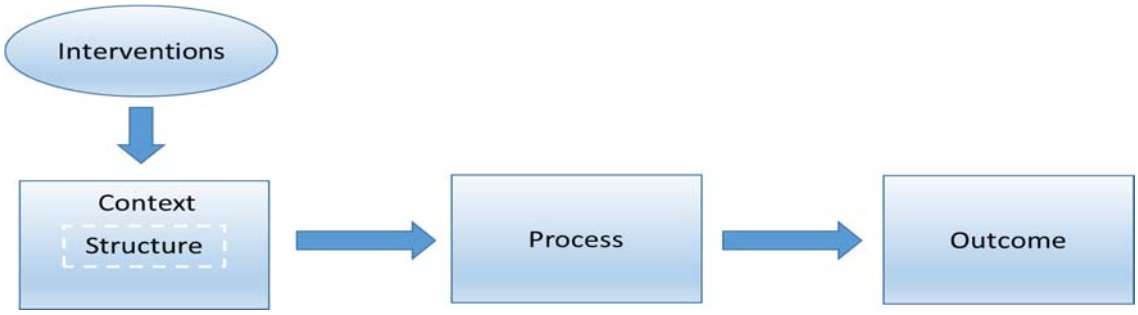

Figure 1-8 Point of influence for interventions

1.9.4 Physicians' Construction of Quality

In this section, two aspects of physicians' conception of quality in health care delivery are addressed. First, the results of the two empirical projects are

compared, and second, disagreement between the findings and prior research are discussed.

Table 1-5 Comparison of quality constructs between Project Two and Three

Element	Construct	P2	P3	Theory	Theoretical concept	Reference example
Process	Communication	X	X	TPB	Attitude	Ajzen 1991, p. 198
				Agency	Risk: monitoring and negotiation	Conlon & Parks 1990, p. 607
	Correct interpretation of information	X		TPB	Control belief	Ajzen 1991, p. 204
				Decision	Causal vs. diagnostic interpretation	Einhorn & Hogarth 1981, p. 65
	Continuity of care	X	X	TPB	Control belief	Ajzen 1991, p. 199
	Physician attitude, including responsibility for provision of care	X	X	TPB	Control belief & Social norm	Ajzen 1991, p. 199
	Patient		X	Agency	Moral hazard & adverse selection	Eisenhart 1989, p. 72
Context	Resource availability	X	X	TPB	Control belief	Ajzen 1991, p. 188
	Resource utilization	X		TPB	Control belief	Ajzen 1991, p. 188
	Time	X	X	TPB	Control belief	Ajzen 1991, p. 188
				Agency	Moral hazard & adverse selection	Conlon & Parks 1990, p. 619; Eisenhart 1989, p. 70
	Cooperation and organization	X	X	TPB	Control belief	Ajzen 1991, p. 188
				Agency	Moral hazard & adverse selection	Eisenhart 1989, p. 72
	Competency (including experience)	X	X	TPB	Control belief	Ajzen 1991, p. 203
				Agency	Adverse selection	Eisenhart 1989, p. 61
				Decision	Habit persistence	Ajzen 1989, p. 203
	Standards of care		X	Decision	Causal vs. diagnostic interpretation	Einhorn & Hogarth 1981, p. 65
	Evaluation		X	Decision	Reinforcement: positive outcome feedback	Einhorn & Hogarth 1981, p. 79
Outcome	Early diagnosis and treatment	X	X	TPB	Control belief	Ajzen 1991, p. 204
				Agency	Risk: random market effect	Conlon & Parks 1990, p. 610
	Effect of therapy, outcomes (clinical and experiential)	X	X	TPB	Control belief	Ajzen 1991, p. 204
				Decision	Reinforcement: positive outcome feedback	Einhorn & Hogarth 1981, p. 79

1.9.4.1 Comparison of Empirical Findings

There is a close relation between influencers (enablers and barriers) and quality constructs. The level of investigation in both empirical projects is the patient-physician encounter, based on real patient cases supplied by physicians taking part in the study. Thus, physicians' conception of quality is linked with actual clinical practice, and the findings in Project Two and Three are homogenous; see **Error! Reference source not found.**. Two notable differences emerged when comparing constructs of physicians' quality conception between the two empirical projects. First, the patient was found to be a construct in Project Three, but not in Project Two. The patient construct appeared in Project Two, but did not reach significance as per the study protocol. This was not the case in Project Three. Second, evaluation and standards of care emerged from Project Three as a result

of this topic being predefined for investigation in the protocol; see Appendix C.1.13 Interview Guide on page 377.

1.9.4.2 Contradictory Findings

Quality evidence of studies examining physicians' conception of quality has not been reported in the extant literature. The constructs have previously been addressed separately, but not in the context of how physicians frame quality in health care delivery. Theoretical saturation was achieved early, at interview 17 in this study. It is therefore reasonable to argue that the emerging constructs reflect that there is strong agreement within the physician community about what constitutes quality in health care, which is embedded in the "medical institution" and practice. However, the findings are in disagreement with previous studies, on three points. First, the findings of cooperation and organization are not in line with Agency Theory. The findings of the study focus on interpersonal cooperative efforts between health care professionals rather than the presumed patient-physician dyad of Agency Theory (physician agency, see Section 1.9.4.2.1). Second, physicians claim that experience is a construct and a strong influencer; however, literature is divided on whether more experienced physicians translate their experience into better quality of care. Third, in this study physicians unanimously claim that resources are lacking and that quality of care suffers as a consequence, but empirical studies do not support this claim. These findings are now discussed in more detail.

1.9.4.2.1 Agency

Delivery of health care in the context of modern medicine may be considered a cooperative effort. According to Eisenhardt (1989) p. 72, "Agency Theory provides a unique, realistic and empirically testable perspective on problems of cooperative effort". Thus, the principal-agent dyad may be considered a cooperative effort. The main tenet of Agency Theory holds that there is a conflict of interest between the principal and the agent. On one hand, asymmetry of information may drive a condition of moral hazard, and on the other, risk may cause adverse selection to occur. Even though the findings of this study support patient-physician cooperation, the main focus is on the quality of the cooperative effort among physicians and other health care workers. In this context, economic interest would drive a possible conflict of interest. However, this is not felt to be the case in this study due to the lack of evidence in support of this notion.

The findings of this study suggest that how health care service delivery is organized may influence quality in health care. Physicians claim that health care service delivery should be organized so that patients have equal access, should ensure efficient and appropriate cooperation between different health care professionals providing health care according to standardised protocols, and should ensure a supportive work environment.

1.9.4.2.2 Experience

Experience emerged as a construct of physicians' conception of quality, and the respondents claim that more experienced physicians are more likely to provide better quality care. However, in a literature review on the topic, it has been found

that “physicians who have been in practice longer may be at risk for providing lower-quality care” (Choudhry et al., 2005 p. 260). Thus, the findings in this study and that in the literature are contradictory.

There may be several explanations for this finding. First, the physicians’ “toolkits” are created during training and may not be updated regularly (Carthy et al., 2000). Second, older physicians seem less likely to adopt newly proven therapies, and may be less receptive to new standards of care (Choudhry et al., 2005). In addition, practice innovations that involve theoretical shifts, such as the use of less invasive medical interventions (i.e., laparoscopic versus open surgical techniques), may take longer to adopt due to habit persistence (Coleman et al., 1957, Coleman et al., 1959, Menzel and Katz, 1955, Kwong and Norton, 2007). However, when it comes to treating a particular disease, experience is an important indicator of quality. Studies show that physicians/hospitals that treat a high number of patients for a particular disease and perform large numbers of procedures to treat it have better results (Birkmeyer et al., 2002). Thus, consensus on the effect of experience on quality in the literature is therefore lacking. The literature points in two directions when it comes to experience. First, a body of evidence investigates experience at the physician level, measured by time in practice, and finds a paradoxical effect. Second, a body of evidence has examined experience in relation to specific disease and procedures, and found that higher numbers of patients treated reduces mortality. This may indicate that years in practice as a measure of experience is an inaccurate measure of experience.

1.9.4.2.3 Resources

In this study, physicians claim that increased resource availability and utilization will improve clinical outcomes. However, there is little evidence in the literature suggesting that increased resource utilization improves outcomes (Wennberg et al., 2002). Fisher et al. (2003) investigated whether regions with higher Medicare spending provide better care. The authors found that regional differences in Medicare spending are largely explained by the more inpatient-based and specialist oriented pattern of practice observed in high-spending regions, and that neither quality of care nor access to care appear to be better for Medicare enrolees in higher-spending regions (Fisher et al., 2003 p. 273). Furthermore, “Medicare enrolees in higher-spending regions receive more care than those in lower-spending regions, but do not have better health outcomes or satisfaction with care” (Fisher et al., 2003 p. 288).

1.9.5 Enablers and Barriers to Quality

Enablers and barriers of quality in health care are found to be extremes on a continuum; thus, they may be considered polarized limits of influencers. Project Two revealed key constructs representing a static picture of physicians’ quality conception. Project Three extend the findings revealed in Project Two by exploring enablers and barriers, so adopting a dynamic approach. The project revealed that enablers and barriers were closely linked; in fact, it was revealed that enablers and barriers (influencers) represent a dynamic dimension of the quality constructs. For example, time is both a construct of quality and an

influencer. Time refers to the amount of time available for a physician to spend on caring for a particular patient. Lack of time would be perceived as a barrier, and sufficient time would be perceived as an enabler of quality. Two important conclusions may be drawn from this example. First, time is a construct used in conceptualizing quality and also a factor acknowledged to influence it. Thus, there must exist some point along the continuum (too much time – too little time) where influence is exerted. This point is likely to be different from physician to physician and may be linked to other factors such as degree of experience. In other words, an experienced physician usually requires less time to get the job done than does an inexperienced one, and consequently, the effect of available time on physicians' perception is variable. Time may also be linked to availability of resources and how work is organized. Second, if the time barrier did not exist, physicians claim that they would not do anything differently, but just more of the same. This suggests that perceived behavioural control is a mechanism by which influence on supply of effort is exerted. Furthermore, it suggests that physicians accept time constraints and adjust effort accordingly, thus accepting variation in quality. This has implications for accountability, as it is not clear whether a given outcome is due to physician initiated variation in effort supplied or a system driven variation in supply of effort.

Physician expectancy of efficacy of medical interventions has been shown to influence behaviour (Denig et al., 2010). The physician takes on an expert role in the patient-physician dyad; and with increasing expertise, uncertainty associated with expectancy is reduced (McGuire, 2001). The mechanism for this reduction is indicated by respondents in this study to be experience of similar situations. Furthermore, results in this study indicate that given freedom of choice, the motivation may be considered constant. It could therefore be argued that variability in actual behaviour may be explained by the variance in perceived behavioural control by physicians.

Since there is a close relation between influencers and quality constructs, it is concluded that physicians frame quality by the presence or absence of influencers on the effort supplied into the delivery of health care.

1.9.6 Factors Influencing Physicians' Supply of Effort

Factors influencing physician prescribing have been widely examined. Smith (1977) and Gallan (2005) conducted literature reviews addressing physician prescription of pharmaceuticals. The research presented in this thesis differs from previous work on four main points. First, this research employs systematic literature review methodology, whereas Smith (1977) and Gallan (2005) adopt a non-systematic approach. Second, the research presented in this thesis employs a factor analysis, thereby extending the thematic review. Third, the scope of the research presented in this thesis is not limited in scope to type of prescribing or geography; Gallan's study was limited to outpatient prescribing in the USA. Fourth, the research presented in this thesis employs realist synthesis; Smith and Gallan did not state how the data were synthesized. Thus, this thesis presents the first systematic review of physician prescribing behaviour with a focus on

physician decision making while prescribing, identifying influencing factors and providing a novel classification of these factors.

Physician habit persistence and empathy are two components of physicians' characteristics that help understand the physician's role in quality of health care delivery.

In order to understand habit persistence and its implications, it is necessary to first define habit and to identify by which mechanism its effects are mediated. According to Ajzen (1987), past behaviour may reflect the impact of factors that influence later behaviour; however, it may not be considered a causal factor on its own. Thus, past behaviour cannot be assumed to be a valid measure of habit (Ajzen, 1991). In order to define habit as a predictive variable, it must therefore be defined independently of past behaviour and would capture residues of past behaviours (Ajzen, 1991). Attitude has been suggested to be residues of past experience (Campell, 1963). Thus, according to Ajzen (1991) p. 203, "the unique contribution of habit would lie in finding a residue of past experience that leads to habitual rather than reasoned response". Habit persistence in this context does not fit the strict definition of habit, as it is found to be a temporal expression of past experience.

Although empathy is regarded as an important element in the development of patient-physician relationship (Mitchell and Cormack, 1998, Dixon et al., 1999), evidence suggests that empathy is often lacking in modern medicine (Reynolds and Scott, 2000). Spiro (1992) p. 843, contends that "medical students lose some of their empathy as they learn science and detachment, and hospital residents lose the remainder in the weariness of overwork and in the isolation of the intensive care units that modern hospitals have become". Furthermore, confusion and debate about the precise meaning of empathy exists (Reynolds, 2000, Mercer and Reynolds, 2002), and it is common to consider only the emotive aspect of empathy (Mercer and Reynolds, 2002). However, empathy is distinct from sympathy (Nightingale et al., 1991), and may be considered a multi-dimensional, multi-phase construct that has several components (Reynolds, 2000). An extensive literature review by Morse et al. (1992) summarised the components of empathy under four areas - emotive, moral, cognitive and behavioural - thus providing a conceptual framework which widens the view of empathy (Mercer and Reynolds, 2002).

In this study, physicians' conception of empathy can be illustrated by the following quote: "the ability to understand the patient's situation and feel with the patient, ability to see the situation from the patient's perspective and thus better understand the patient's needs" (ID# 13).

Different kinds of attitudes may be distinguished along two lines: affect and evaluation (Ajzen and Timko, 1986, Bagozzi, 1986, Bagozzi, 1989, Ajzen, 1991). There is evidence to suggest "a convergent and discriminant validity of the affective and evaluative measures of beliefs and attitudes" (Ajzen, 1991 p. 201).

1.9.7 Mechanism by Which Influence on Physician Effort is Exerted

In this thesis, three theoretical domains are combined to form a theoretical lens to enable a better understanding of the complexities of quality in health care delivery. The research undertaken was carried out in three separate research projects. Project one, the systematic literature review, found that factors influencing physicians' control beliefs are strong influencers of physician decision making when prescribing. For both contextual and interventional factors, the Theory of Planned Behaviour plays a central role (see Section 4.2 from page 169), and has revealed an empirically derived and theoretically grounded classification of physicians' conceptions of quality in health care. The majority of the constructs map to control beliefs as the central theoretical construct; see Table 1-3 Key constructs by quality elements and relation to theory. Project Three identified physicians' perception of enablers and barriers (influencers) to quality in health care delivery. Influencers were found to be the same as the quality constructs identified in Project Two - the majority of the constructs map to control beliefs as the central theoretical construct; see **Error! Reference source not found.**.

In summary, factors influencing physician decision making while prescribing, constructs forming physicians' construct of quality, and enablers and barriers are all strongly related to control beliefs and perception of behavioural control; see **Error! Reference source not found.** and **Error! Reference source not found.**.

Control of volition is an underlying assumption of TPB (Ajzen, 1991). Evidence in Ajzen's study strongly suggests that perceived behavioural control is a central mechanism by which enablers and barriers exert influence. In an ideal world where barriers do not exist, physicians will not do anything differently other than do more of what they are already doing. Thus, the evidence indicates that physicians will not change what they are doing, but effort supplied by physicians may be influenced. It is therefore argued that "the will to act" (behavioural intent) is present in a clinical setting, and may be considered a constant. As such, it is possible for the TPB constituents, attitude and social norm, to be considered constant in a clinical setting.

From a practitioner perspective and personal experience, this makes sense, as the drive to help others may be considered strong in the medical profession because there is a concern for medical ethics (Arrow, 1963). Thus, the combination of both intent and perceived behavioural control may be used to predict actual behaviour, as asserted by Ajzen (1991) p. 184. Keeping behavioural intent constant, the probability of actual behaviour becomes dependent on perceived behavioural control, which in TPB, is assumed to be dependent on prerequisite opportunity and resource. The availability of requisite opportunities and resources (e.g., time, money, skills, cooperation of others) collectively represent physicians' actual control over behaviour related to health care service delivery (Ajzen, 1985, Ajzen, 1991 p. 182)

1.9.8 Role of the Physician

The research contributing to this thesis adopts the physician's perspective as it is assumed that the physician plays a central role in contributing to quality in health care. At this stage it is therefore natural to consider the evidence of the physicians' role in this regard. In order to address the physicians' role in health care, the following rhetorical question is posed: what is the physician's role and how does the role influence quality in health care? The question will be answered by providing seven claims supported by literature and empirical findings in this thesis:

1. Access to medical care requires physicians' concurrence and initiative (McGuire, 2001).
2. Physicians make decisions on behalf of patients and stakeholders in health care (Vogel et al., 2003). Thus, the supply of effort by physicians into the delivery of health care is decision making. The context of physician decisions is that of information asymmetry (McGuire, 2001), and hence uncertainty (Arrow, 1963).
3. Habit persistence is a strong driver of physician decision making (Section 1.8.1.1.1 from page 22).
4. The effort supplied by physicians is unobservable (Ma and McGuire, 1997, McGuire, 2001) and unpredictable (Section 1.9.2 from page 34).
5. Physician effort defines the process element of quality, and is even considered to be equal to quality by some scholars; for example Ma and McGuire (1997) and McGuire (2001).
6. Physicians perceive quality by what defines the spectrum of choice available when making decisions (Section 5.5.5 from page 266).
7. Physicians do not formally evaluate quality of effort supplied (Section 5.5.1.6 from page 246).

It is clear that the physician has a central role in health care, and thus plays a key role in quality in health care. However, there is evidence to suggest that the physician's role and link to quality is ambiguous, and that if left uncontrolled, it could be detrimental to quality. For example, large numbers of patients are injured or die as a result of preventable medical errors (Kohn et al., 1999), and change is difficult because physicians are in a position to invoke the concept of risk associated with any change in service delivery (Currie et al., 2013). Change is needed, and the evidence presented in this thesis provides the foundation for a way forward.

1.10 Contribution to Knowledge

In this section, each contribution to scholarship from this research is presented. This thesis offers insights around quality in health care delivery that go beyond prior related studies, thus contributing to knowledge in various ways. These are explained below and summarized in Table 1-6 Contributions to knowledge.

Table 1-6 Contributions to knowledge

Domains of contribution	Extent of contribution		
	What has been confirmed?	**What has been developed?**	**What has been added?**
Theoretical knowledge	Validity of Donabedian's systems approach to quality Validity of TPB in a health care context Validity of Agency Theory in a health care context No uniform theory of medical decision making has been formulated	Extension of Donabedian's model of quality to include context (Section 5.6.1.1) Bio-medical contexts define spectre of clinical outcomes (Section 5.6.1.2) Predominant influencer of effort supplied by physicians is perceived behavioural control (section 5.6.4.2) Multiple principals lead to loyalty conflicts (physicians remain loyal to patients on account of system) (Section 3.4.4.1) Physician provision of decision effort is unpredictable (Section 5.6.1.2)	Established link between three hitherto separate theoretical domains: agency, Decision Theory and Theory of Planned Behaviour (Section 5.6.5) Antecedents to clinical outcomes (time to and correctness of diagnosis and therapy) are more reliable indicators of quality than clinical outcomes (Section 5.5.3)
Methods	Systematic review validated as a method in management and organizational studies Repertory grid technique validated as a method in management and organizational studies Semi-structure interview technique validated as a method in management and organizational studies	Extending thematic synthesis approaches in systematic review by novel use of factor analysis (Section 3.3.2)	
Empirical evidence	Validity of Donabedian's systems approach to quality Validity of TPB in a health care context Validity of Agency Theory in a health care context No uniform theory of medical decision making has been formulated Validate repertory grid technique Validate semi-structured interview technique	Bio-medical contexts define spectre of clinical outcomes (Section 5.6.1.2) TPB on its own not sufficient to explain phenomena of interest (Section 5.6)Agency on its own not sufficient to explain phenomena of interest (Section 5.6) Decision Theory not sufficient to explain phenomena (Section 5.6)	New classification of influencers of physician decision making (contexts and interventions, Section 3.4) Theoretically based and empirically derived classification of physicians' conception of quality (Section 4.5) Quality constructs identified as influencers (physicians define quality by what defines their spectre of choice) (Section 5.6.1.3) A categorisation of physicians' perceived enablers and barriers to quality health care and the mechanisms by which they (Section 5.5.4 and 5.5.5)

This research makes five contributions to knowledge. First, a novel classification of factors influencing physician decision making when prescribing is developed, providing new understanding of the link between these factors and quality of health care (see Section 3.4). Second, the systematic review shows an innovative application of factor analysis to structure the findings of a complex phenomenon (see Section 3.3.2). Third, the study presents a new conceptualisation of physicians' construction of quality in health care (see Section 4.5). Fourth, the research provides a categorization of physicians' perceived enablers and barriers to quality health care and the mechanisms by which they operate (see Section 5.5.4 and 5.5.5). Finally, this research develops a theoretically-grounded and empirically-informed conceptual model that incorporates three hitherto separate domains: agency, planned behaviour, and decision theories (see Section 5.6.5). This model provides a new integrated lens to better understand the complexities influencing quality in health care delivery.

1.10.1 Classification of Factors Influencing Physician Decision Making when Prescribing

The thesis provides a novel classification of factors influencing physician decision making when prescribing. Hitherto, no comprehensive systematic review on the topic has been produced. Two sets of influencing factors emerge from Project One: context and interventions (see Chapter 3). The research presented in this thesis differs from previous work on four main points. First, this research employs systematic literature review methodology, whereas Smith (1977) and Gallan (2005) adopt a non-systematic approach. Second, the research presented in this thesis employs a factor analysis, thereby complementing the thematic synthesis used in systematic review. Third, the scope of the research presented in this thesis is not limited in by type of prescribing or geography; Gallan's (2005) study was limited to outpatient prescribing in the USA, which health care system is different from that of other countries. Fourth, the research presented in this thesis employed realist synthesis (Pawson et al., 2004) providing an degree of transparency and audit trial not seen in Smith (1977) and Gallan (2005). Thus, this thesis presents the first systematic review of physician prescribing behaviour with a focus on physician decision making while prescribing, identifying influencing factors and providing a novel classification of these factors. The aim of factor analysis is to determine the factors accounting for the structure between the variables (Fabrigar et al., 1999). Information about the use of factor analysis as an approach in systematic reviews is limited. However, factor analysis has been used as an approach in the development of a measurement tool to assess the methodological quality of systematic reviews (Shea et al., 2007).

1.10.2 Factor Analysis in Synthesising Systematic Review

The key purpose of systematic review is to locate, critically appraise and synthesise the best available evidence in a particular domain (Tranfield et al., 2003). Systematic review is useful in providing audit trial and transparency about the decisions made during the research process. The synthesis of the findings in a review, may be subject to some bias. Thus, in this thesis an innovative application of factor analysis to structure the findings is developed.

Using the data variables captured during the review, a categorical coding structure was constructed. Data were then evaluated using a measure of sampling adequacy and analysed to identify correlations between the variables exist to ascertain the appropriateness of the factor analysis of the data. This novel procedure provides additional rigour to the synthesis of the systematic review.

1.10.3 Conceptualization of Physicians' Construction of Quality

The thesis provides a classification of physicians' conception of quality. Project Two (see Chapter 4) identified eleven constructs making up physicians' conception of quality in health care delivery. Project Three (see Chapter 5) confirmed 10 of the constructs identified in Project Two, and added two further constructs. The constructs were categorized making use of established elements of quality in health care (Donabedian, 1988), thus providing granularity to the elements of quality; see Table 1-3 Key constructs by quality elements and relation to theory. Hitherto, there is no research providing an empirically-supported classification of how physicians frame quality in health care.

1.10.4 Categorization of Enablers and Barriers and Mechanisms of Influence

Enablers and barriers emerged from the data and were revealed to be almost identical to the constructs making up physicians' conception of quality (see Section 5.5.4). Enablers and barriers emerged as the two poles in the quality constructs continua, and as key factors in explaining the degree of physician's effort in providing quality health care. To date, exploration of physicians' perceptions of enablers and barriers to quality in health care delivery is limited. The implication of this finding is that physicians define quality by what defines the spectrum of choice available when making decisions.

The synthesis of data from all three projects presented in this thesis revealed a strong theoretical link to the Theory of Planned Behaviour; specifically control beliefs and perceived behavioural control into the phenomenon of physicians' decision-making (see Section 5.5.5.). In the empirical research, physicians claimed that if barriers were not present, they would simply do more of what they are already doing to enhance quality in health care. Thus, empirical evidence suggests that the mechanism by which influence is exerted on physicians' supply of effort into the delivery of health care is perceived behavioural control. This finding is empirical validation of the predominant mechanism (perceived behavioural control) revealed in Project One (see Chapter 3).

1.10.5 Conceptual Model of Quality in Health Care

In order to help conceptualise the complex phenomenon of influencers, contexts and mechanisms of quality in health care service delivery, this thesis provides an integrated framework grounded in constructs from Decision Theory, Agency Theory and the Theory of Planned Behaviour, see Figure 1-9 Conceptualization of physicians' role in health care delivery. The flow of the conceptual model is now explained.

The ‘moment of truth’ in medicine takes place when patient and physician interact (Sokol, 2010). The primary reason for this interaction is that the patient has an unresolved medical need. Patient-physician interaction in an agency context mandates patient engagement in the process of work delegation, as is evident from the findings of this study (see Section 4.5.4 and 5.5.2.1). When presented with a patient’s medical need it is the physician’s perception of this need (patient expectation) that is the main influencer of physician behaviour (Mangione-Smith et al., 1999, von Ferber et al., 2002, Hyde et al., 2005, Lado et al., 2008). In the agency context, the patient (principal) delegates work to the physician (agent). The physician supplies effort into the production of health care; however, the effort cannot be observed and can therefore not be predicted in advance.

Why can effort not be predicted in advance? The patient interaction takes place in the context of information asymmetry and uncertainty. Since the physician is the “expert”, he/she holds more information than the patient, and this creates a situation of information asymmetry. However, the physician is not “all knowing”, and thus makes decisions under conditions of uncertainty. Since it is not possible to know what the physician knows when deciding to supply the effort, it is also not possible to predict the effort in advance - but it can be observed in retrospect. Evidence presented in this study suggests that contextual (see Section 3.4.1 and 5.5.1), structural (see Section 5.5.1) and procedural (see Section 5.5.2) influencers may determine the supply of effort by the physician in the delivery of health care.

Since, according to Agency Theory, it is not possible to predict the behaviour of a physician in advance, the question of interest is: what influences physician behaviour (effort)? From the Scoping Study (see Chapter 2) and the Systematic Review (see Chapter 3) several theoretical frameworks were identified to describe behaviour, but the Theory of Planned Behaviour (TPB) is the one that is most widely studied and recognized to predict behaviour in a health care context (Godin et al., 2008).

What is effort in this context? Physicians supply health care by diagnosing and treating patients when performing their duties; i.e., the physician takes a course of action resulting in a diagnosis and treatment. Thus, effort in the context of health care may be considered as the actions associated with diagnosing and treating patients.

TPB holds that attitude, social norm and perceived behavioural control influence behavioural intent, the antecedent to actual behaviour (Ajzen, 1991). The findings of this study suggest that perceived behavioural control is an influencer of physician behaviour when delivering health care. Perceived behavioural control is about the freedom to act. Consider the following quote from the empirical data in Project Three (ID #11):

> “Interviewer: what facilitates you delivering good quality health care services?
> Respondent: freedom to act.”
> Interviewer: what you mean by freedom to act?

Respondent: that I have time, resources and a team to do the job. This is in line with new public management, where I believe that the most benefit will be achieved by giving me the freedom to act."

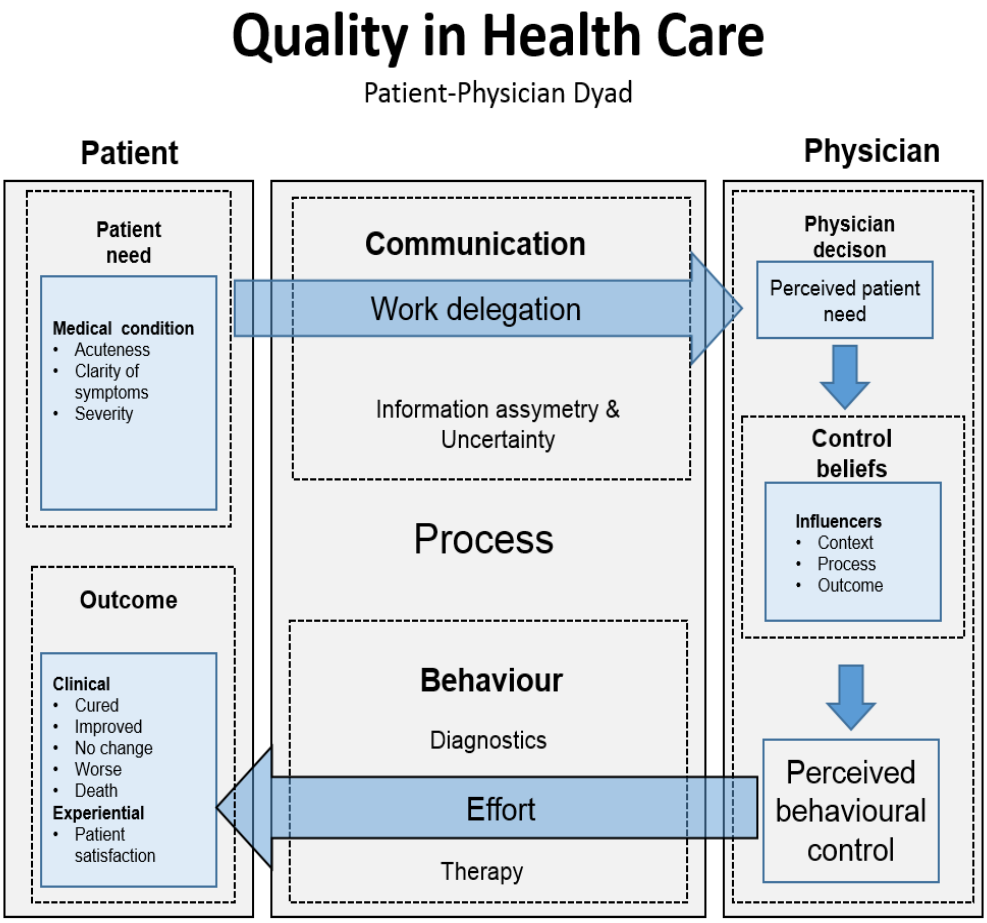

Figure 1-9 Conceptualization of physicians' role in health care delivery

What influences the freedom to act? TPB is based on the assumption of volitional control, and holds that there are two levels of perceived behavioural controls: external and internal (Ajzen, 2002). The external level is related to external structural elements; for example, 'I cannot perform the surgery because I do not have a scalpel'. The internal level is more abstract and relies on whether one believes that one can succeed when the external level is satisfied; for example, 'I have the scalpel, but I am not sure I am competent to perform the surgery'.

Finally, the effort supplied into the production of health care results in an outcome at the patient level; however, the outcome does not influence the perceived behavioural control. Past behaviour, or experience in this context, is important because perceived behavioural control may mediate past experience on later behaviour (Ajzen, 1991 p. 204). Thus, outcome may influence later behaviour. The empirical data from Project Three (see Section 5.5.3) reveal that diagnosis and therapy are more reliable indicators of quality than clinical and experiential outcomes.

1.11 Contributions to Management Practice

The nature and aims of a DBA specify that a clear contribution to knowledge in the context of managerial practice is demonstrated, and that the potential impact of the research on organisational performance and/or managerial effectiveness is articulated.

This research has enabled the author to make two significant contributions to practice in the context where he works as Director of Medical Division and Chief Medical Officer of Akershus University Hospital (AHUS). First, the findings have helped initiate discussions about the transformation of the pharmaceutical industry's business model in Norway, evolving from business-to-person to business-to-business. Second, the findings have served as a catalyst to drive organizational changes in AHUS, the hospital with Norway's largest emergency unit; see Table 1-7 Contributions to management practice.

Table 1-7 Contributions to management practice

Domains of contribution	Extent of contribution		
	What has been confirmed?	**What has been developed?**	**What has been added?**
Management practice	Context and interventions influence medical decision making Experience reduces uncertainty when making decisions Pharmaceutical interventions are found to largely found to have persuasive intent Pharmaceutical business model is so far largely based on B2P Understanding and reducing information asymmetry in health care is key	Measuring antecedent to clinical outcomes can reduce the intrinsic information asymmetry	Antecedents to clinical outcomes introduced as measures of quality in Emergency Room Experienced physicians see patients first Pharmaceutical industry are not allowed to see physicians (new policy) Move to a B2B model is being piloted in collaboration with industry association

1.11.1 Pharmaceutical Industry's Promotion Approach

The systematic review of the literature provided evidence that pharmaceutical promotion in its various forms influence physicians' decision-making. A central assumption is that pharmaceutical promotion does more good than harm in terms of overall health care outcomes. However, for this assumption to be true, promotion must influence physicians to increase their effort into the delivery of healthcare. The systematic literature review and the two empirical projects did not reveal any evidence in support of this.

Project One revealed that pharma promotional efforts influence physician decision-making, however a link to quality was found to be missing from extant literature reviewed. Project Two and Three revealed how physicians construct quality, what factors influences quality and the mechanism of influence. Pharma promotion was not revealed to be a key factor influencing quality in Project Two or Three, in fact it was not mentioned as a contributor to quality by any of the

respondents. However, provider factors were found to be strong contextual influencers of quality. The author therefore argues that there is a break in strategic and operational alignment between provider and producers in the health care value chain. Because of these findings, changing the pharma business model from direct-to-physicians promotion to business-to-business ensuring alignment of strategic and operational activities were embarked upon.

The following figure explains this phenomenon. The proposed model would be that representatives of the pharma industry, interact on a strategic level with provider representatives and share their knowledge. In addition, within an ongoing dialogue, they discuss the best therapies for the patient population served by the provider. The resulting provider strategies are then acted upon by physicians who treat patients, observe outcomes and feed these back to the provider representatives, for example hospital management. Then pharma representatives and provider representatives jointly discuss how to improve patient outcomes. In this context, conversation, dialogue and exchange of best practice takes place at an organisational level. The proposed model aligns strategy and operational activities to balance levels of pharma influence and information. Thus, ensuring unbiased medical decision-making by physicians while delivering health care.

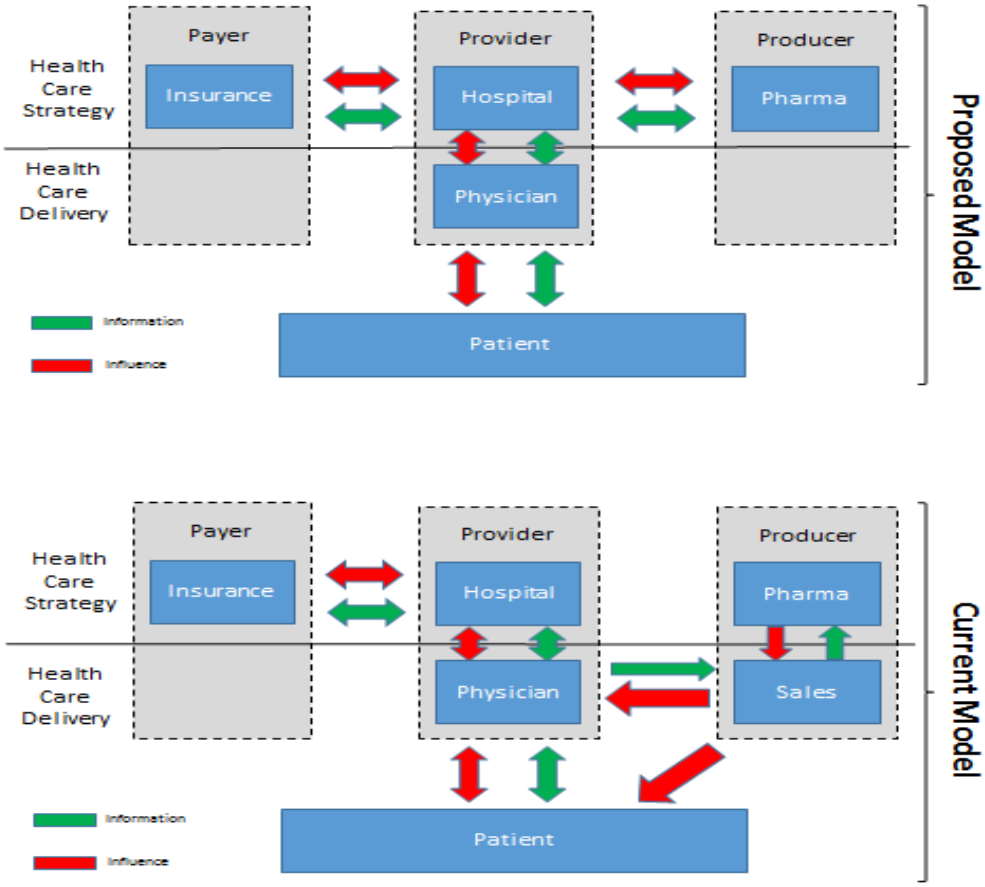

Figure 1-10 Proposed and current pharma promotion models

As stated, the literature review revealed that the link between pharmaceutical promotion and clinical outcomes linked to quality of care is missing, which characterises the current model in most countries. What happens is that pharmaceutical sales representatives directly influence physicians in their-decision making. The dialogue on a strategic level between producer and provider representatives are missing, thus buy passing provider governance of pharma influence on medical decision-making.

Health care providers' overarching strategy centres on maximizing value for and outcomes for patients whereas producers' strategic intent is to maximize shareholder value. This research suggests that one way to achieve higher degree of alignment between providers and producers is to move away from the current business model adopted by the pharmaceutical industry which origins can be traced back to 1890 with the introduction of the "detail man" (Leffler, 1981). Current evidence suggest that 70 % of promotional spend is direct to physician and the remaining direct-to-patient (only permissible in two markets, USA and New Zealand). Pharmaceutical companies employ a large, but diminishing sales force to deliver the (direct to physician) marketing strategy. A major factor for this diminishing numbers is the reduced effectiveness of pharmaceutical sales forces. For instance, readily available clinical information through the internet, is questioning the traditional role of 'information provision' of large pharmaceutical field sales forces. Consequently, over the last few years we have seen the industry shifting its focus from large promotional expenditures into cost optimisation, employing multiple channels and electronic communication more effectively. It must be said that the target of this 'new' marketing approaches is still the physician.

The author argues that changing the business model of pharmaceutical promotion from person-to-person to business-to-business is necessary. Such a change allows for strategic and operational alignment between health care providers and the producers of medicines in a health care value chain context. This change requires a change in the mind set of current and future pharmaceutical marketers from a focus on directly influencing physician decision making to an emphasis on aligning promotional objectives and activities with provider strategy for quality health care delivery. Current practices in the pharmaceutical industry (pharma) favour internal recruitment/promotion to occupy senior sales or marketing positions. The evolution of the model from a focus on the person to a focus on the organisation is unlikely to be realised given that the necessarily skill sets to articulate and implement this new paradigm is outside the 'comfort zone' of the current community of marketers in pharma. Thus, the author argues that a move away from the current practice of recruiting managers and executives with a (increasingly irrelevant) pharma sales background is necessary. The services industry has a long heritage of innovation in service contracts. The engineering sector has adopted a product-service systems that could be used as a template in pharma to initiate and progress the change in the marketing approach.

Is such a change possible? The author contends that it is possible to change established pharmaceutical promotion practices. Below a promising case provides evidence of this possibility.

Based on insights that emerged from conducting this research, strict policy changes governing the interaction between industry and health care personnel have been implemented in Akershus University Hospital (AHUS). In short, the policy prohibits all contact in a promotional context, as pharmaceutical promotion is largely found to have persuasive intent. The Pharmaceutical industry's persuasive efforts may influence physician decision making, and hence influence quality of health care delivery in ways not necessarily optimal for the patient (see Chapter 3). As a consequence of the policy, industry access to physicians in AHUS is now very limited.

The CEO of the Norwegian Pharmaceutical Industry Association (LMI) asked for a meeting in August 2012 to discuss the situation. The meeting resulted in an agreement to investigate the possibility of piloting a new model for interaction between the pharmaceutical industry and physicians at AHUS. The author was asked to speak on the topic at the yearly LMI strategic seminar in October 2012. Furthermore, he was asked to address the topic at the health care regions yearly procurement conference in November 2012. He has collaborated with a representative for LMI (Pål Rydstrøm) to present to the board of directors the pilot project in May 2013. The presentation was well received and has resulted in a mandate for a pilot for a business-to-business model based on alignment of strategy and goals between pharma companies and the hospital. Finally, the author has addressed the topic at the national company conference for Glaxo Norway on August 6th 2013, and has been invited back by the CEO to discuss models for a cooperative effort within the health care industry in Norway.

1.11.2 Hospital Management

The evidence that emerged from this research (Project Two and Three) was unequivocal in suggesting that the key constructs defining quality in health care from a physician's perspective are early and correct diagnosis accompanied by appropriate and timely treatment. Thus, it the factors influencing these key quality constructs are important for quality in health care. Therefore, we conclude that experienced physician effort should be introduced as early as possible in the process of providing care to patients. Placing experienced physicians (specialists) in the front line, that is, in the first encounters with patients improves accuracy of diagnosis, and appropriateness of treatment. It reduces effort needed in decision-making since decisions are made quick, first think and at the point of delivery. However, this is not how most hospitals around the world are organised. Often a physician in training, thus with limited experience sees the patient first. Typically, specialist services are provided at a later stage of clinical care.

Time as a key quality construct, relates to the period that the physician has available for the patient. Thus, time is a valuable resource for physicians. However, time is relative and related to experience in that more experienced physicians typically spend less time making clinical decisions and chose appropriate care levels more often than their inexperienced counterparts do.

Thus, time relates to quality, but should be considered in combination with experience. Thus, more experienced physicians on the front line of the clinical operations not only provide earlier and correct diagnosis and treatment, but also increase efficiency of care delivered. For example, increased efficiency in the emergency room will lessen the potential for overcrowding, which has been associated with increased premature death (30-day mortality rates).

Communication emerges as a key construct of how physicians construct quality. Clinical communication amongst physicians? is important for both arriving at a correct diagnosis and treatment, and for enhancing experiential quality. In fact, at the author's hospital approximately 80 % of complaints from patients are related to communication. Thus, focusing on clinical communication training will influence both technical and experiential quality elements.

Coordinated resource input emerged as a key construct of quality in health care delivery. Patients seldom come with only one ailment, thus a combined effort of experienced physicians is often necessary. Coordination of these efforts in time and space often bring about challenges, but can be addressed by implementing defined patient pathways for tailored for large patient groups such as myocardial infarction, heart failure, dyspnoea, chronic obstructive lung disease, etc. Thus, defining level of physician experience levels necessary at the different stages of clinical care. Clarity of necessary experience levels coupled with development plans ensure a match between patient need and physician experience.

Continuity of care also emerged as a key construct in health care quality and is related to information integrity and efficiency of care. Continuity of care increases information integrity by reducing the number of information exchanges. Information integrity is an important aspect of patient safety. Furthermore, repeated questions about similar issues can be avoided, thus increasing confidence and experienced quality. Efficiency of care increases due to a reduction in duplication of efforts.

The findings of this thesis, Project Two and Three, revealed that physicians construct quality of health care by saying that expertise should be provided in a way that facilitates early diagnosis and correct treatment. Project Three identified experience as a key influencer of quality related to the accuracy-effort framework of medical-decision making. Because of these findings managers may go about improving quality by ensuring that 1) quick and correct diagnosis is performed and that 2) appropriate and timely therapy is provided. Therefore, these managerial changes were embarked upon 1) match physician experience with patient needs 2) ensure sufficient time for a physician to be with the patient 3) focus on medical communication skills in clinical practice 4) coordinate resource input with patient needs 5) ensure information flow and increase efficiency by focusing on continuity of care. Thus, this research provide a framework for managers to systematically examine and evaluate factors influencing quality in health care delivery. Below the author provides an example of a practical application in clinical practice.

During 2010, Oslo and the surrounding area of the Norwegian capital (Oslo) was subject to a reform, including the closure of one hospital (Aker Sykehus), resulting

in movement of large patient populations between the remaining hospitals in the area. During 2011, 160 000 inhabitants were transferred from Oslo to AHUS, resulting in a population base of 460 000 inhabitants for the hospital, which was originally designed for a maximum capacity of 360 000. AHUS has become the largest emergency care hospital in Norway, serving approximately 10% of the population. These changes have resulted in “overcrowding” both in the emergency room (ER) and wards (Svendsen, 2012, Drabløs et al., 2012), and quality of health care service delivery was publicly criticized (Lunde et al., 2012, Holden et al., 2012), also by the county medical officer (Hvidsten, 2012). In addition, there has been a widespread call for change among health care professionals (HCPs) working in the hospital. Furthermore, it is widely stated that ER (Hoot and Aronsky, 2008) and ward (Forster et al., 2003) overcrowding influence quality of health care delivery, as evident by its impact on post discharge mortality rates (Richardson, 2006). Thus, the need for change was evident.

The findings presented in this thesis (Project Two and Three) informed driving changes in how the ER services are being organized and provided in AHUS.

Four main changes relating to the conception of quality of health care delivery by physicians have been implemented. First, the workload (informed by data in Section 4.5.3.11) of physicians has been addressed by changing working hours and shortening periods on call from 16 to 12 hours. Second, the number of staff available (informed by data in Section 5.5.1.1) in the ER follow patient volumes at given time of day and week; this provides a better distribution of health care professional (HCP) resources per patient. Third, a team based organization (informed by data in Section 4.5.3.3 and 5.5.1.4) pairing one physician and two nurses responsible for two ER examination rooms has been implemented; this eradicates duplication of work effort and increases the quality of communication between HCPs in the ER (informed by data in Section 4.5.3.1 and 5.5.2.3). Finally, patients are seen by an ER specialist first (as of September 2nd 2013) (informed by data in Section 4.5.3.7 and 5.5.1.1.2), ensuring immediate specialist evaluation rather than partial generic diagnosis (informed by data in Section 4.5.3.5 and 5.5.3.1).

The changes implemented were subject to extensive media coverage (Storvik, 2013) and have provided a much needed reprieve from the negative media focus during 2012 and 2013; even the patient ombudsman publically applauded the changes (Bakke, 2013). The changes were also reviewed at a meeting with the county medical officer in June 2013, and the report was positive in that no further follow-up was required. These interventions were directly informed by the findings of this research and the in-depth insights developed in conducting the research projects.

1.11.3 Policy Change

As a result of the changes, a national debate has been initiated, involving the Prime Minister (Barth-Heyerdahl, 2013), Minister of Health (Bakke, 2013) and the Director of Health (Hallgren, 2013), on how hospital emergency care can best be provided at a national level. In addition to the Minister of Health, the leaders of

five political parties have visited the ER in AHUS to see and to get first-hand experience of the changes that have been implemented and how they are helping deliver a better care and a better experience for the patient.

The ensuing public debate has resulted in three further indirect contributions. First, AHUS has been asked to participate in an advisory board to the Minister of Health, with the focus on ER services in Norway. Second, AHUS has been selected as Centre of Excellence in the region, with the provision of one million NOK (approximately 110 000 GBP) per year over a three year period for research and further development of the concept. Finally, competency requirements and a new specialty in emergency medicine was in the party program for two of the major opposition parties (Conservative party and Progress party) that were running for the national elections that were held on September 9th 2013. After the election, the Conservative and Progress parties initiated discussion leading to the formation of a new coalition government on October 16th 2013. The following sentence can be found on page 43 of the document outlining the political platform for the new government: "The government will implement competency criteria in emergency rooms and a new medical specialty in emergency medicine."

1.12 Implications of the Research

In this section, implications for stakeholders in the health care value chain are discussed, which are payers, providers and producers. Payers refers to policymakers, regulators and payers. Providers refers to hospital management and practitioners (physicians). Producers refer to the pharmaceutical and medical technology industry. In addition, institutions are added, as there may be implications for medical education and research. Finally, implications for patients are also provided.

Deriving guidelines for policy making and practice from research is in itself a complex phenomenon. Realist synthesis and evaluation (Pawson et al., 2004) emerged as an approach to synthesise 'what works, for whom, in which circumstances…'. The realist synthesis methodology suggested by Pawson et al. (2004) is focused on gaining insights from the respondent perspective about the relationship between context, intervention, mechanism and outcomes (CIMO). Pawson (2006) states that "the generative model calls for a more complex and systemic understanding of connectivity. It says that to infer a causal outcome (O) between two events (X and Y), one needs to understand the underlying generative mechanism (M) that connects them and the context (C) in which the relationship occurs". Thus, intervention may be considered the trigger for change (Pawson, 2006 p. 27). In this context, interventions aim to change health status. Mechanisms describe what it is about the intervention that triggers change to occur. Pawson (2006) p. 23, defines mechanisms "as engines of explanation in realist synthesis", as "we rely on mechanisms to tell us why interconnections should occur". Employing the CIMO logic to the results in this study is of value, as it helps derive clear implications for policy and practice.

The context in which this study is conducted is that of funded (e.g. prepaid) health care. When health care is prepaid, fee for service does not regulate demand (Friedman and Gould, 2007). The consequence for the physician in this context

is that the physician does not have mechanisms at his/her disposal to regulate demand (McGuire, 2001). Thus, if demand increases and resources are fixed, the effort per patient may decrease as a result. Evidence from this study suggests that physicians adjust effort into the delivery of health care in line with demand. Physicians therefore seem to accept variability in effort as a consequence of variability in demand. However, empirical data revealed that physicians' believe this to result is lower quality.

It is also possible for an employer to take advantage of a physician's ethical constraints and organize health care delivery in such a way that the physician is forced to supply more effort to make sure the patient attains an acceptable outcome (McGuire, 2001 p. 61). In other words, an employer may provide limited resources and hope that physicians' loyalty to patients will make the physicians provide the necessary effort. This case would be an example of how the health care service delivery is organized and resourced.

Intervention in the CIMO context is to be understood as physician effort supplied into the delivery of health care, and consequently, quality in health care. The underlying generative mechanism is the physicians' perception of behavioural control. Outcome is considered as quality in health care. Therefore, in a context of prepaid health care, physician effort supplied into the production of health care is dependent on the physicians' perception of behavioural control of that effort. Therefore, the implication is that quality in healthcare is dependent on empowering physicians' to make bounded decisions in a complex context.

1.12.1 Implications for Payers

Payers in this context refers to payers in the health care value chain, as defined by Burns et al. (2002). However, in addition to payers and financial intermediaries, policy makers and regulators are considered in this section. The reason for the inclusion of policymakers and regulators is that they influence and regulate the fiscal policies supporting the health care value chain.

The findings of this study may be of interest to payers for three main reasons. First, payers by way of simple monitoring and incentives, leave a great deal of authority concerning diagnosis and treatment with the physician (McGuire, 2001 p. 527). In other words, physicians are free to make clinical choices that drive the cost without being responsible for the financial outcome of the choice. Second, over reliance on medical sub-specialization and physician experience may have a paradoxical effect on quality of health care delivered (Choudhry et al., 2005). Finally, there is a lack of evidence supporting the hypothesis that more is better when it comes to cost of health care (Wennberg et al., 2002). In this study when physicians were questioned about barriers to quality in health care they revealed that they believe that more material and human resources equate to improved quality.

1.12.2 Implications for Health Care Institutions (Providers)

In this case, the central provider is the physician; however, in the context of practice characteristics, it may also be larger organizational units such as hospitals. For simplicity, the physician will suffice, as the review has not revealed

practice characteristics being a potent influencer on physician prescribing behaviour.

This study provides important insights for institutions for three main reasons. First, the supply of physician effort is strongly linked to quality in health care delivery. Thus, health care organization may be able to influence quality in health care by considering factors influencing physicians' supply of effort and the underlying mechanisms for such influence. Second, the study shows how institutions are organized and resourced may influence quality in health care. Finally, this study suggests that physician competency is an influencer of physicians' supplied effort, and hence quality in health care. Thus, the importance of medical training should not be underestimated.

Health care organisations would benefit from considering the findings in this study when:

- Structuring medical departments
- Deciding on resourcing
- When controlling physician's activities and duties
- When planning physicians' careers with respect to current and future competency needs

It is argued that although uncertainty can be reduced, it can never be completely eliminated from decision-making. Therefore, most decision-making performed in medicine contains an irreducible intuitive element, and is thus vulnerable to these biases and heuristics. Given that few medical curricula overtly address the process of medical decision-making, both medical students and physicians remain vulnerable to these effects on their own (and their patients') decision-making. Insight via education appears to be the major means by which to develop more advanced models of decision-making.

A part of the interviews focused on asking respondents about what they would do differently if the mentioned barriers did not exist; the majority of physicians responded that they would do more of what they were already doing.

> "I would spend more time on diagnostics, making sure that we follow national and international standards for establishing diagnosis, more time on treatment and evaluation of effect and follow up, I would spend more time talking to the patients and next of kin ensuring better and more complete information. I would spend more time developing professionally and discussing cases with colleagues." (ID #: 26)

The consequence, as indicated in the projective questions of the semi-structured interviews, would be an improvement in health care service delivery in general.

> "I would probably make fewer mistakes, fewer complaints, patients would be more satisfied, expenses would probably decrease, things would go smoother, we would use less time and may be able to treat more patients. It would be more fun to work, less complaints from colleagues, time to develop as a physician." (ID #: 15)

This was an unexpected finding, but quite intriguing. If physicians would simply do more of what they were already doing if the barriers did not exist, this reveals that barriers influence volition (i.e. the cognitive process of decision-making), or at least the perception of perceived behavioural control, at some level.

Control of volition is an underlying assumption of the Theory of Planned Behaviour (TPB) (Ajzen, 1991). Evidence in this study strongly suggests that perceived behavioural control is a central mechanism by which enablers and barriers exert influence. In an ideal world where barriers do not exist, physicians will not do anything different other than doing more of what they are already doing. Thus, the evidence indicates that physicians would not change what they are doing, but the effort supplied by physicians would actually be affected. It is therefore argued that “the will to act” (behavioural intent) is present in a clinical setting and may be considered a constant. As such, it is possible for the TPB constituents, attitude and social norm, to be considered constant in a clinical setting.

From a practitioner perspective and personal experience, this is plausible, as the drive to help others may be considered strong in the medical profession because there is a concern for medical ethics (Arrow, 1963). Thus, the combination of both intent and perceived behavioural control may be used to predict actual behaviour, as asserted by Ajzen (1991) p. 184. Keeping behavioural intent constant, the probability of actual behaviour becomes dependent on perceived behavioural control, which in TPB, is assumed to be dependent on prerequisite opportunity and resource. The availability of requisite opportunities and resources (e.g., time, money, skills, cooperation of others) collectively represent physicians’ actual control over behaviour related to health care service delivery (Ajzen, 1985, Ajzen, 1991 p. 182).

1.12.3 Implications for Producers of Medicines

The author, content that changing the business model from person-to-person to business-to-business is necessary. Such a change allows for strategic and operational alignment between health care providers and the producers of medicines in a health care value chain context. However, this change requires a change in the mind set of current and future pharmaceutical marketers. Current practice is internal recruitment from sales to marketing and business-to-business models are not necessarily within the skill set or “comfort zone” of current marketers. Thus, the author argue that a move away from current practice of recruiting managers and executives from an increasingly irrelevant salesforce background is necessary.

1.13 Limitations and Future Research

In this section the nature and limitations of this research, and opportunities for further research are outlined.

1.13.1 Nature of the Research

This research is exploratory, and the findings should be interpreted with care when applied to different contexts. The primary purpose is to use existing theory to gain a deeper understanding of quality in healthcare, its enablers and barriers and the underpinning mechanisms that influence it. It integrates hitherto separate theoretical domains, developing a conceptual model to help guide stakeholders in health care when designing and implementing change.

1.13.2 Limitations of the Study

In this section, the limitations of this research are discussed. First, the limitations associated with the systematic review are addressed. Then, the limitations associated with the interview techniques (repertory grid technique and semi-structured interview technique) employed in this research are outlined, and finally, the limitations associated with the use of mixed-methods are covered.

1.13.2.1 Systematic Review

In this review, every effort has been made to follow the steps designed to reduce bias and increase rigor and transparency by systematically searching all available literature and extracting relevant evidence. However, as with any academic work, this review has limitations associated with it.

First, only one reviewer was employed in this systematic review, and the possibility for researcher bias is therefore present. By following a strict and predefined protocol (see Appendix A.1 from page 317) and carefully documenting each step, the researcher has attempted to reduce any untoward bias during the search, extraction and synthesis of the evidence presented in this thesis.

Second, interventions reviewed were often based on previous research, therefore lacking a strong theoretical basis. The research on interventions identified in this review typically focus on the clinical or administrative needs for interventions. As no consensus on what constitutes optimal pharmaceutical consumption, and outcomes data on administrative interventions are lacking, it appears that the choice of intervention is not well grounded in theory, and at the same time, may be inadequately described in the literature in terms of Theory of Planned Behaviour, Agency Theory or decision under uncertainty. However, each study has been evaluated from the theoretical perspectives identified in the scoping study, and relevant mechanisms of influence in health care quality identified within the same theoretical domains.

Finally, no restriction on study type for inclusion was made. The tendency for reviews published within the medical domain of the literature (approximately 80%) is focused on randomized controlled trials as the highest standard of evidence quality. This positivist approach may not be the best when dealing with complex issues such as physician prescribing behaviour, and elements of realist synthesis have therefore been employed.

1.13.2.2 Repertory Grid and Semi-Structured Interview Technique

Three main limitations to repertory grid technique (RGT) apply in this study. First, RGT is a method that is time consuming, which makes it difficult to generate large amounts of data and thus produce general knowledge. Second, RGT may be of limited use if the respondents find it difficult to understand the technique or if the constructs elicited are not handled in a sensitive manner (Cassell and Walsh, 2004). Finally, interpretation of the data may be problematic and due to the fact that interviews are subject to researcher bias (Goffin, 2002).

The study was designed to capture how physicians frame quality of health care delivery in a hospital setting. The interview subjects in this study provided real patient cases where the outcome was death, either indirectly or directly caused by the physician being interviewed. This indicate that the respondents were both able and willing to tell the truth, and is therefore a testimony to the first two criteria suggested by (Gottschalk et al., 1945); see Table 1-8 Checklist of criteria suggested by Gottschalk et al. (1945 p. 35). With respect to the third criteria, the researcher has been as diligent as possible to provide example quotes to substantiate every inference made from the data in this study. The use of low inference descriptors, such as quotes, is described as a strategy for improving the quality of qualitative research (Johnson, 1997 p. 283). Finally, Projects 1-3 and literature have been used to corroborate the evidence presented.

Table 1-8 Checklist of criteria suggested by Gottschalk et al. (1945 p. 35)

#	Description	Checked
1	Was the ultimate source of the detail (the primary witness) able to tell the truth?	Yes
2	Was the primary witness willing to tell the truth?	Yes
3	Is the primary witness accurately reported with regard to detail under examination?	Yes
4	Is there any external corroboration of the detail under examination?	Yes

Though qualitative research does not seek statistical generalizability, but generalizability to theory, there are elements that help establish the quality of the study. First, low inference descriptors (quotes) have been widely used. Second, theory triangulation (Agency Theory, Theory of Planned Behaviour and Decision Theory) and methods triangulation (repertory grid and semi-structured interviews) have been used. Finally, discussions with peers and implementation of findings in practice have yielded accepted changes in the way emergency medical care is organized on a national level. In Norway, quality in health care is a key topic in the national debate particularly towards the election in the fall 2013.

One weakness of the semi-structured interview technique is that there may be a limited scope for the respondent to answer questions in sufficient detail or depth. In order to ensure sufficient detail and depth in the responses, a laddering approach was employed by asking follow-up questions.

Furthermore, during the interview, the researcher may influence the way a respondent answers various questions, thereby biasing the responses. The

researcher followed the interview guide closely, and made every effort possible not to influence the answers provided. Open ended questions with laddering were employed.

1.13.2.3 Triangulation (mixed-methods)

As described above, in this research, a multi-methodical approach suited to the individual projects in this research has been employed. Even though its use goes back more than 100 years, it is still debated by scholars (Blaikie, 2010). Triangulation, also known as mixed-methods, is advocated by several scholars; for example, (Denzin, 1988) and (Robson, 1993). However, (Blaikie, 2010) argues that it is inappropriate to combine methods based on different ontological positions. Blaikie (2010), p. 227, does however note that the use of mixed-methods is of particular benefit when more than one research question is being addressed, as is the case in this thesis.

1.13.3 Opportunities for Future Research

The results from this research have highlighted many opportunities for further research, which are addressed in this section.

The systematic literature review revealed a classification of factors influencing physician decision making. However, a deeper understanding of the link between contexts and interventions in determining health outcomes is an area for further research.

The systematic literature review employed factor analysis and extended the thematic review of extant literature. Further development of research based tools to synthesis knowledge is an area with much potential for further work.

The thesis provides an exemplar of the usefulness of repertory grid and semi-structured interview techniques in exploring physician perceptions of quality in health care delivery based on patient-physician encounters. Their application to the professional service industries in general may be an area for further research.

No grand theory of medical decision making has yet been formulated. Decision making in medicine is closely linked to quality; thus, medical decision making is an area for further theoretical research.

The research undertaken in this thesis employed real patient-physician interactions to gain insight into how physicians perceive and construct quality. In this research, the patient is not included, and the dyadic patient-physician relationships is an area to be further studied in the context of the findings presented in this thesis.

This study has identified how physicians frame quality in health care delivery, identified influencers in quality of health care service delivery, and may serve as a framework for further studies in this field. The model presented in this research will benefit from further mathematical development and prospective testing. Thus, further studies validating the framework presented in this thesis is warranted.

1.14 Chapter Summary

In this chapter, the background and theoretical domains of the research were presented. The research methods and findings were discussed. The author also explicated the contributions of his research to knowledge and management practice, and the limitations of the work and directions for further research were highlighted. In summary, the findings of this research suggest that physicians construct quality in health care by defining influencers of their perceived behavioural control. The point of influence is the context in which effort is supplied; however, the link between context and process is ambiguous. The thesis argues for the need to be aware of the influencing factors and the mechanism by which these factors exert their influence on the supply of physician effort.

In the next chapter, the scoping study and the research questions for the subsequent systematic literature review are presented. Medical and management literature is reviewed, and the relevance of the physician decision making as a focus for this thesis is discussed.

CHAPTER TWO: SCOPING STUDY

This Chapter is concerned with mapping out the influences on physician prescription behaviour from a health care value chain perspective in order to identify stakeholders and point of influence.

2.1 Introduction and Background

Health care policy is focused on addressing the general well-being of people in need, and in recent years, the focus on health care costs has gained momentum, as spend on health care is challenging budgets in most developed countries. The result is emerging regulatory trends focusing on cost containment within the health care sector. Medicines play an important role in clinical medicine and drive health care costs; and cost containment measures focus on medicines, as the cost of medicine accounts for a substantial portion of the total health care budget, typically 8 – 22 % (Legemiddelindustriforeningen, 2010). Physicians act as decision makers on behalf of payers and patients when administering prescription only medicines (Vogel et al., 2003). Influencing physician prescribing behaviour has thus become a key focus for regulatory measures; as a consequence, physician autonomy is under pressure and changes in physician prescribing behaviour can be observed. However, evidence as to the outcome of these changes is sadly lacking (Bradley, 1991, Smith, 1977).

The pharmaceutical industry invests heavily in marketing, using 20 – 40 % of revenue (Gagnon and Lexchin, 2008), and most of these investments are directed to the physician, who acts as the decision maker on behalf of patients and payers when administering prescription medicines (Vogel et al., 2003). However, as yet, the overall effect of pharmaceutical marketing is inconclusive, having generated a heated debate. Furthermore, requests for information from the pharmaceutical industry are declining rapidly, and conversely, the use of the internet as a channel for information is rapidly increasing; in 2009, 86 % of physicians in Europe and 89 % of physicians in the US used internet as a source of information in professional practice (Gucio-Pabia, 2010). The industry is currently facing patent expiry and loss of exclusivity on several “block buster” medicines, creating a revenue vacuum until the industry pipeline can fill the gap in 2012 and beyond. Many of the large companies are undergoing restructuring in order to meet future demands and high investor expectations. In addition to restructuring the biopharmaceutical industry, strategies are focused in the direction of: strategic alliance, merger and acquisitions, strengthening corporate social responsibility in the biopharmaceutical industry, pricing and reimbursement, and the rise of e-health. Given the current fiscal situation in many countries, there is an increasing cost containment focus by authorities, as health care expenditure is on the rise. Furthermore, strict regulatory and control measures for direct-to-physician promotion by the pharmaceutical industry are widely implemented. These factors collectively impact on the playing field for the industry and signal a need for change. The need for new promotional models is evident, and the difficulty will not be to identify the right initiatives - but to change from the current model to a new one (Illert and Emmerich, 2008). The changing environment has sparked the pharmaceutical industry to change the way it

interacts with physicians. Industry sales forces are shrinking across markets and the search for new and cost effective promotional channels is intense. Being on the receiving end of heavy marketing investments, the physician is subject to promotional instruments possibly affecting prescribing behaviour.

The phenomenon of interest in this study is factors and contexts having a bearing on physician prescription behaviour from a health care value chain perspective. The chapter starts by providing a contextual backdrop from a value chain perspective, more specifically using the health care value chain as a framework for defining its boundaries, stakeholders and decision points. Second, the thesis goes on to describe physician interaction with stakeholders in the health care value chain from an agency perspective. Next, the theoretical framework and underpinnings of medical decision making are addressed. Then, the study addresses the factors having a bearing on physician prescribing behaviour. Following this, it goes on to address the theoretical framework and underpinnings of persuasion in order to provide an understanding of how influencing factors affect prescribing behaviour. Finally, the study offers a conclusion and poses a suggestion for further research.

2.2 Health Care Value Chain

In this section, the contributions and definitions of the health care value chain are considered in order to delineate the boundaries that identify stakeholders and decision makers. This will aid in the understanding of prevailing market dynamics within the health care sector. First of all: what is a value chain? According to Porter, the term means the whole production chain from raw material to product consumed by the end user (Porter 1980;Porter 1985, pp.33-61). Inherent to the definition, there are two value chains: one firm internal and one across firms. As health care is a complex function lacking vertical integration from raw material to end product, it may be useful to consider the health care sector from a value chain perspective.

Two authors are central to the understanding of the health care sector from a value chain perspective. {Burns, 2002 #64@@author-year} and {Burns, 2005 #63@@author-year} have contributed to the study of the health care value chain in the US, and (Stremersch (2008), Stremersch and van Dyck (2009)) have added a European and marketing research applications perspective to the framework. Burns et al. (2002) relied mostly on informants from a broad sample of firms collected over a period of three and one-half years. The information was gathered via personal interviews of informants spanning a wide range of functional areas, in the period between January 1998 and June 2001. (Stremersch and van Dyck, 2009) identified marketing decision areas in the life sciences by conducting a literature search of academic literature and personal interviews of life science marketing practitioners. This led to the identification of three main areas of life science marketing decision areas: life science marketing, health care payer and provider, and marketing academics. However, from a competition-theoretical perspective, value chains may have limited applicability outside manufacturing firms, as linear input-output activities do not adequately represent reality (Hunt, 2002) p. 281.

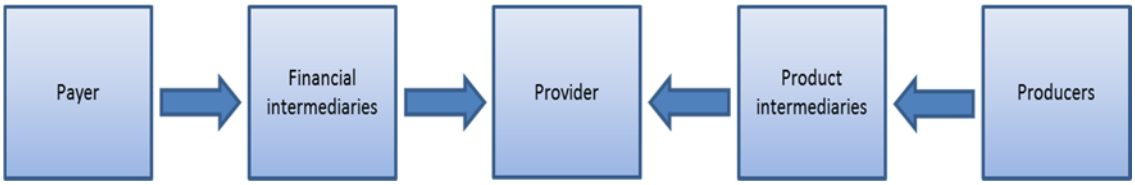

Figure 2-1 Health care value chain (adopted from Stremersch 2008)

The health care value chain consists of two sides: payer and delivery (Stremersch, 2008), as in Figure 2-1 Health care value chain (adopted from Stremersch 2008). As most funds spent in health care originate from government agencies, this represents the largest part of the payer side of the value chain (Burns et al., 2002) p. 15. However, financial intermediaries such as insurance companies may also play an important role. The delivery side is represented by producers and product intermediaries. Producers in this context are the pharmaceutical industry, and product intermediaries are represented by: wholesalers, pharmacies and buying organizations (Stremersch, 2008). Both sides meet in the middle at the provider level, represented by hospitals and physicians (Stremersch, 2008). However, Burns et al. (2002) also place pharmacies at the provider level.

Stakeholders in the supply chain contest access to and control over three critical flows: products, money and information (Burns et al., 2002) p. 18. From a payer and public policy perspective, there are three different policy inputs regulating medicines: public health (quality, safety and efficacy), health care (financing and reimbursement of medicines), and industrial policy (Permanand, 2006) p. 4. From a delivery perspective, competitive forces prevail. Clark's theory of effective competition makes competition a dynamic state in pursuit of increased profit rather than focusing on a static state of profit maximization (Hunt, 2002) p. 262. Alderson's functionalist theory argues that the firms' pursuit of profit is to fulfil the primary goal of survival (Hunt, 2002) p. 264. According to Hunt, competition may be considered as an evolutionary and disequilibrium-provoking process (Hunt, 2002) p. 251.

Thus, it can be argued that the two sides of the health care value chain are driven by different logics in the contest for flow of products, money and information. Understanding these market dynamics is important, as it forms the basis for organization and measures designed to influence decisions within the health care value chain. Ultimately, this may result in influence on the physician level and consequently, may have a bearing on physician prescribing behaviour.

So, how does the market dynamic effect physician prescribing behaviour? Although no direct empirical evidence can be found, there are clues within the academic literature. Consolidation and integration efforts (horizontal and vertical) within the health care sector have for the most part failed miserably (Burns et al., 2002) p. 5; this leaves organizations to interact with each other in a manner often termed business-to-business (B2B) (Brennan et al., 2007) pp.2-6. However, it is the individual that has deciding capacity and is motivated by a complex combination of personal and organizational objectives, and at the same time, constrained by ethics and policies; thus, it is the specific individual and not the

abstract organization that is the target for persuasive efforts (Webster and Wind, 1972). It has been widely stated that the physician is the decision maker on behalf of payers and patients (McGuire, 2001, Vogel et al., 2003) and that 70 % of pharmaceutical promotional spend is directed at the physician (Gagnon and Lexchin, 2008). Even though organizations play an important role in the health care value chain, they control process, availability and price of products. However, the physician retains authority and decision control over outcomes, even though the spectrum of outcomes may have been preselected by B2B marketing efforts.

2.3 Agency

Due to the low level of vertical integration, it is clear that work is delegated within the value chain; thus, it is natural to consider agency relationships. Agency Theory and, more specifically, physician agency is interesting, as it illuminates the contextual framework of the payer-physician-patient interaction and is suggestive of factors, practice and organization having a bearing on physician prescribing behaviour.

This section will start by addressing the theoretical framework and underpinnings of agency and agency relationships. Then, physician agency will be covered in detail, including: uncertainty, informational asymmetry, moral hazard, adverse selection, and ethical and legal constraints.

2.3.1 Theoretical Framework

In an intellectual project for understanding, Eisenhardt (1989) has undertaken a thorough review of agency and Agency Theory. The basis for agency is that one party (principal) delegates work to another (agent), and Agency Theory is concerned with two problems occurring in agency relationships (Eisenhardt, 1989). The first problem relates to conflict of interest (moral hazard) and the second to risk sharing (adverse selection). Studies of agency relations date back to the early sixties, and the seminal work performed by Arrow (1963) is central in defining the difference in attitudes toward risk from an economic perspective. From the same perspective, Ross (1973) and Jensen and Meckling (1976) introduce the concept of different goals and division of labour. {Mitnick, 1986 #358@@author-year} and {Mitnick, 1994 #359@@author-year} takes on a political science perspective and challenges the positivist views presented by Arrow (1963) and Ross (1973), arguing that the central problem with Agency Theory is the lack of consensus as to what the agency problem really is all about. Moral hazard and adverse selection lie at the core of Agency Theory, and both presume a conflict of interest between agent and principal (Mitnick, 1994). Moral hazard occurs when a person is insulated from risk and behaves differently than he/she would if exposed to the risk (Arrow, 1963). Adverse selection refers to a situation when undesired results occur on the bases of the principal and agent having different information (asymmetry of information) (Arrow, 1963). From the health care value chain perspective, physician agency is of importance because it may have a bearing on prescription behaviour, as detailed in the health economic domain of literature, and this is addressed in further detail below.

2.3.2 Physician Agency

Uncertainty is the most important factor influencing physician behaviour (Arrow, 1963) and has been addressed in the context of physician agency. In an intellectual project for understanding, (McGuire, 2001) has provided a comprehensive review of the topic from a health economic perspective. Interestingly, the author concludes that economic models often ignore uncertainty and informational asymmetry inherent in modern health care (McGuire, 2001) p. 496. Perfect physician agency may exist if agent and principal have the same information; however, no demand on the quality of information is made. Thus, perfect agency can be based on imperfect information (Mitnick, 1994). According to Eisenhardt (1989), moral hazard refers to the lack of effort by the agent, and adverse selection refers to the misinterpretation of ability by the agent. Asymmetry of information concerning these two aspects may be considered an advantage and if used inappropriately, may be unbeneficial to the principal.

The physician may play the role of agent for several principals in the health care value chain. First and foremost, the physician is an agent on behalf of the patient. Asymmetry of information regarding diagnosis and treatment options is a natural consequence of the physicians' extensive training and resulting expertise. This training is complex, time consuming and costly, creating a situation where it is not possible for a patient to correctly verify quality or utility of health care provided. It has been argued that only about 25 % of patients would be reasonably well informed about the care they receive (McGuire, 2001) p. 465. Physician agency may also exist with payers and/or employers as principals. Given the potential complexity of physician agency with several simultaneous principals, physician loyalty will be under pressure and may be influenced by shifting power between principals, thus having a bearing on patient health. However, the authority of the physician is still strong and plays a central role in any decisions related to medical care (McGuire, 2001) p. 463. Given the central role of the physician in medical decisions, it is important to further address aspects of moral hazard and adverse selection in this context.

Moral hazard is said to take place when an individual not fully exposed to a risk would behave differently than if fully exposed to the risk (Gaynor and Gertler, 1995). Both physician and patients are insulated from the financial realities of medical decisions (Illert and Emmerich, 2008), and thus subject to forces of moral hazard. Therefore, both the physician and the patient may engage in behaviour motivated by self-interest. The physician may drive demand beyond what would be the case if exposed to the financial risk implicit in making the decision (McGuire, 2001) p. 503. A physician may influence quantity of care in three ways: set the level of non-contactable input (quality), influence patient preference and physician induced demand (McGuire, 2001) p.503-519. Increasing quality may increase cost, and changing patient preference in accordance with physicians' self-interest may have the same effect. Physician induced demand will occur if the physician uses his/her "superior" knowledge to his/her benefit, driving the use of health care resources to a higher level than would be the case if information was symmetric between agent and principal (McGuire, 2001) p. 503. On the other hand, the patient may seek to engage in behaviour driving the consumption of

health care. A patient may, for example, simply opt for taking a pill for high cholesterol rather than engaging in lifestyle changing behaviour such as exercise and healthy eating. Thus, patient preference may impact demand for health care services from physicians.

Moral hazard, as illustrated above, is but one outcome of the agency problem. Physician agency may also have an impact on public policy through mechanisms of adverse selection. In certain circumstances, it will be impossible to know what the physician did or knew (Pauley, 1978). This extreme form of informational asymmetry may lead to uninformed decisions by the principal, and consequently, adverse selection (McGuire, 2001) p. 498.

Behaviour motivated by self-interest of the agent lies at the heart of the agency problem. The physician is an "experience good" (Gaynor 1994); consequently, a patient will not know the quality of care before having experienced the care provided by the physician. McGuire (2001) p.502 argues that learning is slow, and as a consequence, the reward for quality is likely to be inadequate. Thus, the physician may be given room to adjust quality as an input factor (effort) according to prevailing motivations, including self-interest. Furthermore, credible evidence suggests that compensation arrangements with high degree of revenue sharing reduces physician effort (Gaynor and Gertler, 1995).

Since the introduction of the Hippocratic Oath in 4th century BC, ethics have played a central role in the practice of medicine. Physicians have autonomy in decision making on the basis of an understanding that they will act in the best interest of their patients (Arrow, 1963). However, it has been argued that managed care may threaten the physicians' loyalty to the patient (McGuire, 2001) p. 520. The physician is an agent for both the patient and the payer, potentially resulting in a loyalty conflict and cognitive dissonance. A payer can take advantage of the ethical constraints, imposing payment systems that force the physician to personally take on more of the effort to attain an acceptable outcome for the patient (Ma and McGuire, 1997).

In addition to ethics, legislation also plays a central role in the practice of medicine. Legal constraints limit choices, but may also drive behaviour, leading to the practice of defensive medicine; which occurs when a physician practices medicine to protect himself/herself against litigation (Danzon, 2000). The practice of defensive medicine may drive demand for care more than would otherwise be the case.

2.3.3 Summary

At the heart of Agency Theory lays the conflict of interest concept between agent and principal. However, conflict of interest may also be present between simultaneous principals, further complicating physician agency by influencing physician loyalty and possibly impacting patient health. Uncertainty and asymmetry of information play a central role in influencing physician behaviour and can negatively impact public policy decisions and outcomes through adverse selection. Furthermore, physicians may drive health care demand by changing quality of service, influencing patient preference and using asymmetry of

information to drive demand for care. Ethical and legal constraints of decision choices exist, and may be exploited by both agent and principal in addition to motivating the practice of defensive medicine. Thus, Agency Theory and, more specifically, physician agency illuminate the contextual framework of the payer-physician-patient interaction and are suggestive of factors of practice and organization having a bearing on physician prescribing behaviour. That said, academics investigating physician agency have largely ignored uncertainty and informational asymmetry when modelling and investigating physician agency, thus weakening the arguments.

2.4 Decision Making

Several factors influence decision making, and understanding these factors helps in understanding the decision making process and potential outcomes. Because medical decisions have an impact on patients' health, they should be of high quality (Klein, 2005). However, medical practice is complex and time is often limited, leading to use of shortcuts to decisions, or heuristics. Unfortunately, the use of heuristics also brings with it some pitfalls (Klein, 2005). Despite being highly trained, doctors are prone to making mistakes (Bornstein and Emler, 2001); cognitive biases may detract from the use of logical and statistical decision heuristics (Hershberger et al., 1994). This research will address the theoretical aspects of decision making before considering factors that influence decision making in the context of clinical practice. Further, it will address heuristics of medical problem solving and decision making. Finally, a summary will be offered.

2.4.1 Theoretical Framework

Decision making is important in medical practice, and because health outcomes are probabilistic, most decisions are made under conditions of uncertainty (Kaplan and Frosch, 2005). Medical science has not yet solved the uncertainty surrounding many medical decisions (Gillett, 2004) and is the least developed aspect of evidence-based practice (Spring, 2008). Furthermore, uncertainty has been characterized as the most important factor influencing physician behaviour (Arrow, 1963). Thus, uncertainty is central to Decision Theory concerned with medical decision making.

Decision theories are developed to explain decisions under three main conditions of consequence of choice: certainty, risk and uncertainty. Decision under certainty applies when all decisions will lead to only one consequence. Decision under risk applies when a choice will have one of several possible consequences and the probabilities of the consequences are known (Heylighen, 2010). Contrary to decision under risk, decision under uncertainty applies when a choice will have one of several possible consequences, but the probabilities of the consequences are not known. Furthermore, decision theories fall into two main categories: normative or prescriptive theories are based on idealized situations where a decision can be fully rational and all probabilities calculated; and descriptive theories work on the principle that people do not necessarily follow axioms and thus describe what people do rather than focus on optimality. Evidence-based medicine is concerned with integrating individual clinical expertise and the best

external evidence (Sackett et al., 1996), and works on the basis of known probabilities (Kaplan and Frosch, 2005). However, in a knowledge-for-critical evaluation project, Greenfield et al. (2007) address the usefulness of the results of randomized controlled trials for clinical and policy application. The authors conclude that the evidence includes patients who may have minimal benefit and that generalization to patients excluded from the study may result in overtreatment. Thus, it may be argued that the axioms of evidence-based medicine may be invalid in individual treatment decisions, and consequently, normative decision theories explaining decisions under risk may be not be applicable in medical decision making. Further support is provided by (Eddy, 1994) in that clinicians often disagree about appropriate action in similar clinical situations. In addition, there is evidence to support large geographical variations in the use of health care (Wennberg et al., 2002, 2004) and that this variation does not result in the same variation in patient outcomes (Fisher et al., 2003, 2003). This leaves descriptive theories as a possible framework for medical decision making. However, evidence based theories are not abundant and the lack thereof to support medical decision making has led to clinical approaches and decision tools being based on assumptions - and these assumptions have been challenged by behavioural research (Reyna and Rivers, 2008). Modern theories supported by empirical evidence differ in their views of risky decision making, behavioural change, health promotion and medical decision making (Reyna and Rivers, 2008). Three such theories have recently been gaining recognition: theory of reasoned action and its extension the Theory of Planned Behaviour, the trans-theoretical model and fuzzy trace theory.

2.4.1.1 Theory of Reasoned Action and the Theory of Planned Behaviour

The theory of reasoned action states that intent is the best indicator of motivation to act (Fishbein, 2008) and is concerned with what determines intention. Intention to perform a certain action is a function of two factors: attitude and subjective norm (perception of importance) (Fishbein, 2008). Determinants of attitude have been identified as: evaluation of belief and strength of belief (O'Keefe, 2002) p.103-104. Perceived lack of ability may have an impact on intention to perform an action, and in 1991, Ajzen revised the theory and in so doing, added a third factor, perceived behavioural control, leading to the Theory of Planned Behaviour (Ajzen, 1991).

2.4.1.2 The Trans-Theoretical Model

The trans-theoretical model is concerned with strategies or process for change and originally contained four stages of change; pre-contemplation, contemplation, action and maintenance (Prochaska and DiClemente, 1987). The work of Prochaska and DiClemente (1987) was based on the need for behaviour change models having a bearing on health, with special focus on addiction. This change model has led to goal setting as an accepted method to improve performance and has been operationalized through practice guidelines within the context of medical decision making (Prochaska, 2008).

2.4.1.3 Fuzzy Trace Theory and Adaptive Decisions Making

The fuzzy trace theory is based on the finding that people rely on the gist of information, its bottom line meaning, as opposed to verbatim details in judgement and decision making (Reyna, 2008). Thus, fuzzy trace theory lends itself to explaining why detailed information about risk does not necessarily support medical decisions. However, fuzzy trace theory is at odds with the central assumption of evidence-based medicine, that decisions made by computation are superior to those made by intuition (Spring, 2008). Important aspects of decision need not be conscious, and subjective perception of reality shapes decision making (Reyna and Rivers, 2008). Decision making by medical experts often relies on intuitive gist processing and pattern recognition (Lorenz et al., 2005). However, decision tasks vary in complexity and the limited processing capabilities of the decision maker make the adoption of adaptive decision strategies imperative. As no one theory will suffice to cover all eventualities (Reyna and Rivers, 2008), the work of (Payne et al., 1993) still stands as a credible seminal work having greatly contributed to the understanding of adaptive decision processes. The framework for adaptive decision behaviour distinguishes between decision strategies and problem solving; decision strategies are generally reserved for diffuse problems and problem solving lends itself more to an hypothetico-deductive approach (Payne et al., 1993) p.60. This concept is translated to clinical practice by (Elstein and Schwarz, 2002). Furthermore, the adaptive decision framework relies on trade-offs between cognitive effort and accuracy. Thus, the fundamentals of adaptive decision making are that individuals decide how to decide.

2.4.1.4 Heuristics

Human decision behaviour is a contingent form of information processing, and different decision strategies may be used to suit the situation (Payne et al., 1993) p.9. Heuristics may be considered mental short cuts reducing decision effort (Shah and Oppenheimer, 2008). Focus on decision effort follows the assumption that cognitive effort is limited (Payne et al., 1993) p.73. However, decision effort is not the only part of the heuristic; it is also important to consider the accuracy of the strategy to yield a good decision, and hence the effort-accuracy framework was posited by (Payne et al., 1993) p.72. Unfortunately, the use of heuristics also brings with it some pitfalls (Klein, 2005, Tversky and Kahneman, 1974). Despite being highly trained, doctors are prone to making mistakes (Bornstein and Emler, 2001) and cognitive biases may detract from the use of logical and statistical decision heuristics (Hershberger et al., 1994).

In a seminal paper, Tversky and Kahneman (1974) showed that people rely on a limited number of heuristic principles, reducing the complexity of decision making. The authors describe heuristics and biases employed for making decisions under uncertainty. According to Tversky and Kahneman (1974), the main heuristics employed when making decisions under uncertainty are: representativeness, availability and adjustment & anchoring. Klein (2005) identified five pitfalls in decisions about prescribing: representativeness heuristic, availability heuristic, overconfidence, confirmatory bias and illusory correlation. These pitfalls have already been described by Tversky and Kahneman (1974) and do not represent

anything but a rejuvenation of the debate set in a prescription context. However, the notion is further supported by (Poses and Anthony, 1991), but the authors use the term 'inappropriate use of heuristics'. Furthermore, Payne et al. (1993) pp.193-216 identified the lack of knowledge and execution of heuristics as a pitfall. Thus, is can be argued that identifying an appropriate decision strategy and executing within the given context are central to successful decision making.

The representativeness heuristic (Kahneman and Tversky, 1979) is an assumption that something seemingly similar to other things in a category is a part of that category (Klein, 2005). It is important to be aware of base rate occurrence and not weighting information inappropriately. The availability heuristic builds on the principle of the ease with which information can be accessed and gives too much weight to information that is easily available (Payne et al., 1993) pp. 201-207. In many situations, estimates are made from a starting point - and this is known as anchoring {Tversky, 1974 #534@@author-year}. If necessary adjustments are not made, then anchoring bias may occur as a decision is based on incomplete reasoning due to lack of baseline information.

Even though heuristics are available, inappropriate use may lead to mistakes (Poses and Anthony, 1991), and it is important to consider why this may be the case. Confidence relies on representativeness of the prediction with disregard for predictive accuracy (Tversky and Kahneman, 1974). According to Klein (2005), most people are more confident about judgments than they ought to be and may be contextually influenced by an individual's attitude, leading to overconfidence or illusion of validity(Tversky and Kahneman, 1974, Crano and Prislin, 2006).

According to Tversky and Kahneman (1974), illusory correlation is a pitfall of the availability heuristic. How frequently two events occur together will influence the associative bond between them (Payne et al., 1993, Tversky and Kahneman, 1974). Klein (2005) defines this simply as: "Illusory correlation is the tendency to perceive two events as causally related, when in fact the connection between them is coincidental or even non-existent."

Tversky and Kahneman (1974) argue that adjustment and anchoring bias may occur as a consequence of subjective probability distribution and hence violate the logic of statistical prediction. The fact that people do not appear to follow logic and statistical theory of prediction leads to intuitive judgement (Poses and Anthony, 1991) that sometimes leads to severe and systematic errors (Kahneman and Tversky, 1973).

In conclusion, decision under uncertainty is based on the use of a limited number of heuristics designed to reduce the effort of judgement, but this may reduce the accuracy of the decision and lead to errors (Kahneman and Tversky, 1973, Tversky and Kahneman, 1974, Poses and Anthony, 1991, Payne et al., 1993, Hershberger et al., 1994).

2.4.2 Medical Decision Making and Prescribing Behaviour

From the literature, it is evident that complex decisions are based on the use of a limited set of heuristics to reduce the effort associated with decision making. Medical decisions are designed to have effects on patient health, and hence the

quality of these decisions is important. Supported by the positivist ontology of evidence based medicine, most medical decisions are probabilistic in nature and occur under uncertainty (Elstein and Schwarz, 2002). Given the potential high risk to patient health and complex nature of modern medicine, factors affecting the quality of medical decisions need to be understood. Medicines play an important role in modern medicine (Hemminki, 1975) and their use as a therapeutic intervention is widespread.

The work of (Bradley, 1991) represents the only identified comprehensive literature review on decision making and prescribing behaviour linking the observed effects and moderators highlighted thus far to the theory of decision making. At first glance, it may seem that the author adopts a neutral stance legitimate for a knowledge-for-understanding project, but adopts a negative stance criticising the rash introduction of interventions to curb cost without the understanding of how decisions are affected. In short, Bradley (1991) concludes that the understanding of prescribing behaviour requires study of the underlying decision process. This author argues that policy change may have untoward effects on patients if it is made without an understanding of current decision patterns. This sentiment is later echoed by others (Sketris et al., 2009), further underlining the need for more research on the topic.

Taking a broader view, McKinlay et al. (1996) found that the variability in medical decision making by physicians was not entirely accounted for by prescriptive theory and thus conclude that non-medical factors such as patient characteristics, physician characteristics and practice setting may play an important role in influencing physician prescribing behaviour. The notion of the authors is supported in a more recent literature review by (Hajjaj et al., 2010) and by the work of Gill et al. (1999), reporting that only 51 % of interventions introduced to change physician prescribing behaviour had an effect, and that no difference could be found across interventions. Finally, Bornstein and Emler (2001) found that physician clinical reasoning is vulnerable to biases and that formal processes may aid in improving decision quality by focusing on the most relevant information. The overall finding is that how factors influence physician decision making is a phenomenon poorly understood. In conclusion, more studies may lead to better decisions and healthier patients (Poses and Anthony, 1991).

In an interesting study, employing a grounded theory approach, on the decision-making process leading to appendectomy, Larsson et al. (2004) developed a model suggesting that the decision is made based on the interplay between an assessment of the patient's condition and contextual characteristics. The authors did not strictly follow Glaser's advice on theoretical sampling, thus limiting the depth of findings from the study and consequent conclusion. However, the study indicates that contextual factors may have a bearing on medical decisions, fully in line with the previous discussion on agency and agency relationships.

According to Miller (1989), decision control involves direct influence over outcomes, but the range of outcomes are typically preselected; on the other hand, process control involves indirect influence over outcomes. Process for deciding on diagnosis and therapy intervention is grounded in evidence based medicine,

and the individual physician has only indirect influence over process outcomes. The process will guide the decision making, but intuitive judgements are still made (Kahneman and Tversky, 1973, Poses and Anthony, 1991) within the bounds of decision and process control.

2.4.3 Shared Decision Making

Shared decision making is being advocated as the preferred method for decision making in medical care. In an intellectual project for knowledge generation, (Charles et al., 1997) identified four characteristics of shared decision-making in the medical encounter: both physician and patient must be involved, both parties share information, consensus regarding preferred treatment must be built, and that agreement on implementation is reached. The approach outlined by Charles et al. (1997) will reduce the informational asymmetry between patient and physician and is denoted by others as the informed treatment decision model (Gafni et al., 1998). In an attempt to ascertain difference in patient outcome between the informed treatment decision model and the physician as a perfect agent for the patient, Gafni et al. (1998) investigated adjuvant chemotherapy versus no adjuvant chemotherapy in patients with early stage breast cancer. The authors concluded that both approaches result in the same outcome. However, the distinction between the two agency approaches is delegation (perfect physician agency) versus retention of authority (informed treatment decision model) (Gafni et al., 1998). Nevertheless, even though shared decision making models are advocated, implementation remains limited in practice (Barratt, 2008).

2.4.4 Summary

Decision making in medicine is performed under uncertainty. However, no general theory of medical decision has been formulated, but the theory of reasoned action and its extension the Theory of Planned Behaviour is the most studied theoretical framework informing on the topic of physician cognition leading to decision behaviour. In addition, Agency Theory plays a central role in defining contextual contributors to the decision making process. Despite being highly trained, doctors are prone to making mistakes, and cognitive biases may detract from the use of logical and statistical decision heuristics. Given the multidimensional theoretical framework having a bearing on medical decision making, deciding how to decide is central.

2.5 Physician Prescribing Behaviour

Hemminiki (1975a) investigated the literature on factors affecting the prescription of medicines. In this knowledge-for-understanding intellectual project, the author found that education, colleagues, patients, promotion, expectations and demands from society, and physician characteristics affect the prescribing of medicines. Kremer et al. (2008) and Venkataraman and Stremersch (2007) have in addition identified the attributes of medicine and price. Anderson et al (2006) show that clinical trial participation may affect prescribing behaviour. Expectations and demands from patients and society, and searches on physician characteristics yield no relevant recent literature and are omitted from this study.

2.5.1 Factors Affecting Prescribing Behaviour

2.5.1.1 Education

Hemminki (1975) summarizes the few studies on the effect of education that are available (Lee et al., 1965, Joyce, 1970, Becker et al., 1972). There appears not to be any difference in prescribing patterns for graduates from different schools; however, it has been shown that higher postgraduate qualifications result in lower rate of prescription of any kind. Hemminki (1975) concludes that there is evidence to suggest that there is a link between education and quality of prescribing.

More recently, Carroll et al. (2007) investigated educational interventions and regulatory policies on trainee perceptions of the pharmaceutical industry. The authors performed a literature search using Medline and bibliographies or review articles of relevant studies. Articles published before 1991 were excluded. The review suggests that well-designed seminars, role playing and focused curricula can affect trainee attitudes and behaviour. However, whether the effect is sustainable over time is still unknown (Carroll et al., 2007).

Ellison et al. (2009) investigated post-activity Continuing Medical Education (CME) evaluation surveys. The background for the survey was the concerns raised around possible bias in commercially supported CME activities. The authors concluded that 93 % of physicians participating claimed to perceive no bias.

Ross and Loke (2009) performed a systematic review of literature, investigating whether educational interventions improve prescribing by medical students and junior doctors. The authors searched MEDLINE, EMBASE, Educational Resource Information Centre, British Education Index, PsycINFO, CINAHL, TIMELIT, Cochrane Trials Database and grey literature. 3189 studies were identified for initial screening and 22 studies were included in the review. The WHO Good prescribing Guide is the most widely tested and has demonstrated efficacy. However, the authors concluded that further work is needed to produce high-quality intervention (Ross and Loke, 2009).

2.5.1.2 Promotion

In addition to observed effects of promotion, moderators of these effects have been investigated by several authors (De Laat et al., 2002, Hurwitz and Caves, 1988, Kremer et al., 2008, Leffler, 1981, Manchanda and Honka, 2005, Mizik and Jacobson, 2004, Smith, 1977, Venkataraman and Stremersch, 2007, Windmeijer et al., 2006). However, most of the information on the topic of promotional efficiencies and moderators has been summarized in an intellectual project for understanding by Kremer et al. (2008). The authors conducted a meta-analysis including 58 studies with the aim to formulate generalisations about the effectiveness of pharmaceutical promotion. In summary, Kremer et al. (2008) concluded that statistically significant moderators of observed effects measured at any level of demand are: marketing instrument, disease category and price. Venkataraman and Stremersch (2007) found that the attribute of medicines, effectiveness and side effects may be a significant moderator of effect, and contrasts with the findings of Kremer et al. (2008). Perhaps one of the most

important findings of Kremer et al. (2008) is that of endogeneity, the correlation between a variable and its error term[1] (Bijmolt et al., 2005). The authors note that this correlation significantly influences the effectiveness of promotional instruments; thus, it can be argued that endogeneity of marketing decisions is a key moderator of effect, a notion supported by Bijmolt et al. (2005). In conclusion, it is found that effectiveness of DTP pharmaceutical promotion is moderated by price, endogeneity of promotional investments, disease category and attribute of medicines. In other words, that pharmaceutical promotion at the physician level positively affects sales of medicines. Changes in physician prescribing behaviour can therefore be considered as an effect.

2.5.1.3 Price and Price Sensitivity at the Physician Level

At first glance, it appears that there is wide consensus in the literature on the fact that promotion lowers price sensitivity at the physician level (Kremer et al., 2008, Manchanda et al., 2005, Rizzo, 1999). However, others have found that physicians demonstrate a basic lack of price sensitivity (Gönül et al., 2001). This is supported by the fact that physician awareness of price is in general low (Ryan et al., 1990, 1992, 1996).

2.5.1.4 Colleagues

Nair et al. (2006) investigated the asymmetric peer effects in physician prescribing behaviour and the role of the opinion leader. Using detailed individual-level prescription data along with self-reported social network information, the authors investigated peer effects. The authors found significant and robust peer effects across model specifications. However, no direct data of information shared is available; furthermore, information regarding sales force is not available. The characteristic of this study is that of an experiment without a control group, thus limiting the value and generalizability.

2.5.1.5 Control and Regulatory Measures

Taking on an intellectual project for knowledge describing the regulatory environment in Europe from a health economic perspective, Permanand (2006) p.4 found that there are three different policy inputs regulating medicines: public health (quality, safety and efficacy), health care (financing and reimbursement of medicines), and industrial policy.

Due to market imperfections created by asymmetry of information central to the supply-demand dynamic, regulation is warranted (Permanand, 2006). So, does it work? It has been shown that control measures can influence drug consumption, at least for short periods (Hemminki, 1975). Information regarding safety may also have an effect on consumption of medicines (Venkataraman and Stremersch, 2007).

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[1] Error term is the difference between the actual and the predicted value of the independent variable in a regression model.

From a practitioner perspective, the experience is congruent with the findings of (Hemminki, 1975); however, for most medicines regulated though cost containment measures, the price sensitivity at the physician level seems to play a part if loyalty to the patient is challenged.

2.5.1.6 Drug Characteristics

Venkataraman and Stremersch (2007) empirically analyse the moderator effect of the attributes of medicines (safety and efficacy) on the effect of marketing activities (detailing and meetings); this is the first and thus far the only study to take this perspective. The authors employed physician-level panel data, drug approval database and clinical trial reports in the econometric model analysis. The main finding of the study is the responsiveness of physicians' decision making to marketing efforts, and patient request depends upon the attributes of the medicine.

2.5.1.7 Participation in Clinical Trials

There is limited evidence that participation in clinical trials impacts prescribing behaviour. However, in a cohort study, it was found that conducting a trial sponsored by a pharmaceutical company had no significant impact on physicians' adherence to international treatment recommendations, but increased their use of the trial sponsor's drugs (Andersen et al., 2006).

2.5.2 Summary

The literature reviewed in order to conduct this scoping study suggests that physician education and training, control and regulatory measures, peer effect, promotion and drug characteristics impact the quality and quantity of prescribing in the short term. How these factors affect prescribing behaviour is largely unknown. Thus, factors having a bearing on physician prescribing behaviour in a health care value chain context have been identified, but there is still a need to understand how factors affect physician prescription behaviour, and in which contexts and with what results.

2.6 Influence and Persuasion

Leffler (1981) and Hurwitz and Caves (1988) address the role of pharmaceutical promotion. Leffler (1981) argues that the pharmaceutical promotion has an informational role. On the other hand, Hurwitz & Caves (1988) argue strongly for a persuasive role. In support of Hurwitz and Caves (1988), Manchanda et al. (2005) and Mizik and Jacobson (2004) found evidence of brand persistence late in the product lifecycle, suggesting a persuasive role; persuasion is defined as a successful attempt to influence. According to O'Keefe (2002) p.2, the definition of persuasion lacks a clear consensus, but still acknowledges the definition provided by (Simons, 1976) p.21: "Human communication designed to influence others by modifying their beliefs, values or attitudes".

In a comprehensive review of the literature on persuasion, O'Keefe (2002) identifies three theoretical constructs used to explain persuasion effects:

cognitive dissonance theory, elaboration likelihood model, and theory of reasoned action and its extension the theory of planed behaviour.

2.6.1 Theoretical Framework

2.6.1.1 Cognitive Dissonance Theory

The cognitive dissonance theory was developed in the 1950's by Leo Festinger and is concerned with the uncomfortable feeling due to simultaneous and conflicting ideas and the hardwired drive to reduce this discomfort (Festinger, 1957). Festinger labelled this uncomfortable feeling as dissonance and its converse as consonant. Dissonance can vary from non-existent to high, and consequently, the pressure to reduce it will vary accordingly. The magnitude of dissonance is related to the relative proportions of dissonance and consonant elements, and to the importance assigned to the elements (O'Keefe, 2002) pp.77-100.Thus, the persuader can influence any one or both of these dimensions by using various techniques and ultimately influence decision making. Dissonance theory does not represent a universal theory of persuasion, but provides ideas for further investigation.

2.6.1.2 Theory of Reasoned Action & Theory of Planned Behaviour

The theory of reasoned action (TRA) is concerned with what determines intention. Intention to perform a certain action is a function of two factors: attitude and subjective norm (perception of importance). Determinants of attitude have been identified as: evaluation of belief and strength of belief (O'Keefe, 2002) pp.103-109. Perceived lack of ability may have an impact on intention to perform an action; in 1991, Ajzen revised the theory, and in so doing added a third factor, perceived behavioural control, leading to the Theory of Planned Behaviour (TPB). Persuasive efforts from a TRA perspective can take three forms: changing the attitudinal component, changing the normative component or the relative difference between the two (O'Keefe, 2002) p.109.

2.6.1.3 Elaboration Likelihood Model

Elaboration likelihood model (ELM) was developed by Petty & Cacioppo and is concerned with persuasion as a consequence of how likely a receiver is to think about the message received (O'Keefe, 2002) p.137. ELM is a dual process model consisting of two routes to persuasion: central and peripheral. The central path involves a high level of elaboration or cognitive effort, and the peripheral part involves a low level of elaboration and cognitive effort. Elaboration is defined by O'Keefe (2002) p.138 as engaging in issue-relevant thinking. Although the term high low is used categorically, the degree of elaboration is a continuum. The central pathway to persuasion requires extensive elaboration and thoughtful examination of issue-relevant information (O'Keefe, 2002) p.139. Consequently, the peripheral pathway requires less cognitive effort and is thought to be based on the use of simple decision rules or heuristics. Two factors have been found to affect the degree of elaboration: motivation and ability. High degree of elaboration is not likely to occur if the individual is not motivated, and the same applies if ability is lacking (O'Keefe, 2002) pp.141-142. Motivation is affected by personal

relevance and the need for cognition; unmotivated individuals are less likely to engage in elaboration than motivated individuals, whereas some individuals enjoy cognitive exercises and are more likely to engage in elaboration. Ability is affected by distraction and prior knowledge, and a distractive stimulus may detract from engaging in elaboration. If the individual has prior knowledge, then it is considered easier for him/her to engage in elaboration (O'Keefe, 2002) p.144.

2.6.2 Factors Having a Bearing on Persuasion

Furthermore, O'Keefe (O'Keefe, 2002) pp. 181-264 identified three factors having a bearing on persuasion: source factors, message factors, and receiver & context factors. Source characteristics can have complex and interrelated effects having direct or indirect effects on persuasion. Message characteristics have not been shown to have a convincing effect one way or the other. However, persuasive effects may be dependent on receiver and contextual factors (O'Keefe, 2002) p.260. The findings of O'Keefe (2002) have largely been supported by Cialdini (2007) work on influence and persuasion.

2.6.3 Persuasion and Health Care Professionals' Behaviour

In a systematic review of health care professionals' intentions and behaviours, Godin et al. (2008) included studies that aimed to predict health care professionals' intentions and behaviours with a clear specification of relying on a social cognitive theory. The cognitive factors most consistently associated with prediction of health care professionals' intentions and behaviours were documented. This study shows that the theory most often used as reference was the Theory of Reasoned Action (TRA) or its extension the Theory of Planned Behaviour (TPB); and the authors suggest that the TPB appears to be an appropriate theory to predict behaviour, whereas other theories better capture the dynamic underlying intention (Godin et al., 2008). Finally, the authors provide a hypothetical framework for studying health care professionals' intentions and behaviours, as illustrated in Figure 2. The framework has explanatory power, as it provides a simple and credible explanation. Furthermore, it is not overly complex. However, it lacks testability and as such may not be internally consistent.

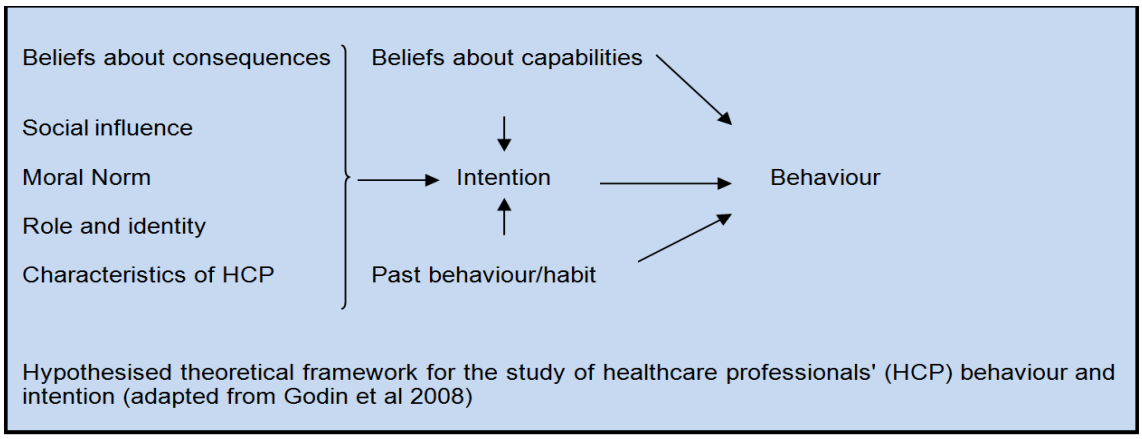

Figure 2-2 Hypothesized theoretical framework (Godin et al 2008)

In a study designed to examine factors affecting antibiotic prescribing in a managed care setting, the authors found that behavioural intention was significantly correlated with both attitude and subjective norms, but was not predictive of actual prescribing behaviour (Lambert et al., 1997). The authors thus posit that it is possible that prescribing behaviour is influenced by non-psychological factors. Furthermore, physician autonomy is challenged and it can be argued that a system-level approach may be needed to yield a descriptive model of physician prescription decisions.

2.6.4 Summary

O'Keefe (2002) identified three theoretical models of persuasion: cognitive dissonance theory, ELM, TRA and its extension the TPB. All of the theories provide explanatory models for persuasion, but TRA & TPB are the ones that have received the most credible attention and undergone extensive empirical testing (O'Keefe, 2002) p.130 in a health care setting. Godin et al. (2008) found that TRA and TPB lacked granularity and hypothesized a modified TPB framework for the study of health care professionals' behaviour. However, Lambert et al. (1997) argue that psychological factors alone may not explain observed behaviour in the context of a health care value chain.

2.7 Conclusion

Evidence based medicine plays a central role in modern health care, and in recent years, health care costs have soared. Evidence needed to justify treatment interventions has also come under scrutiny from several fronts. Both patient and physician are insulated from the economic realities of treatment decisions, thus creating a need for control by payers. Hence, the autonomy of the physician to make treatment decisions has purposely been limited. The pharmaceutical industry is under duress due to patent expiry on "block buster" medicines and limited efficiency of pharmaceutical promotion. In addition, the request for information from the industry by physicians is rapidly declining and the search for new and effective channels of communications is intense.

Four general conclusions emerge from the literature reviewed in this chapter. First, the health care value chain welfare framework is helpful in identifying stakeholders and areas of decision within the health care sector. Stakeholders in the supply chain contest access to and control over three critical flows: products, money and information. Furthermore, it is clear that the physician plays a central role and retains direct influence over outcomes, but the range of outcomes is typically preselected. Second, Agency Theory and physician agency are central to understanding the context of structure and organization having a bearing on physician prescribing behaviour. Third, no grand theory of medical decision making has yet been formulated, but consensus exists around medical decisions being made under conditions of uncertainty. TRA & TPB have been extensively empirically tested and provide a credible framework for physician cognition in this context. Decision under uncertainty is based on the use of a limited number of heuristics designed to reduce the effort of judgement, but this may reduce the accuracy of the decision and lead to errors. Thus, deciding how to decide still

plays a central role. Fourth, physician education and training, control and regulatory measures, peer effect, promotion, price, clinical trial participation and drug characteristics impact the quality and quantity of prescribing in the short term. How these factors affect prescribing behaviour is largely unknown. However, source, message, receiver and contextual factors have all been postulated to have persuasive effects. Evidence suggests that source, receiver and context factors may have persuasive effects, but no such clarity exists with regards to message content.

In conclusion, the following citation from an editorial on the complexities of physician prescribing behaviour still holds true: “At this critical juncture in the evolution of pharmaceuticals and health care, the time has come for much more systematic study of the myriad factors that affect what physicians prescribe for their patients” (Naylor, 2004) p. 106.

Thus, the scoping study has identified the theoretical underpinning and factors having a bearing on physician prescribing behaviour in a health care value chain context, but there is still a need to understand how these factors affect physician prescription behaviour, in which contexts, and with what results.

Therefore, the proposed focus for the systematic review is to study literature in order to gain an understanding of the factors that influence physician prescription behaviour.

Specifically, the review will:

- Explore and map the key issues, frameworks and theoretical underpinnings of physician decision behaviour
- Investigate factors that influence physician decision behaviour when prescribing
- Investigate which factors, under which contexts may affect prescription behaviour and in what ways

CHAPTER THREE: PROJECT ONE

The first chapter, the linking commentary, provided a synthesis of the entire research presented in this thesis. This and subsequent chapters examine specific areas in more detail, starting with a systematic literature review addressing the gap identified in Chapter Two, the Scoping Study. Specifically, this chapter reviews the relevant literature concerning factors influencing physician decision making when prescribing. The chapter discusses contextual and interventional factors, employing a theoretical lens, combining three hitherto separate theories; agency, decision and behaviour. A brief review of the three theoretical domains is presented to address how they contribute in shaping this research. The research question derived from the emergent gap in literature is presented.

3.1 Introduction

It has been widely recognized that access to medical interventions necessitates physician initiative and concurrence (McGuire, 2001), and that payer driven public policy is at odds with strategies employed by the pharmaceutical industry (Hurwitz and Caves, 1988, Leffler, 1981, McGuire, 2001) within the context of a health care value chain (Stremersch, 2008, Stremersch and van Dyck, 2009). Furthermore, it is widely recognized that because medical decisions have an impact on patients' health, they should be of high quality (Klein, 2005). Factors influencing physician prescribing behaviour have been widely stated, but the linkage between these factors and evidence of how and under which circumstances (contexts) influence is exerted remains unanswered (Bornstein and Emler 2001; Bradley 1992).

The profit maximising hypothesis central to Agency Theory predicts that physicians act in a manner motivated by financial self-interest (Gaynor and Gertler 1995;McGuire 2001). Asymmetry of information may perpetuate self-interest behaviour in a manner not beneficial to either side of the value chain and thus lead to poor decisions being made on behalf of the principal (Eisenhardt 1989;McGuire 2001). Loyalty issues having a bearing on patient health may arise consequently. The practice of medicine is further complicated by the context of ethical and legal constraints on decision choices (Ma and McGuire 1997;McGuire 2001).

There appears to be consensus that decision making in medicine is performed under uncertainty (Bornstein and Emler, 2001, Elstein, 1999, Elstein and Schwarz, 2002, Payne et al., 1993, Reyna and Rivers, 2008, Spring, 2008). However, no general theory of medical decision has been formulated, but the theory of reasoned action is the most studied theoretical framework informing on the topic of physicians' decision behaviour (Reyna, 2008). Given the complexities of medical decision making and that no grand theoretical framework exists, deciding how to decide is central (Payne et al., 1993). Despite being highly trained, doctors are prone to making mistakes, and cognitive biases may detract from the use of logical and statistical decision heuristics (Hershberger et al., 1994). In summary, there is a lack of contextually sensitive evidence informing medical decision processes.

The purpose of the review is to systematically examine the literature in order to gain an understanding of the factors and contexts that influence physician prescription behaviour. Specifically, the review identifies and maps factors and contexts having a bearing on physician decision behaviour when prescribing, and provide a synthesis of what is known about these issues.

The model used for this systematic review is as outlined by Tranfield et al. (2003), drawing on elements taken from Huff (2009) and Fink (2010). Data extraction followed the methodology described by Wallace and Wray (2006). Synthesis of the data adopts a realist synthesis approach, as proposed by (Pawson et al., 2004) and (Pawson, 2006), in order to ensure a strong link with practice and policy.

This systematic review is structured as follows. It starts with an overview of the methodology employed in the review. Then a comprehensive descriptive analysis of the evidence is provided before offering a realist synthesis informing practice and policy. Following the realist synthesis, key gaps in the literature are presented. Next follows a brief overview of central theoretical constructs before a framework proposal is offered. Then, stakeholder perspectives are addressed before next steps and suggestions for future research are proposed.

Key findings of the review are summarised in tabular form. Table 3-1 Summary of systematic review – interventions, highlights the findings related to interventional factors having a bearing on physician prescribing behaviour. Table 3-2 Summary of systematic review – contexts, highlights the findings related to the contextual factors identified in the systematic review.

Table 3-1 Summary of systematic review – interventions

Interventional factors and components						
Factor	**Component**	**Effect**	**Mechanism**	**Theory**	**Influence**	**Evidence of influence**
Pharmaceutical promotion	**Detailing**	Increase demand Decrease price sensitivity	Modulate uncertainty	TPB Agency	Low	High
	Sample	Increase demand Decrease price sensitivity	Modulate uncertainty	TPB Agency	Low	High
	Academic journal advertising	Increase demand Decrease price sensitivity	Modulate uncertainty	TPB	Low	Low
Regulation and control	**Audits**	Increase guideline adherence and quality Decrease prescribing	Modulate perceived control and subjective norm	TPB Agency	Medium	Medium
	Formulary/PDL	Limit choice and decrease prescribing of branded medicines	Modulate perceived control	Agency	High	Medium
Economic	**Price/Cost**	Influence demand	Modulate perceived control and moral hazard	TPB Agency	Low	High
	Reimbursement	Limit choice and decrease prescribing of branded medicines	Modulate perceived control and moral hazard	Agency	High	Medium
	Financial incentives	Shift prescribing in line with incentives	Modulate self interest	Agency	Low	Low
	Managed care	Limit choice Decrease prescribing of branded medicines	Modulate perceived control	TPB Agency	High	High
Non-Economic	**Peer effects**	Influence prescribing in line with peer practice and guidance	Modulate uncertainty and provide a social network context for legitimate information sharing and experience	TPB	High	Medium
	Academic detailing	Increase guideline adherence	Modulate uncertainty and perceived control	TPB	High	High
	Guidelines	Improve quality of prescribing in line with available evidence	Modulate uncertainty and limit choice	TPB	Low	Medium
	Academic literature	Increase guideline adherence	Modulate uncertainty	TPB	Medium	Low
	Bio-medical	Central to all medical decisions and is the basis for uncertainty	Modulate value of belief and control belief in addition to uncertainty	TPB	High	High
	Clinical study participation	Increase prescription of study medicine and other medicines in sponsor portfolio	Modulate uncertainty and habit persistence	TPB Agency	Medium	Low
	Technology	Increase guideline adherence	Limit choice and modulate normative beliefs	TPB	Low	Medium
	Legal concerns	Limit perceived control and choice	Modulate perceived subjective norm	Agency	Low	Low

Table 3-2 Summary of systematic review – contexts

Contextual factors and components consistently present				
Factor	Component	Mechanism	Theory	Evidence of influence
Physician characteristics	Specialty	Specialty can be considered a temporal accumulation and synthesis of information which in combination with experience and social contexts provide a basis for habit persistence and modulation of uncertainty	TPB	Low
	Age	Age is considered to be a temporal axis for the development of habit persistence	TPB	Low
	Time in practice	Time in practice is considered to be a temporal axis for the development of habit persistence	TPB	Low
	Habit persistence	Habit persistence is a residue of past behaviour and experience	TPB	High
	Gender	No credible evidence to support physician gender as an independent factor has been found; however, it should be noted that women are increasingly entering the medical profession.	TPB	Low
Practice characteristics	Degree of urbanization	No credible evidence to support degree of urbanization as an independent factor has been found. Degree of urbanization is tightly linked with bio-medical influencers and no attempt to separate this aspect has been made.	TPB	Low
	Organization	No credible evidence to organization of practice as an independent factor has been found.	Agency	Low
	Academic status	No credible evidence to support academic status of practice as an independent factor has been found.	TPB Agency	Low
Patient Characteristics	Age	No credible evidence to organization of practice as an independent factor has been found. Age is tightly linked with bio-medical influencers and no attempt to separate the two has been made	TPB	Low
	Gender	No credible evidence to support patient gender as an independent factor has been found. Gender is tightly linked with bio-medical influencers and no attempt to separate the two has been made.	TPB	Low
	Expectation	No credible evidence of patient expectation as an independent factor has been found; however, the physicians' perception of patient expectation may be an influencing factor.	TPB Agency	Low
	Bio-medical	Bio-medical factors lie at the core of any medical decision as is evident in the medical literature and is tightly linked with uncertainty.	TPB	High
	Social	No credible evidence of patient social status as an independent factor has been found. Social status is tightly linked with bio-medical influencers and no attempt to separate the two has been made	TPB	Low
Medicine attributes	Efficacy and safety	Modulate uncertainty	TPB	High

3.2 Research Methodology

3.2.1 Objectives & Scope

The purpose of the review is to study the literature in order to gain an understanding of the factors and contexts that influence physician prescription behaviour.

Specifically, the review will:

- Identify and map factors and contexts having a bearing on physician decision behaviour when prescribing

The scope of the review is highlighted in Table 3-3 Scope of systematic review.

Table 3-3 Scope of systematic review

Focus	The focus of the review is on factors and contexts influencing physician prescription behaviour. Source: knowledge must be produced by organizations adhering to accepted academic methods of inquiry and be research based. Content: knowledge must be generated following academically accepted methodologies and aligned with appropriate epistemologies.
Time Frame	Searches will be conducted from 1980 onwards, as this denotes the time from which modern regulation of promotion of medicines was instituted. Literature earlier than this will be included if cross referenced within the original search frame.
Language	English only
Discipline	The review will examine the management, marketing, health economics, psychology and medical literature. List is not exhaustive, and flexibility will be key to extracting available information.

3.2.2 Search Strategy

The nature of research into physician prescribing behaviour makes it difficult to confine available literature into one specific domain (Mikkelsen, 2010). Therefore, the search strategy included databases and literature covering medicine, marketing, economics, health care, policy health technology assessment and decision-making. Consequently, the search for publications addressing the research question was conducted in citation databases, grey literature (SIGLE: International System for Grey Literature), references from other sources and manual searches of specific journals.

The following citation databases were searched:

- MEDLINE
- EMBASE
- PROQUEST
- EBSCO
- Web of Science
- Science Direct
- Emerald
- PsycINFO
- ERIC
- Cochrane Trials Database

- Index to Thesis

In addition, references from the following sources were also included in the review:

- References suggested by the review panel, knowledgeable researchers and practitioners
- List of references from selected papers
- Personal library (1050 books and articles)

SIGLE was searched, but only contained unpublished work more than three years old. The protocol pre-specified that only unpublished work of 2 years or less would be included, thus SIGLE was not included in the review.

Finally, manual searches based on findings from the scoping study were performed in the following sources:

- International Journal of Research in Marketing
- Journal of Marketing
- Journal of Law and Economics
- Social Science Medicine
- The Academy of Management Review
- Marketing Research
- Medical Decision Making
- Management Science
- Journal of Advertising Research
- Journal of the American Medical Association
- British Medical Journal

The search terms listed in Table A-3 Systematic review search terms were used to locate relevant studies and documents. These search terms were combined into search strings in the different databases to be combined as appropriate (see Table A-10 Systematic review search strings for details).

3.2.3 Information and Data Handling

The details (database collections, search strings, number of documents retrieved and number of documents initially selected) of the searches were captured and documented in Microsoft Excel using two by two tables including a unique identifier for further tracking. EndNote X5 was used for citation storage and management. Microsoft Excel 2010 and SPSS 19 were used for analysis and synthesis of data.

3.2.4 Selection of Publications

The selection of publications to be included in the systematic review was achieved through a predefined staged approach.

3.2.4.1 Stage 1: Selection by Title and Abstract

Papers were selected if they addressed the following aspects:

- Frameworks and theoretical underpinnings of physician decision behaviour having a bearing on prescription behaviour

- Factors, interventions and contexts that influence physician decision behaviour

3.2.4.2 Stage 2: Selection by Full Text

Documents selected at stage 1 underwent a second selection stage with the following criteria:

- Conceptual overview: papers included were those that addressed the key issues, framework and theoretical underpinnings of physician prescription behaviour.
- Review of factors and contexts influencing physician prescription behaviour: Papers exploring factors and/or contexts influencing physician decision behaviour when prescribing were included at this step.

3.2.5 Quality Appraisal & Review Panel

Quality Appraisal criteria has been adapted from (Tranfield, Denyer, & Smart 2003) and was applied to and documented for all literature selected for inclusion at stage 2. Only literature appraised as being of high and medium quality was included in the review. Furthermore, non-peer reviewed literature was appraised by a second reviewer (Dr. Javier Marcos), and judgement on reputability of source was made. Only non-peer reviewed literature from a reputable source, such as academic and government institutions, having passed the quality appraisal criteria by the second reviewer, was included in the review. The review panel served as the final decision authority for all literature included in the review.

The review panel consisted of the reviewer (Yngve Mikkelsen), lead supervisor (Dr. Javier Marcos), a senior academic supervisor (Professor Hugh Wilson) and senior academic supervisor (Professor Simon Knox).

Table 3-4 Review panel members

Person	Role / Title and organization
Yngve Mikkelsen MD	Researcher, doctoral student, Cranfield School of Management
Dr. Javier Marcos	Lead supervisor, lecturer, Cranfield School of Management.
Prof Simon Knox	Senior supervisor, professor, Cranfield School of Management
Prof Hugh Wilson	Senior supervisor, professor, Cranfield School of Management

3.2.6 Descriptive Analysis and Data Extraction

The data was extracted from the studies and input into EndNote X5, and subsequently into Microsoft Excel 2010 and SPSS 19 (please refer to Table A-6 Data extraction form and Table A-12 Systematic review data extraction results for details). After extracting the data for the descriptive analysis, relevant information was imported and coded in SPSS 19. Furthermore, a factor analysis was performed to quantitatively interrogate the dataset for common themes and validate the selection of themes for further analysis and synthesis of the evidence.

3.2.7 Synthesis and Analysis

A qualitative synthesis of the publications selected for review was conducted using the framework proposed by Wallace and Wray (2006). Emerging themes were identified and grouped into dimensions following a retroductive analysis approach.

Table 3-5 Principles of synthesis summarizes some principles of good synthesis methods (Tranfield et al., 2003) and how the synthesis strategy of this systematic review met these principles.

Table 3-5 Principles of synthesis

Principles	Strategy: Approach and methods
Synthesis method appropriate to research	1. Explore and map the key issues, frameworks and theoretical underpinnings of physician decision behaviour having a bearing on prescription behaviour 2. Investigate factors that influence physician decision behaviour, 3. Investigate contexts under which these factors influence physician decision behaviour.
Cope with diffuse and heterogeneous data	Summaries of the studies following the Wallace and Wray framework will be import into SPSS 19 facilitating handing of diffuse and heterogeneous data.
Transparency and detail of content allowing reader to adequately gauge quality of method, data and conclusion	Transparent and exhaustive referencing of material included in the review will allow the reader to interpret and validate the conclusions of the review.
Ensure audit trail	Studies included and excluded from the review will be reported. Comprehensive descriptive analysis tables and coding in SPSS 19 will provide audit trials.

3.3 Descriptive Analysis of the Literature

In this section, the high-level results from the systematic review will be presented, with the aim to clearly map the structure of the literature addressing the research question. In order to structure the presentation of data from 160 articles, a subject matter approach was chosen, as suggested by (Leonard, 2001). This approach consists of grouping articles according to subject headings assigned by the researcher, following an inductive approach. However, due to the complexity and amount of data available, it became apparent that retroductive analysis alone would not suffice. Consequently, a factor analysis of the data was performed to aid in the determination and validation of appropriate subject matter headings.

Based on the factor analysis, described in detail below, data is presented and structured in separate sections. Before presenting the data, the search results and selection flow are briefly described. Then, an overview of key literature dimensions related to the publications (type of intellectual project, study type, level of measurement, publication date, geography, level of influence and evidence) is provided. Next, data related to physician (specialty, age, gender, and time in practice) and practice characteristics are presented, followed by data on patient characteristics. After this, data on therapy area and medicine attributes

are presented, along with data on pharmaceutical promotion (detailing, samples, journal advertising), before presenting data on regulation and control. Then, economic factors and, finally, data on non-economic factors are addressed before a summary is offered.

3.3.1 Search Results

The initial search included publications from 1980 to 2011, and August 30th 2011 was chosen as the cut-off point for inclusion. The search yielded 3030 publications, including 783 duplicates, leaving 2243 publications for title and abstract review. Title and abstract review identified 1794 publications as not relevant or of inferior quality, leaving 453 publications for full text review. The full text review identified 253 publications as not relevant and 33 of low quality. Thus, 160 articles were finally included in the review; please see Figure 3-1 Search flow chart.

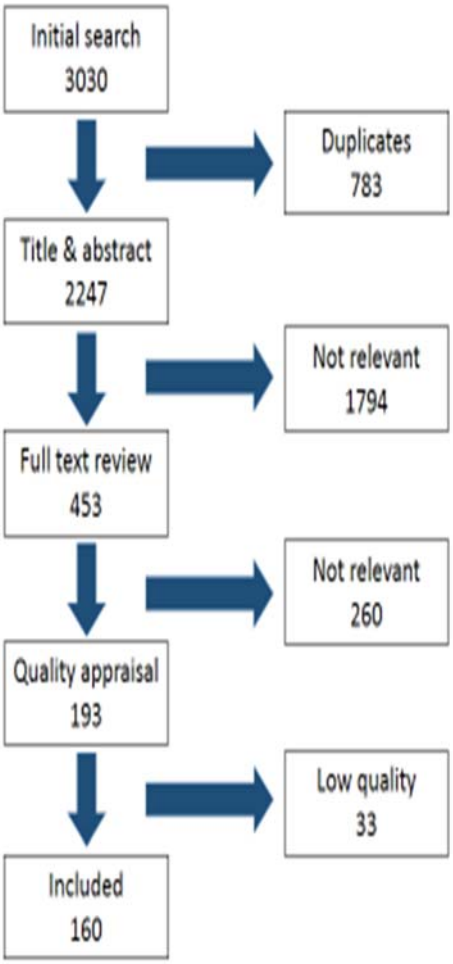

Figure 3-1 Search flow chart

3.3.2 Organizing the Literature Using Factor Analysis

In this study, the author employs factor analysis to interrogate the data set to identify complex interrelationships among items and group items that are part of unified concepts, thus forming the basis of a data reduction strategy. Factor analysis allows using information about interdependencies between observed variables to reduce a set of variables in large datasets, thus it was considered appropriate. It complements and strengthen the summary of findings by the use of regression modelling techniques to identify groups of inter-related variables.

Using the data variables captured during the review, a categorical coding structure was constructed, as can be seen in Table 3-6 Coding structure for factor analysis. The dataset was then evaluated by using Kaiser- Meyer-Olkin[2] (KMO) measure of sampling adequacy and Bartlett's test of sphericity[3]. The aim of these tests is to assess whether the dataset is adequately sampled and if correlations between the variables exist or not; in other words, to test whether a factor analysis of the data is appropriate.

[2] KMO measure of sampling adequacy is a test to assess the appropriateness of using factor analysis on the data set

[3] Bartlett' test of sphericity is used to test the null hypothesis that the variables in the population correlation matrix are uncorrelated

Table 3-6 Coding structure for factor analysis

Coding structure for factor analysis																	
				Physician characteristics													
Code	Geography	Level of measurement	Wallace & Wray	Specialty	Age	Gender	Time in practice	Practice characteristics	Patient characteristics	TA category	Medicine attribute	Pharmaceutical promotion	Regulation and control	Economic factors	Non-economic factors	Influence	Evidence
0	North-America	Physician		Specialist	<30	Male>50%	<10	Office based	Gender	Metabolic	Efficacy	Detailing	Audits	Price/Cost	Peer effect	Low	Low
1	South-America	Patient		GP	31-50	Female>50%	>10	Hospital based	Age	Gastrointestinal	Safety	Gifts	Formularies and PDLs	Reimbursement	Academic detailing	Medium	Medium
2	Asia	Prescription			>50				Attitude and preference	Infection and immunology		Samples		Financial incentives	Guidelines	High	High
3	Oceania	Practice							Information	Oncology		Journal advertising		Managed Care	Biomedical influence		
4	Europe	Study							Diagnosis	Pain and inflammation		Sponsored CME			Academic literature		
5	Middle East									Psychiatry					Clinical study participation		
6										Respiratory					Technology		
7										Urology					Legal concerns		
8	Mix			Mix				Mix	Mix	Mix	Mix	Mix	Mix	Mix	Mix		
9	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing	Missing

As noted in Table 3-7 KMO and Bartlett's Test, the KMO value was 0.538 and Bartlett's test of sphericity significant with a p value of < 0.0001. This indicates that the data set is adequately sampled and that a factor analysis of the data can be adequately performed.

The results of the factor analysis before rotation can be seen in Table 3-8 Structure matrix (factor analysis). It shows that component 1 may be composed of physician and practice characteristics; in addition, geography may be a constituent of the component. However, geography and clinical medicine is in itself a field of study (geographical medicine) looking at the interaction of health and factors such as location (spatial), social, financial and functional (Twigg, 2002). Other fields of study that may have a bearing on the subject are epidemiology, climatology and demography. For these reasons, geography is not considered as a part of component 1, but is instead addressed separately below. Component 2 is related to medicine attributes, component 3 to economic factors, component 4 to patient characteristics, component 5 to non-economic factors and, finally, component 6 to regulation and control.

Table 3-7 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.538
Bartlett's Test of Sphericity	Approx. Chi-Square	134.713
	Df	45
	Sig.	.000

Table 3-8 Structure matrix (factor analysis)

	Component					
	1	2	3	4	5	6
Physician characteristics	.769	.139	.014	.095	.202	-.288
Practice characteristics	.791	.084	-.082	-.011	.328	-.203
Patient characteristics	.030	-.023	.072	.866	-.054	.026
Therapy area	.246	.151	-.459	.435	.226	-.355
Medicine attributes	.010	.806	.249	.155	.145	.121
Pharmaceutical promotion	-.012	.676	-.229	-.361	-.331	-.260
Regulation & Control	-.110	-.008	.028	-.031	-.045	.885
Economic factors	.016	.149	.894	.079	-.029	-.052
Non-Economic factors	.148	.022	-.099	-.017	.894	-.068
Geography	.734	-.170	-.064	.133	-.217	.226

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

In order to confirm the component structure of the data set, a non-linear rotation (direct Oblimin with Kaizer normalization[4]) was performed with delta set at zero. The results can be seen in Table 3-9 Pattern matrix (factor analysis), depicting the pattern matrix where the rotation converged after 20 iterations. The pattern matrix overlaps the findings seen in the initial structure matrix, thus confirming the factor analysis. However, the component correlation matrix (see Table 3-10 Component correlation matrix (factor analysis)) shows relatively little correlation

[4] The Kaiser's normalization tends to decrease the standard errors of the loadings for the variables with small communalities and to increase those of the correlations among oblique factors.

between components. This is to be expected, as authors have previously noted that physician behaviour is complex and that any successful strategy to influence it will have to be multifaceted (Segal and Wang, 1999). Furthermore, it has been widely stated that physician characteristics may only explain 20-30 per cent of the observed variation in prescribing (Hemminki, 1975, Denig and Haaijer-Ruskamp, 1992, Segal and Wang, 1999).

Table 3-9 Pattern matrix (factor analysis)

	Component					
	1	2	3	4	5	6
Physician characteristics	.739	.092	.091	.012	.095	-.196
Practice characteristics	.762	.044	-.011	-.106	.238	-.088
Patient characteristics	-.040	.002	.044	.878	-.117	.009
Therapy area	.126	.130	-.429	.423	.139	-.255
Medicine attributes	-.003	.829	.204	.160	.132	.216
Pharmaceutical promotion	.008	.661	-.219	-.314	-.351	-.185
Regulation & Control	-.020	.109	-.087	-.023	.046	.912
Economic factors	.061	.112	.912	.056	-.040	-.147
Non-Economic factors	.053	-.003	-.079	-.091	.897	.038
Geography	.790	-.142	-.047	.076	-.282	.273

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Table 3-10 Component correlation matrix (factor analysis)

Component	1	2	3	4	5	6
1	1.000	.024	-.071	.100	.115	-.111
2	.024	1.000	.021	-.023	.032	-.127
3	-.071	.021	1.000	.024	-.021	.124
4	.100	-.023	.024	1.000	.079	-.006
5	.115	.032	-.021	.079	1.000	-.101
6	-.111	-.127	.124	-.006	-.101	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

3.3.3 Key Literature Dimensions

In this section, key dimensions of the literature included in the systematic review are presented. First, an overview of the type- of intellectual projects undertaken by the authors is provided. Next, data on types of studies and level of measurements are presented. Following this, information about the time of publication before presenting information related to geography is provided. Finally, evidence related to level of influence and evidence is detailed.

3.3.3.1 Wallace & Wray Framework

Wallace and Wray's framework categories (Wallace and Wray, 2006) are summarized in Table 3-11 Wallace and Wray Framework. For further details on the framework, please consult the Glossary of Terms on page xxiii. From the data, it is revealed that 52% of the articles are knowledge-for-critical review intellectual projects. This implies that there may be an inherent tendency for a critical view of the factors influencing physician prescribing behaviour in the available literature. It has been previously noted that this may represent an inherent critical bias of

interventions designed to influence physician prescribing behaviour, with special focus on pharmaceutical promotion (Gallan, 2005).

Table 3-11 Wallace and Wray Framework

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Knowledge-for-understanding	47	29.4	29.4	29.4
	Knowledge-for-action	30	18.8	18.8	48.1
	Knowledge-for-critical review	83	51.9	51.9	100.0
	Total	160	100.0	100.0	

3.3.3.2 Type of Study and Level of Measurement

Of the 160 included articles, 138 (86.3%) were quantitative, 14 (8.8%) qualitative and 8 (5.0%) literature reviews; see Table 3-12 Study type for details. Only two (1.3%) meta-analyses were included (Pearson et al., 2009, Pippalla et al., 1995). In most cases (65%), the physician was the level of measurement, followed by patient (15%) prescription (9.4%) and practice (4.4%); see Table 3-13 Level of measurement. The level of measurement in the quantitative group spanned all levels of measurement; however, in the qualitative group, physician was the only level of measurement. From the above, it is therefore evident that the majority of the authors included in this systematic review have adopted a positivist epistemology.

Table 3-12 Study type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Quantitative	138	86.3	86.3	86.3
	Qualitative	14	8.8	8.8	95.0
	Literature review	8	5.0	5.0	100.0
	Total	160	100.0	100.0	

Table 3-13 Level of measurement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Physician	104	65.0	65.0	65.0
	Patient	24	15.0	15.0	80.0
	Prescription	15	9.4	9.4	89.4
	Practice	7	4.4	4.4	93.8
	Study	10	6.3	6.3	100.0
	Total	160	100.0	100.0	

3.3.3.3 Publication Year

In this systematic review, 160 articles from the period 1976 to 2011 were included. Figure 3-2 Frequency distribution by year of publication, depicts the frequency distribution by publication year. Approximately 80% of the publications have been published from 2000 onwards. The low number in 2011 is partly due to the cut-off date for the review (ultimo August 2011). The rise in number of publications post 2000 may be an indication of increased interest in the subject

matter, driven by continued focus on the accelerating growth in spends on prescription medicines.

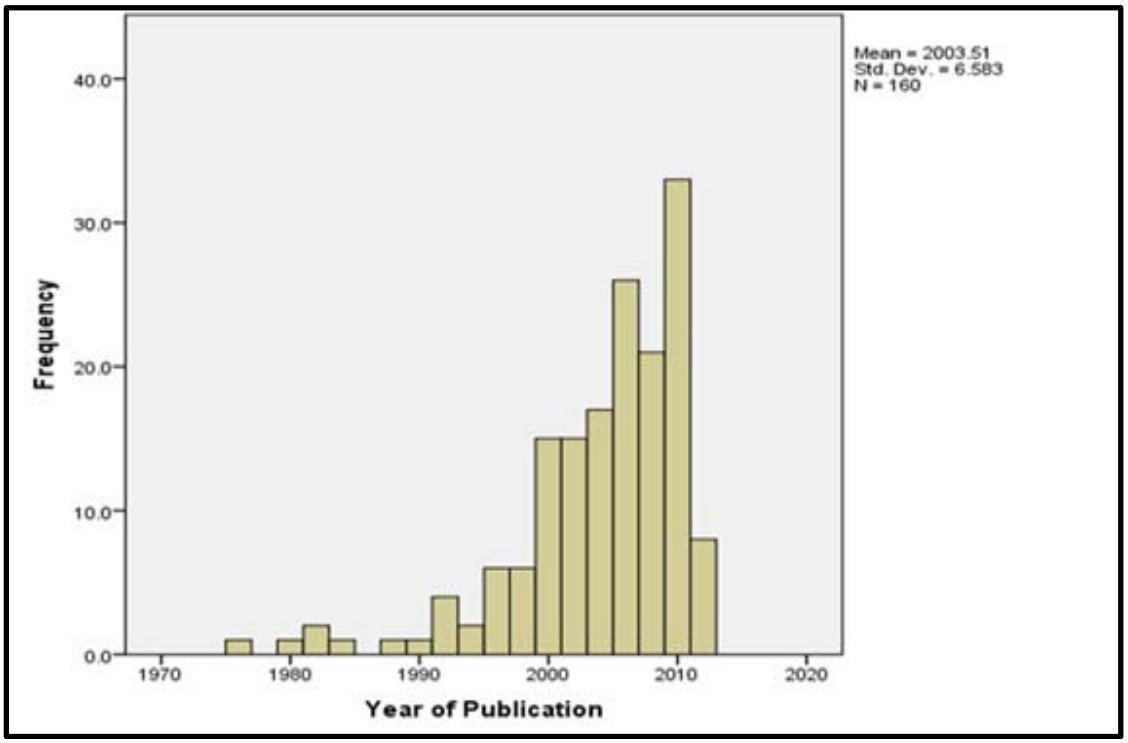

Figure 3-2 Frequency distribution by year of publication

3.3.3.4 Geography

There is good geographical representation in the sample included in this systematic review. However, Europe and North America account for more than 90%, with 47.5% and 43.8%, respectively; please see Table 3-14 Geography for details. The rest of the world (ROW) representation is comprised of 10 (6.3%) articles. There are only a few articles, four in total (2.5%), addressing cross-country effects.

Table 3-14 Geography

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	North-America	70	43.8	43.8	43.8
	Latin-America	1	.6	.6	44.4
	Asia	2	1.3	1.3	45.6
	Australia & NZ	5	3.1	3.1	48.8
	Europe	76	47.5	47.5	96.3
	Middle-East	1	.6	.6	96.9
	Africa	1	.6	.6	97.5
	Mix	4	2.5	2.5	100.0
	Total	160	100.0	100.0	

3.3.3.5 Literature Domains

The publications included in the systematic review come from 108 different journals spanning five literature domains: medicine, marketing, economy, policy and health technology assessment (HTA); please see Table 3-15 Literature domains for details. The majority of articles (78.3%) have been published in journals covering one or more of the medical disciplines. Journals from the marketing domain account for 9.3% of the publications. Only a few publications come from policy and decision making domains of the literature, with 1.9% and 1.2%, respectively. Finally, the HTA domain accounts for 4.3% of the publications.

Table 3-15 Literature domains

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Medicine	126	78.3	78.3	78.3
	Marketing	15	9.3	9.3	87.6
	Economy	8	5.0	5.0	92.5
	Policy	3	1.9	1.9	94.4
	Decision making	2	1.2	1.2	95.7
	Health technology assessment	7	4.3	4.3	100.0
	Total	160	100.0	100.0	

The majority of journals (75.9%) represent one publication, and 24.1% of the journals represent more than one publication. The average number of publications per journal in the sample is 1.49 with a range of 1 – 7; please see Table A-11 Journals included in the review for details.

3.3.3.6 Level of Influence and Evidence

For the papers selected for this systematic review, the level of influence and the strength of the evidence of influence were assessed; see Table 3-16 Level of Influence and Table 3-17 Level of evidence for details. Please refer to the section on methodology (page 85) for details on the assessment of influence and evidence. As per protocol (see Appendix A.1 Protocol on page 317), only publications representing medium to high levels of evidence were included.

Table 3-16 Level of influence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	57	35.6	35.6	35.6
	Medium	87	54.4	54.4	90.0
	High	16	10.0	10.0	100.0
	Total	160	100.0	100.0	

Table 3-17 Level of evidence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Medium	130	81.3	81.3	81.3
	High	30	18.8	18.8	100.0
	Total	160	100.0	100.0	

At first glance, there appears to be a higher level of both influence and evidence in the quantitative study category; please see Table 3-18 Study type by level of evidence (cross tabulation) and Table 3-19 Study type by level of influence (cross tabulation). However, when accounting for the absolute numbers in each group, the percentage distribution is very similar. Furthermore, geography does not seem to influence level of influence or evidence; please see Table 3-20 Geography by level of influence (cross tabulation).

Table 3-18 Study type by level of evidence (cross tabulation)

		Level of Evidence		Total
		Medium	High	
Study type	Quantitative	113	25	138
	Qualitative	14	0	14
	Literature review	3	5	8
Total		130	30	160

Table 3-19 Study type by level of influence (cross tabulation)

		Level of Influence			Total
		Low	Medium	High	
Study type	Quantitative	51	74	13	138
	Qualitative	4	8	2	14
	Literature review	2	5	1	8
Total		57	87	16	160

Table 3-20 Geography by level of influence (cross tabulation)

		Level of Influence			Total
		Low	Medium	High	
GEOGRAPHY	North America	19	40	11	70
	Europe	34	43	3	80
	ROW	4	4	2	10
Total		57	87	16	160

3.3.4 Physician- and Practice Characteristics

Physician characteristics include specialty, age, gender and time in practice. Information on physician specialty was available in 72.5% of the articles included in the systematic review and is shown in detail in Table 3-21 Physician specialty. The data are presented in three categories: general practitioners, specialists and a mixture of both general practitioners and specialists.

The category “Specialists” contains a variety of medical specialties. The literature is not consistent on medical specialty included in the studies. Furthermore, medical specialties are not geographically homogenous, as education and regulatory requirements differ between countries (UEMS, 1993).

Table 3-21 Physician specialty

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	General practitioner	71	44.4	61.2	61.2
	Specialist	25	15.6	21.6	82.8
	Mix	20	12.5	17.2	100.0
	Total	116	72.5	100.0	
Missing	Missing	44	27.5		
Total		160	100.0		

Information about physician age is available in 28 (17.5%) of the articles. The information is categorized and presented in Table 3-22 Physician age. Only a limited number of physicians in the included articles are under the age of 30 years, as is expected due to the extended duration of medical education. The majority of information (71.4%) addressing physician prescribing behaviour and age comes from study populations between 30 and 50 years of age.

Table 3-22 Physician age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 30 years	1	.6	3.6	3.6
	30 - 50 years	20	12.5	71.4	75.0
	> 50 years	7	4.4	25.0	100.0
	Total	28	17.5	100.0	
Missing	Missing	132	82.5		
Total		160	100.0		

Information about physician gender is available in 29 (18.1%) of the articles included in the systematic review; please see Table 3-23 Physician gender for details. Of the 29 articles, 23 (79.3%) are based on a study population containing more than 50% males. More than 50% female representation can be seen in 6 (20.7%) of the publications. In other words, approximately 80% of the information addressing physician prescribing behaviour is based on studies dominated by an overweighting of males in the study sample.

Table 3-23 Physician gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	> 50% male	23	14.4	79.3	79.3
	> 50% female	6	3.8	20.7	100.0
	Total	29	18.1	100.0	
Missing	Missing	131	81.9		
Total		160	100.0		

Information about time in practice is available from 18 (11.3%) of the articles included in the systematic review. Please see Table 3-24 Time in practice for details. 17 (94.4%) of the articles include information on physicians with more

than 10 years in practice. Therefore, little information about those with less than 10 years in practice is available for this review.

Table 3-24 Time in practice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 10 years	1	.6	5.6	5.6
	> 10 years	17	10.6	94.4	100.0
	Total	18	11.3	100.0	
Missing	Missing	142	88.8		
Total		160	100.0		

Information about practice characteristics is available from 94 (58.8%) of the articles included in the systematic review. The majority of publications containing practice characteristics (N=74, 78.7%) can be categorized as office based practices. Office based practice types include solo, double and group practices (three or more physicians). Hospital based practices (n=14, 14.9%) are those associated with a hospital, either academic or non-academic. In six publications (6.4%), there is a mixture of office and hospital based practice; please see Table 3-25 Practice characteristics. As expected, there is a clear association between office characteristics and physician specialty; please see Table 3-26 Physician specialty by practice characteristics. Office based practices are mainly staffed by general practitioners, and conversely, hospital based practices are mainly staffed by specialists.

Table 3-25 Practice characteristics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Office based	74	46.3	78.7	78.7
	Hospital based	14	8.8	14.9	93.6
	Mix	6	3.8	6.4	100.0
	Total	94	58.8	100.0	
Missing	Missing	66	41.3		
Total		160	100.0		

Table 3-26 Physician specialty by practice characteristics

		Practice Characteristics			
		Office based	Hospital based	Mix	Total
Physician Speciality	General practitioner	57	0	0	57
	Specialist	4	10	3	17
	Mix	7	1	3	11
Total		68	11	6	85

3.3.5 Patient Characteristics

Information about patient characteristics can be found in 57 (35.6%) publications; please see Table 3-27 Patient characteristics. Patient characteristics described in the publications included in the systematic review contain information about gender, age, attitude/preference/expectations, and provision of information, biomedical and social factors. The most prevalent patient characteristics

mentioned in the publications included are gender (n=20, 35.1%) and attitude/preference/expectations (n=17, 29.8%). Biomedical factors can be found in 8 (14%) of the publications and are related to the diagnostic process or the diagnosis itself. Information about social factors and provision of information can be found in six (10.5%) publications.

Table 3-27 Patient characteristics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Gender	20	12.5	35.1	35.1
	Age	6	3.8	10.5	45.6
	Attitude/Preference	17	10.6	29.8	75.4
	Information	3	1.9	5.3	80.7
	Biomedical	8	5.0	14.0	94.7
	Social	3	1.9	5.3	100.0
	Total	57	35.6	100.0	
Missing	Missing	103	64.4		
Total		160	100.0		

3.3.6 Therapy Area and Medicine Attributes

Information on therapeutic area can be found in 130 (81.3%) of the publications included in the systematic review; please see The large proportion in the mix category is due to the fact that general practice is highly represented in this category; see Table 3-29 Therapeutic area category by physician specialty.

Information about medicine attributes can be found in 17 (10.6%) of the publications included in this review; please refer to attributes for details. Medicine attributes is related to efficacy and safety or a combination of the two (benefit-risk).

Table 3-28 Therapy area category

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CV/Metabolic	23	14.4	17.7	17.7
	Gastroenterology	5	3.1	3.8	21.5
	Infection/Immunology	12	7.5	9.2	30.8
	Oncology	6	3.8	4.6	35.4
	Pain/Inflammation	13	8.1	10.0	45.4
	Psychiatry	14	8.8	10.8	56.2
	Respiratory	10	6.3	7.7	63.8
	Urology	3	1.9	2.3	66.2
	Mix	44	27.5	33.8	100.0
	Total	130	81.3	100.0	
Missing	Missing	30	18.8		
Total		160	100.0		

Table 3-29 Therapeutic area category by physician specialty

		Physician Speciality			
		General practitioner	Specialist	Mix	Total
Therapeutic Area Category	CV/Metabolic	11	3	5	19
	Gastroenterology	1	2	1	4
	Infection/Immunology	6	5	0	11
	Oncology	1	3	0	4
	Pain/Inflammation	2	4	1	7
	Psychiatry	5	2	1	8
	Respiratory	9	0	1	10
	Urology	1	1	0	2
	Mix	26	2	7	35
Total		62	22	16	100

Table 3-30 Medicine attributes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Efficacy	6	3.8	35.3	35.3
	Safety	6	3.8	35.3	70.6
	Mix	5	3.1	29.4	100.0
	Total	17	10.6	100.0	
Missing	Missing	143	89.4		
Total		160	100.0		

3.3.7 Pharmaceutical Promotion

Information about pharmaceutical promotion can be found in 26 (16.3%) of the publications included in the systematic review; please see Table 3-31 Pharmaceutical promotion for details. Pharmaceutical promotion is related to detailing by sales force representatives, the provision of samples, journal advertising and a mixture of the above. Detailing and mix categories account for 22 (84.6 %) of the publications related to pharmaceutical promotion. Samples and journal advertising trail with two publications each. There are a high proportion of knowledge-for-critical review intellectual projects represented in the literature addressing pharmaceutical promotion. In total, 21 (80.1%) out of 26 publications take critical perspective, with equal distribution across promotional tools. As mentioned previously, this may represent an inherent critical bias of pharmaceutical industry interventions designed to influence physician prescribing behaviour, as noted by (Gallan, 2005) among others.

Detailing refers to sales face-to-face visits by industry representatives. This has been the preferred way of promotion by the pharmaceutical industry for more than a century (Leffler, 1981), and is addressed directly in 11 (6.9%) publications. The provision of free medicine samples is based on the assumption that it does more good than harm and is addressed in two publications. Journal advertising is addressed in two publications and represents advertising in academic journals directed at physicians of different specialities and subspecialties. Effective promotion often involves the use of several promotional instruments. The effect of a mix of promotional interventions is addressed in 11 (6.9%) publications.

Table 3-31 Pharmaceutical promotion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Detailing	11	6.9	42.3	42.3
	Samples	2	1.3	7.7	50.0
	Journal advertising	2	1.3	7.7	57.7
	Mix	11	6.9	42.3	100.0
	Total	26	16.3	100.0	
Missing	Missing	133	83.1		
	System	1	.6		
	Total	134	83.8		
Total		160	100.0		

3.3.8 Regulation and Control

Information about regulation and control can be found in 16 (10.0%) of the publications included in the systematic review. The authors in this section address the effect of audits, formularies and preferred drug lists (PDLs). Audits in this context imply checks by regulatory agencies to ensure compliance with prescribing regulations. Formularies and preferred drug lists limit the spectrum of choice under which the physician is free to prescribe and are addressed in seven publications, see Table 3-32 Regulation and control.

Table 3-32 Regulation and control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Audits	9	5.6	56.3	56.3
	Formularies/PDLs	7	4.4	43.8	100.0
	Total	16	10.0	100.0	
Missing	Missing	144	90.0		
Total		160	100.0		

3.3.9 Economic Factors

Information about economic factors can be found in 38 (23.8%) of the publications included in the systematic review. Economic factors include price/cost (n=10), reimbursement (n=7), financial incentives (n=4), managed care (n=8) and a mixture of the above (n=9), see Table 3-33 Economic factors.

Price and cost of medicines are thought to influence prescribing behaviour by physicians. Price sensitivity plays a special role due to the complexities of multiple agency relationships and strict price regulation (Kremer et al., 2008). The phenomenon has been investigated in 10 publications included in this review. Reimbursement transfers cost of prescribing from patient or end user to a central payer. The payer will often be a government agency, managed care organization or insurance company. Information about reimbursement is found in seven publications included in this review. Financial incentives are thought to influence prescribing behaviour, as financial theory postulates that behaviour is driven by the fulfilment of a person's desire to increase his/her own benefit. This topic is addressed in four publications included in this review. Managed care represents

systems designed to finance and provide health care to patients enrolled in the programme. Central to managed care is the intention to reduce the cost of health care delivery. Information on managed care is found in eight publications. Mixed factor effects are addressed by several authors and can be found in nine publications included in this review.

Table 3-33 Economic factors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Price/Cost	10	6.3	26.3	26.3
	Reimbursement	7	4.4	18.4	44.7
	Financial Incentives	4	2.5	10.5	55.3
	Managed Care	8	5.0	21.1	76.3
	Mix	9	5.6	23.7	100.0
	Total	38	23.8	100.0	
Missing	Missing	122	76.3		
Total		160	100.0		

3.3.10 Non-Economic Factors

Information about non-economic factors can be found in 115 (71,8%) of the articles included in the systematic review; please see Table 3-34 Non-economic factorsfor details. Non-economic factors are numerous and are categorized as follows: peer effects (n=5), academic detailing (n=15), guidelines (n=7), biomedical influence (n=13), academic literature (n = 8), clinical study participation (n=3), technology (n=14), legal concerns (n=3) and a mixture (n=13).

Peer effects are concerned with the effect that physicians have on each other when it comes to prescribing. Most of the literature is concerned with the effect of key opinion leaders (KOLs) on prescribing behaviour. Academic detailing is concerned with the provision of information in an academic context. This form of detailing takes place in different formats, but face-to-face is the most frequent modality. Guidelines have a central place in evidence-based medicine and are prescriptive in nature when it comes to the prescribing of medicines. Biomedical influence is concerned with the diagnostic process or the diagnosis itself; the category addresses the influence in the spectrum of diagnostic tests to disease severity across therapeutic areas. Academic literature is concerned with the effect of medical journals as an information source on physician prescribing behaviour. Clinical study participation is concerned with the effect of a physician being an investigator in a clinical study on physician prescribing behaviour. Technology is concerned with the use of technological tools to influence physician prescribing behaviour. Legal concerns addresses the effect legal consequences of medical practice have on physician prescribing behaviour. Several authors also address the influence on physician prescribing across a spectrum of non-economic factors.

Table 3-34 Non-economic factors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Peer effects	5	3.1	3.1	3.1
	Academic detailing	15	9.4	9.4	12.5
	Guidelines	7	4.4	4.4	16.9
	Bio-medical influence	13	8.1	8.1	25.0
	Academic literature	8	5.0	5.0	30.0
	Clinical study participation	3	1.9	1.9	31.9
	Technology	14	8.8	8.8	40.6
	Legal factors	3	1.9	1.9	42.5
	Mix	13	8.1	8.1	50.6
	Missing	45	28.1	28.1	78.8
	Other	34	21.3	21.3	100.0
	Total	160	100.0	100.0	

3.4 Realist Synthesis

The review identified two categories of influencers: contexts, a set of circumstances or facts surrounding prescription events; and interventions, in other words, proactive techniques, processes or actions introduced to create change. In this section, a realist synthesis of the data captured in the systematic review is presented, following the convention and consequent structure made implicit by the separation of context and intervention.

Therefore, contexts (physician characteristics, practice characteristics, patient characteristics, therapeutic area medicine attributes, and geography) are firstly addressed. Then, interventions (pharmaceutical promotion, regulation and control, economic factors and non-economic factors) are addressed separately, taking into account the contexts in which these interventions are applied. Theoretical considerations and a summary are provided for each category, and concluding remarks are made at the end of the section.

3.4.1 Contexts

In this section, the consistently present contextual factors are presented; these include physician characteristics, practice characteristics, patient characteristics, therapeutic area, medicine attributes, and geography.

3.4.1.1 Physician Characteristics

Physician characteristics have been suggested as a factor which may influence physician prescribing (Bradley, 1992). This review has identified specialty, age, time in practice, habit persistence and gender as physician characteristics. Since these characteristics are static at the time of prescription, it may reasonably be argued that physician characteristics constitute contextual components rather than interventions. In this section, the physician characteristics identified in the literature are addressed sequentially, before a summary is provided. However, it is worth noting that physician age, time in practice and habit persistence are all temporal in nature and are therefore addressed together.

3.4.1.1.1 Specialty

Pharmaceutical promotion and regulatory intervention are often directed to physicians (Gagnon and Lexchin, 2008, Gill et al., 1999), and this makes specialty a relevant context to investigate. The literature divides physicians into two main categories for comparison: specialists and general practitioners (GPs). Further division of the literature can be made into studies showing a relationship between specialty and physician prescribing behaviour and those that show little or no such association.

Jones et al. (2001) explored specialists' and general practitioners' perceptions of factors that influence their decisions to introduce new medicines into their clinical practice. The authors found that GPs generally prescribed more medicines that are new and for a wider range of conditions, but their approach varied considerably both between general practitioners and between medicines for the same general practitioner. Furthermore, the authors found that pharmaceutical sales representatives were an important source of information for GPs. However, specialists mainly used scientific literature and meetings to inform prescribing decisions and usually prescribed only a few new medicines relevant to their specialty. In another study, Biga et al. (2007) characterized profiles of physicians (GPs and rheumatologists) prescribing cyclo-oxygenase-2 inhibitors in France in 2002. The authors found that there was a positive statistical link between a high level of cyclo-oxygenase-2 inhibitors prescriptions and the specialty of rheumatology. Mamdani et al. (2002) examined the association between socioeconomic status, as indicated by neighbourhood median income levels, and physician medicine selection between older, less expensive generic medicines and newer, more expensive brand-name medicines for elderly patients initiating drug therapy in a universal health care system. Within each class of medicines, physician specialty consistently remained a significant independent predictor of newer brand-name medicine selection. The odds ratio of specialists initiating a patient on a newer brand-name medicine relative to non-specialists ranged from 1.36 (95% CI 1.22 to 1.51) for ocular β-blockers to 7.17 (95% CI 6.43 to 7.99) for antipsychotics. Pressman et al. (2001) undertook a study aimed at describing initiation of osteoporosis drug therapy after bone mineral density (BMD) testing, physician factors, or both, adjusting for BMD status. The authors found that those whose BMD test was ordered by a gynaecologist or internist were more likely to receive osteoporosis therapy than women whose BMD test was ordered by practitioners in other medical specialties (OR = 1.4; CI = 1.1–1.7 for gynaecologists; OR = 1.2; CI = 1.0–1.5 for internists).

Soumerai and Avorn (1987) analysed a university-based program to educate physicians about proper medication use. The authors investigated whether physician background characteristics and the quality or number of educational exposures influenced the rate of relinquishment of inappropriate prescribing. The results indicated that the rate of prescribing change was independent of most physician background characteristics studied, including age, board certification, specialty, rural versus urban practice, intensity of previous target medicine use, and size of Medicaid practice (Soumerai and Avorn, 1987). Pinto et al. (2010) investigated the main reasons physicians give for prescribing decisions. The

target population for the study consisted of physicians practicing in Portugal. Of the 350 physicians randomly sampled, 102 were included (29% responder rate), of which 48.6% were GPs and 51.2% specialists from 15 various medical specialties. The investigators used conjoint analysis as the principal statistical tool to rank the values most relevant for the analysis. Results of the analysis show that physicians place hierarchical importance on different factors when making prescribing decisions. The hierarchy, ranked from high to low, was as follows: effectiveness, tolerability, scientific sustainability, daily dosage, price, sales representative, institutional brand and generics. Specialty and geographical distribution were not found to influence the value placed on the determinants in relative or absolute terms (Pinto et al., 2010).

The evidence supporting an association between specialty and physician prescribing behaviour is limited and conflicting. Thus, no consensus as to the effect of specialty on prescribing could be found in the literature identified in this review.

3.4.1.1.2 Age, Time in Practice and Habit Persistence

Physician age, time in practice and habit persistence are contextual components that may influence physician prescribing (Bradley, 1991). However, these components constitute a temporal dimension, raising the question about time as a factor. Time as an independent factor has not been addressed in the literature, and information on possible temporal effects can only be made by investigating age, time in practice and habit persistence. These three components are addressed separately before a summary is provided.

In a study by Bauer et al. (2008), antidepressant prescribing patterns and factors influencing the choice of antidepressant for the treatment of depression were examined. The authors prospectively observed 3468 adults in 12 European countries who were about to start antidepressant medication for their first episode of depression or a new episode of recurrent depression. The authors found that older investigators were associated with a decreased likelihood of a serotonin-reuptake-receptor-inhibitor (SSRI) being prescribed. In another study, Biga et al. (2007) characterized profiles of physicians (GPs and rheumatologists) prescribing cyclo-oxygenase-2 inhibitors in France in 2002. A negative statistical link was found between a high level of cyclo-oxygenase-2 inhibitors prescriptions and physician age below 44 years. Harries et al. (2007) investigated whether, and how, individual doctors are influenced by a patient's age in their investigation and treatment of angina pectoris (chest pain). Physicians who were influenced by age were on average five years older than those who were not; they were significantly positively influenced by old age on decisions to change prescriptions for ischemic heart disease - in particular, nitrates. It is also worth noting that female physicians were underrepresented in the study population, creating a male bias. In an Australian study aimed at investigating the effect of remuneration changes on physician prescribing behaviour, it was found that GPs aged over 55 years old were less likely to counsel their patients and more likely to prescribe medication than GPs aged under 35 years old (Scott and Shiell, 1997). Hamann et al. (2004) interviewed 100 psychiatrists on drug choice for 200 patients suffering from schizophrenia and found that older physicians were up to five times

more likely to prescribe first-generation antipsychotics. Furthermore, the authors found that patient variables did not influence treatment decisions significantly.

Time in practice has been mentioned as a possible factor influencing physician prescribing behaviour. However, few studies addressing this issue have been found in the literature. de Jong et al. (2009) investigated the influence of child, parent and physician factors on drug prescriptions for respiratory symptoms in primary care in infancy, as respiratory symptoms account for the majority of drug prescriptions in the first year of life. The authors found that physicians with more than 15 years' experience prescribed more. In another study, Mamdani et al. (2002) examined the association between socioeconomic status, as indicated by neighbourhood median income levels, and physician drug selection between older, less expensive generic drugs and newer, more expensive brand-name drugs for elderly patients initiating drug therapy in a universal health care system. The authors found that physician graduation year was inconsistently associated with newer brand-name drug prescribing across the three drug classes investigated in the study.

Janakiraman et al. (2008) explored the effects of habit persistence on prescribing behaviour by examining 9672 prescriptions written for depression by 108 physicians of non-specified specialities over a four-year period in the USA. A two-state model was adopted based on the assumption that physicians can be either persistent or non-persistent. The authors investigated whether persistent physicians responded differently to detailing, out-of-office meetings, and symposium meetings. There is compelling evidence to show significant cross-sectional levels of persistence in decisions concerning the prescription of medicines. Practice type may play a role, as it was found that physicians working in smaller practices are more likely to be persistent. Furthermore, age and detailing acceptance also play a role in defining persistence. Older physicians and those more accepting of detailing stand a higher chance of being persistent. Both persistent and non-persistent physicians appear be responsive to symposium meetings; however, only non-persistent physicians were found to be responsive to detailing. Out-of-office meetings had no effect on prescribing behaviour. In another study, Venkataraman and Stremersch (2007) also found that there is substantial habit persistence in physician decision making. Lilja (1976) performed an empirical study utilizing a mailed questionnaire examining how GPs (180) in Sweden chose medicines. The data were analysed using linear regression modelling, and the author found a positive effect on habitual choice with increasing age. Highest weight was given to curing effect of medicines prescribed. In addition to physician age, it was found that disease severity was a determining factor. Moreover, no significant relationships for background variables of physician were found. "The unique contribution of habit would lie in finding a residue of past experience that leads to habitual rather than reasoned responses" (Ajzen, 1991). Further support is provided by Coscelli (2000), who also notes that doctors' prescribing behaviour shows habit persistence. Furthermore, personal experience combined with social meaning of medicines drive prescribing behaviour during the end of life therapies (Zerzan et al., 2011); and early experience of using new medicines seems to strongly influence future prescribing (Jones et al., 2001).

Evidence supporting the effect of age and time in practice as individual components influencing physician prescribing behaviour is limited. However, both age and time are temporal, and it may therefore be argued that time is a factor influencing physician prescribing. This review has, however, not identified any evidence to link time to physician prescribing directly. The third component in this section is also temporally related, as habit represents residues of past behaviour and experiences (Ajzen, 1991). Age and time in practice may therefore merely represent the temporal axis on which past behaviours and experiences are placed. The key to understanding temporal effects can thus be found in the literature addressing habit persistence. From a theoretical perspective, temporal effects may simply reflect the sum of past behaviour and as such is best characterized as a reflection of all factors that determine the behaviour. The correlation between past and later behaviour is an indication of the behaviour's stability or reliability (Ajzen, 1991). Furthermore, Ajzen (1991) notes that residual effects of past behaviour may constitute habit, but can also be the result of missing or unrecognized attributable factors. However, evidence presented in this review suggests a strong influence of habit persistence on physician prescribing behaviour. Thus, evidence of temporal components influencing physician prescribing is considered high.

3.4.1.1.3 Gender

In a prospective study, Bauer et al. (2008) examined antidepressant prescribing patterns and factors influencing the choice of antidepressant for the treatment of depression. The authors prospectively observed 3468 adults in 12 European countries who were about to start antidepressant medication for their first episode of depression or a new episode of recurrent depression. Female physicians were found to be more likely to prescribe a serotonin–norepinephrine reuptake inhibitor (SNRI) than male physicians (OR 1.77; 95% CI 1.27, 2.48). In another study, Biga et al. (2007) characterized profiles of physicians (GPs and rheumatologists) prescribing cyclo-oxygenase-2 inhibitors in France in 2002. A negative statistical link was found between a high level of cyclo-oxygenase-2 inhibitors prescriptions and female physician gender. In a study undertaken by Pressman et al. (2001), aimed at describing initiation of osteoporosis drug therapy after bone mineral density (BMD) testing, it was found that if the BMD test was ordered by a female health care practitioner, prescription of osteoporosis drugs was more likely than if the BMD test was ordered by a male practitioner (OR = 1.3; CI = 1.1–1.5). In an Australian study aimed at investigating the effect of remuneration changes on physician prescribing behaviour, it was found that compared to male GPs, female GPs were less likely to provide prescription medicines as a form of treatment (Scott and Shiell, 1997).

Evidence supporting a gender effect on physician prescribing behaviour is scant, and what evidence is available is scattered across different therapy areas, making a comparative analysis impossible. Thus, no consensus as to the effect of physician gender on prescribing could be found in the literature identified in this review.

3.4.1.1.4 Summary

Evidence supporting physician characteristics as an influencer on physician prescribing is limited in quantity and quality, see Table 3-35 Summary of physician characteristics. There is no consensus in the literature supporting physician specialty, age, gender, or time in practice as independent influencing factors. However, habit persistence has been found by several authors to be a strong influencer on prescribing, and early exposure to new medicines may lay the ground for its development. Thus, in conclusion, the evidence of influence of physician specialty, age, and gender on physician prescribing is low; and the evidence supporting physician habit persistence as an influencer on physician prescribing is high.

Table 3-35 Summary of physician characteristics

Physician Characteristics			
Component	**Mechanism**	**Theory**	**Evidence of influence**
Specialty	Modulate uncertainty	TPB	Low
Age	Temporal axis for habit persistence	TPB	Low
Time in practice	Temporal axis for habit persistence	TPB	Low
Habit persistence	Habit persistence	TPB	High
Gender	None identified	TPB	Low

3.4.1.2 Practice Characteristics

Practice characteristics may serve as an influencer on physician prescribing. Typical distinctions between practice types include location (rural versus urban), organization (solo versus group) and academic status. The literature addressing practice characteristics as an influencing factor on physician prescribing behaviour is limited and heterogeneous.

Rice (2009) investigated whether health maintenance organizations (HMO) physicians are more price sensitive than non-HMO physicians are in their prescribing behaviour of brand-name medicine substitutes. The author found that the prescription of medicines was strongly influenced by the organization and structure of the physician's practice. In another study by Stewart et al. (2003), two general practice variables, organization form and degree of urbanization were found to influence physician prescribing. Addressing the degree of urbanization, de Bakker et al. (2007) found that urban practice location was related to a broader range of prescribing by GPs. Further evidence supporting the degree of urbanization as a factor influencing physician prescribing comes from a study undertaken by Canli et al. (2006). The authors found that antibiotics were most often prescribed in rural areas. Tett (2003) investigated whether geographical remoteness in Australia is a factor influencing physician prescribing behaviour. The author employed a self-reporting survey technique, and most respondents agreed that they prescribed differently in rural compared with city practices. More specifically, the majority of respondents agreed that their prescribing was influenced by practice location, isolation of patient home location, limited diagnostic testing and increased medicine monitoring. Furthermore, prescribing recently marketed medicines was more likely by doctors practicing in less remote rural areas. However, the evidence is not consistent. In a study investigating

determinants of prescribing for young children with respiratory symptoms, de Jong et al. (2009) found that urban or rural practice type does not affect prescribing by physicians.

Investigating the organization of practices, Bro and Mabeck (1988) found that GPs in group practices used traditional penicillin more frequently and broad spectrum antibiotics less frequently than their colleagues in solo practices. It has also been noted by Muijreres et al. (2005) that there may be a correlation between quality of prescribing and solo versus group practice. The authors claim that the quality of prescribing, measured by guideline adherence, is higher in group practices when compared with solo practices. Furthermore, speculation around the reason behind these observations has surfaced and may in part be due to the internal audit effect, implicit or otherwise, existing in group practices (Bro and Mabeck, 1988).

Cettomai et al. (2010) investigated the use of pneumocystis pneumonia (PCP) prophylaxis among immune-compromised patients. The authors found that there was a higher frequency of PCP prophylaxis being prescribed in academic-based practices when compared to non-academic based practices (OR 2.75, $p < 0.001$).

The evidence supporting practice characteristics as an influencer of physician prescribing is limited; however, it has been suggested that degree of urbanization, practice organization and academic status may exert influence on physician prescribing. The evidence provided to support this view is not consistent, as some authors find no relation between practice characteristics and physician prescribing. Furthermore, degree of urbanization cannot be disengaged from the fact that there are several components of urbanization that have been shown to influence health status (Williams, 1990), and the consequent need for prescription medicines. It is therefore difficult to attribute influence on physician prescribing behaviour to the components of urbanization, and the authors contributing to the evidence shedding light on the subject have made no such attempts. Furthermore, it has also been noted that there may be a correlation between degree of urbanization and practice organization, in that there is a higher concentration of group practices in more urban areas (De Laat et al., 2002). Thus, practice organization befalls the same fate as degree of urbanization, in that the components influencing the need for prescription medicines are not accounted for. The same argument can be made for academic status, as it may be argued that disease severity is higher in academic practices as compared to non-academic practice types. In conclusion, practice characteristics may influence physician prescribing, but health related components influencing prescribing have not been accounted for, and the evidence of influence is therefore felt to be low.

Table 3-36 Summary of practice characteristics

Practice Characteristics			
Component	**Mechanism**	**Theory**	**Evidence of influence**
Degree of urbanization	Differing prevalence and incidence of medical conditions requiring prescription medicines	TPB	Low
Organization	Peer influence and informal/formal audits with feedback	TPB Agency	Low
Academic status	Differing prevalence, incidence and severity of medical conditions requiring prescription medicines	TPB	Low

3.4.1.3 Patient Characteristics

Much has been written about the effect of patient characteristics on physician prescribing behaviour. In a literature review by (Bradley, 1991), investigating factors which influence the decision whether or not to prescribe, it was found that important factors include age, ethnicity, social class and education, the doctor's prior knowledge of the patient, the doctor's feeling towards the patient, communication problems, and the doctor's desire to try to preserve the doctor-patient relationship (see Table 3-37 Summary of patient characteristics). However, in another review by Chauhan and Mason (2008), little evidence on the influence of patients upon prescribing decisions was identified. Therefore, available literature may suggest that a clear consensus on the effect of patient characteristics on physician prescribing behaviour does not exist. Furthermore, it is worth noting that from a practitioner's point of view, age, gender and race are all linked to health states that may require prescription medicines. The common link is differences in anatomy and physiology influencing both the prevalence and incidence of disease states that may require prescription medicines. Such information is common knowledge for physicians and provides part of the context under which prescribing decisions are made. Thus, any literature addressing patient characteristics must consider these aspects in order to separate effects driven by common medical knowledge and consequent actions taken to remedy undesired health states directly or indirectly associated with the patient characteristic in question.

3.4.1.3.1 Patient Age

Age is the most prevalent patient characteristic potentially influencing prescribing behaviour by physicians mentioned in the literature included in this review. Harries et al. (2007) investigated whether, and how, individual doctors are influenced by a patient's age in their investigation and treatment of angina pectoris (chest pain). Age, independent of comorbidity, presentation and patients' wishes directly influenced decision-making about angina pectoris investigation and treatment by half of the doctors in the primary and secondary care samples. Furthermore, elderly patients were less likely to be prescribed a statin after cholesterol testing, suggesting inequity in health care related to patient age. In a study by Ohlsson et al. (2009) on factors related to early adoption of rosuvastatin (statin), it was found that rosuvastatin was prescribed more frequently to younger patients than to elderly patients. In another study aimed at determining the impact of differential Medicare medicine coverage on physicians' prescribing behaviour

in clinical practice, it was found that the dichotomous and continuous age terms and education level were significant independent predictors of biologic prescription choice (DeWitt et al., 2006). In a study by Kisely et al. (2000), addressing the growing interest in factors that might influence the prescription of psychotropic medicines in general practice, the authors found that older patients were significantly more likely to be prescribed psychotropic medication than their younger counterparts. Pressman et al (2001) focused on initiation of osteoporosis drug therapy after bone mineral density (BMD) testing. The authors found that compared with osteoporotic women aged 45-54 years, women aged 55-64 years who started drug therapy were 40% more likely (OR = 1.4; CI = 1.0-2.2) and women aged > or = 65 years were twice as likely (OR = 2.0; CI = 1.4-2.8) to start non-hormone replacement therapy medicines. In a study investigating the effect of GP and patient characteristics on physician prescribing, Stewart et al. (2003) found that age was a significant predictor for prescribing. The authors also found that patient characteristics have greater influence on physician prescribing behaviour than physician characteristics. However, not all authors have found a convincing association between age and physician prescribing behaviour. For example, Mamdani et al. (2002) investigated the association between socioeconomic status, as indicated by neighbourhood median income levels, and physician medicine selection between older, less expensive generic medicines and newer, more expensive brand-name medicines for elderly patients initiating drug therapy in a universal health care system. The authors found that patient age was inconsistently associated with newer brand-name medicine prescribing across the three investigated medicine classes (antipsychotic, hydroxymethylglutaryl-coenzyme A reductase inhibitor (statin), ocular beta-blocker).

Several authors have described the effect of patient age on physician prescribing behaviour, and it may therefore seem evident that convincing evidence to support the hypothesis that patient age can affect physician prescribing behaviour exists. However, none of the authors has addressed age as a temporal factor linked to the natural evolution of aging and associated health states. Age in itself, therefore, can be argued to be an axis on which the prevalence and incidence of pathology and pathophysiology vary accordingly. Not taking into account the natural evolution of medical conditions and the consequent need for prescription medicines severely weakens any argument claiming age to be an independent factor influencing physician prescribing. However, it may also be argued that age is an independent factor, as recently highlighted in a Norwegian newspaper article where a patient with terminal chronic obstructive lung disease was taken of the waiting list for lung-transplantation on the day he turned 67 (Aftenposten, 5/12/2011). The ensuing debate has made it clear that age, in itself, should not be a determining factor. On the other side, it is well known in the practice of medicine that age plays a role in the risk-benefit assessment of any medical intervention. For example, the decision to withhold medication for aged individuals may in part be due to the short duration of expected lifespan. However, in these cases, risk-benefit is associated with any likely benefit in the context of bio-medical factors present at any given evolutionary stage of aging. In conclusion, the available literature does not separate age and bio-medical influencers on physician prescribing behaviour; and any conclusion concerning

age as an independent factor influencing physician prescribing behaviour can therefore not reliably be drawn. Age in this context, can therefore be considered a temporal axis reflecting the evolution of aging and the associated pathology and pathophysiology, which influence physician prescribing.

3.4.1.3.2 Patient Gender

Patient gender is a factor that may influence prescribing behaviour by physicians, simply for the fact that men and women are different anatomically and physiologically. The difference in anatomy and physiology makes for differences in prevalence and incidence of different disease states. Further complicating the issue is the link between age and gender influencing health indirectly through prevailing bio-medical factors. Gender differences will therefore clearly influence prescribing; for example, therapies for prostate ailments are reserved for males, and hormone replacement therapy for menopause is reserved for women. However, there are also instances when gender difference does not play such an implicit role. It is under these circumstances that the influence of patient gender is less clear and that the literature may inform on evidence of influence.

In an Australian study designed to investigate the effect of remuneration on prescribing behaviour, the authors found that the most important factors influencing decisions in consultations for upper respiratory tract infections and sprain/strain are the age and gender of patients, suggesting that patient characteristics are the most influential in the GP's utility function (Scott and Shiell, 1997). Mamdani et al. (2002) investigated the association between socioeconomic status, as indicated by neighbourhood median income levels, and physician medicine selection between older, less expensive generic medicines and newer, more expensive brand-name medicines for elderly patients initiating medicine therapy in a universal health care system. It was found that patient gender was inconsistently associated with newer brand-name medicine prescribing across the three investigated classes of medicines (antipsychotic, hydroxymethylglutaryl-coenzyme A reductase inhibitor (statin), ocular beta-blocker). In another study aimed at quantifying the relative contributions of patient versus physician factors to the decision to prescribe selective cyclooxygenase-2 (COX-2) inhibitors during the first 2 years of their availability, it was found that first-time users of COX-2 inhibitors were more likely to be female than male, with 88% versus 85 %, respectively (Schneeweiss et al., 2005). Stewart et al. (2003), in a cross-sectional study in the northern Netherlands, investigated a two-level multilevel model which was applied to patients (n = 269,067) in 190 practices with 251 general practitioners. The authors found that gender was a significant factor influencing prescribing and adherence to pharmaco-therapeutic guidelines. In another study, Van der Ent et al. (2009) investigated the influence of child, parent and physician factors on medicine prescriptions for respiratory symptoms in primary care. The authors found that boys had a three times higher chance of receiving a prescription than girls.

There are few studies specifically addressing patient gender as a factor that may influence physician prescribing behaviour. Furthermore, the available evidence is not consistent in quality or conclusion on the question related to whether patient gender influences prescribing behaviour. However, the topic is hotly debated in

some medical circles. For example, gender and coronary heart disease has been a hot topic for decades, and literature abounds with information on gender differences in presentation, prognosis and interventions (Fiebach, 1997). However, the context of gender differences in anatomy and physiology is not addressed in the studies uncovered in this review; thus, the available literature addressing patient gender as an influencer of physician prescribing behaviour does not separate gender and bio-medical influencers on physician prescribing behaviour, and any conclusion as to any effect cannot reliably be drawn. Evidence of influence is therefore felt to be low.

3.4.1.3.3 Patient Race

Patient race was suggested by Bradley (1991) to be a factor influencing physician prescribing behaviour. Only two studies addressing this topic have been uncovered in this review, and the consensus is that race does not affect physician prescribing behaviour (Schneeweiss et al., 2005, Tamayo-Sarver et al., 2003). However, race may imply differences in both anatomy and physiology. For example, Europeans (fair skin colour) will be at increased risk of skin cancer when compared to populations with darker skin (Boni et al., 2002), although none of the authors of publications included in this review have addressed race in the context of the potential differences in anatomy and physiology. Thus, the available literature does not separate race and bio-medical influencers on physician prescribing behaviour, and any conclusion as to any effect cannot reliably be drawn. Evidence of influence is therefore felt to be low.

3.4.1.3.4 Patient Expectation

The physician's desire to preserve the physician-patient relationship as a factor that may influence physician prescribing behaviour has been described in the literature (Bradley, 1992). In an agency context, patient expectancy may clearly influence physician prescribing behaviour. However, only a few authors included in this review address the question. Furthermore, the origin of patient expectancy is not clearly identified in the included literature, but it has been shown that patients exhibit strong state dependence (Coscelli, 2000).

Lundin (2000) investigated the effect of moral hazard on physician prescribing and found that patient acquired taste (preference) is an important factor, giving further support to the findings of Coscelli (2000). In addition, Naik et al. (2009) note that patients requests for specific brands may influence physician prescribing behaviour. In a study by Tett (2003), it was found that 66.1% of GPs felt that patient expectation influences prescribing. Webb and Lloyd (1994), examined the effect of patient expectations of physician prescribing and hospital referrals; the investigators employed a self-administered survey, covering 1080 consultations with 12 GPs. Results showed that physician prescribing behaviour was most strongly associated with patients' expectations. The level of influence exerted by patient expectations on physician prescribing behaviour may be strong, as was found in a study assessing the influence of non-medical factors in the context of upper respiratory infections (Hummers-Pradier et al., 1999). The authors conclude that patient expectations are extremely important when prescribing medicines for cold and cough. This notion is further supported in a

similar study investigating the prevalence of patient expectations for upper respiratory infections (Faber et al., 2010). In another study, Macfarlane et al. (1997) investigated patient expectations in the context of antibiotic prescribing, and found that 85% of patients felt that symptoms were related to infections and that antibiotics would help (87%). The authors found that most (72%) patients wanted antibiotics and the same number of patients expected a prescription for antibiotics.

The literature suggests that there may be a poor correlation between patient expectation and physician perception of this expectation. Whether it is the patient expectation or the physician's perception of the patient expectation that is the influencer becomes a key question to address. Mangione-Smith et al. (1999) investigated the expectation of parents among children diagnosed with a probable viral cause. The authors found that the actual parent expectation did not influence the decision to prescribe. The authors note that there was poor agreement between actual pre-visit expectations reported by parents and the perception of expectation by the physician. In a study exploring how GPs decide to prescribe, it was found that the decision is shaped by the perception of patient expectation (Hyde et al., 2005). Lado et al. (2008) conclude along the same lines and claim that there is no association between patient expectations and physician perception of such expectations. In an observational study, von Ferber et al. (2002) found that patients' needs and expectations are lower than observed prescribing behaviour by physicians. More recently, further support to the perception of expectation is given by the work of Tusek-Bunc et al. (2010), where it was found that the physician perception of patient expectation was a significant factor influencing statin prescribing.

From the evidence presented, patient expectation as an influencer is not well established. However, the evidence points in the direction of the physicians' perceptions of patient expectation as an influencer of physician prescribing behaviour. Furthermore, it has been suggested that there may be differences in the level of reliance on these perceptions dependent on physician specialty (Lapeyre-Mestre et al., 1998). Therefore, in conclusion, the evidence of influence is felt to be low.

3.4.1.3.5 Biomedical Factors

In general, it can reasonably be argued that the clinical practice of medicines is concerned with how bio-medical factors affect the physical and psychological wellbeing of patients. In this review, however, the quantity of literature addressing this very issue is limited. That said, a few publications included in this review do address the question (Cettomai et al., 2010, Choudhry et al., 2006, Schneeweiss et al., 2005, Blix et al., 2011, Crawford et al., 2011).

Four publications present evidence of patient level bio-medical influence on physician prescribing behaviour, whereas one publication presents evidence contradicting such influence. Cettomai et al. (2010) investigated factors associated with the prescription of pneumocystis pneumonia (PCP) prophylaxis among 3150 members of the American College of Rheumatology. The authors found that patients currently on immunosuppressive therapy had a two-fold

chance of receiving prescriptions for PCP prophylaxis. In another study, Crawford et al. (2011) investigated the influence of patient and contextual factors on the prescribing for patients with personality disorders. The authors found that even though the evidence base for prescription medicines for patients with personality disorders is weak, it is still a widely employed treatment strategy. Furthermore, the authors note that the type of personality problem appears to have an impact on whether medicines are prescribed or not. Blix et al. (2011) investigated the effect of patient smoking status on antibiotic prescribing. The authors found that patient smoking habits influenced the prescribing of antimicrobials for several years in a dose-response relationship. In a study by Choudhry et al. (2006) investigating physicians' experiences on prescribing behaviour, the authors found that the experience of an adverse event as a result of treatment can influence the prescribing of warfarin. However, the prescribing of warfarin was not affected after a physician had a patient with stroke, and physicians who had a patient with bleeding or stroke did not influence the prescribing of angiotensin-converting-enzyme inhibitors.

Schneeweiss et al. (2005) investigated patient versus physician factor influence on the prescribing of Cox-2 inhibitors during the first two years of their availability. The authors found that first time Cox-2 inhibitor prescribing is somewhat dependent on patient factors such as gastrointestinal toxicity. However, the proportional influence of physician preference increased substantially over the following two-year period, suggesting habit persistence as a temporal residue of experiences and past behaviours.

The limited evidence found in support of bio-medical factors as an influencer on physician prescribing behaviour can be argued to be because such influence is presumed. In fact, medical literature in general is focused on patient level bio-medical factors as a cause of disease and focus for diagnosis and treatment, and ultimately lie at the core of decisions relevant to the practice of clinical medicine. Therefore, bio-medical factors can reasonably be argued to figure prominently among influencers of physician prescribing behaviour. Therefore, in conclusion, evidence of influence is felt to be high.

3.4.1.3.6 Other Patient Factors

Other factors mentioned in the literature included in this review are: social (Campo et al., 2006), price sensitivity and patient intervention (Arnold and Straus, 2005, Ostini et al., 2011). However, only a few authors included in this review address these factors, making a comparative synthesis impossible. Furthermore, none of the factors was the primary focus of the studies and the contexts were heterogeneous; thus, no conclusions could be drawn as to possible influence on physician prescribing.

3.4.1.3.7 Summary of Patient Factors

Patient factors have been postulated to influence physician prescribing. However, the evidence presented in this review supporting this hypothesis is limited. Evidence addressing patient age, gender and race are detached from the biological links described in the medical literature as having impact on health

status and the consequent need for prescription medicines. On the question of patient expectations as an influencer, it has been suggested that it is not the expectation, but rather the physician's perception of the patient expectation that constitutes the component directly influencing physician prescribing behaviour. Only a few authors addressed other factors identified included in the review, and as a consequence, no conclusion could be drawn as to their role in physician prescribing. Thus, the evidence of patient characteristics as an influencer on physician prescribing behaviour is in general low. However, based on included evidence and medical literature in general, patient-level bio-medical factors are felt to be significant influencers of physician prescribing. Considering the wealth of evidence provided in the medical literature on the connection between patient level bio-medical factors and clinical decision making, it is apparent that the evidence of influence is high.

Table 3-37 Summary of patient characteristics

Patient Characteristics			
Component	**Mechanism**	**Theory**	**Evidence of influence**
Age	Temporal axis along which medical conditions requiring prescription medicines reside	TPB	Low
Gender	Difference in anatomy, physiology and consequent medical conditions requiring prescription medicines. Modulate uncertainty.	TPB	Low
Race	Difference in anatomy, physiology and consequent medical conditions requiring prescription medicines. Modulate uncertainty.	TPB	Low
Expectation	Physician perception of patient expectation is the true driver. Modulate social norm.	TPB	Low
Bio-medical factors	Modulate uncertainty	TPB	High
Others	None identified	?	Low

3.4.1.4 Therapy Area

Therapy area is closely linked with bio-medical factors on a patient level; for example, diagnosis. Kremer et al. (2008) claim that the efficiency of pharmaceutical promotion differs across therapeutic areas; however, these findings are based on aggregated data and are not corrected for the influence of bio-medical factors. The literature included in this review does not clearly distinguish therapy area as an independent factor influencing physician prescribing behaviour. Thus, any further conclusion than simply assuming that any associated effect of physician prescribing is linked with patient level bio-medical factors is not possible to make, given the available evidence uncovered. Therefore, in conclusion, evidence of therapy area as an independent factor influencing physician prescribing behaviour is low.

3.4.1.5 Medicine Attributes

Bradley (1991) found that a physician's concern about medicines was a factor influencing physician prescribing behaviour. Several authors have since investigated the origin of these concerns and found that efficacy and safety are the main constituents, thus addressing the benefit-risk profile of medicines. Uncertainty is stated as the main driver of physician behaviour (Arrow, 1963), and

it is therefore unreasonable to expect the benefit-risk profile of a medicine not to influence physician prescribing behaviour. Indeed, safety and effectiveness were considered highly influential by all participants in a study describing and comparing the opinion of physicians, clinical pharmacists and formulary committee members with respect to key factors that influence medication prescribing in community hospitals (Schumock et al., 2004). Physicians, however, may not be risk averse. Pinto et al. (2010) analysed the main reasons physicians give for their prescription choices. It was found that the effectiveness of the product; tolerability, which is directly related to the abandonment rate of a given course of treatment, was considered less important by doctors in this study. The authors argue that this proves that members of the medical profession are willing to take certain risks by using more effective medicines, even if they cause more reactions that are adverse. In another study, Choudhry et al. (2006) found that adverse events that are possibly associated with underuse of warfarin may not influence subsequent prescribing. When analysing trends in rosuvastatin prescribing, Ohlsson et al. (2009) realized that the medicine was the subject of safety concerns and subsequent regulatory warnings during the observation period of the study. The authors note that these warnings may have influenced the patterns of prescription. This conclusion was drawn on the basis of an overall reduction in the prevalence of rosuvastatin prescriptions in the latter third of the study. However, the clustering of rosuvastatin prescriptions was not substantially affected by the warnings.

When Prosser and Walley (2006) investigated the range of factors influencing the prescription of new medicines, the key factors behind the first prescription of a new medicine were found to be an absence of current available treatment or expectation of better outcomes based on a medicine's alleged relative advantage over current treatment. This was largely attributed to increased effectiveness and fewer side effects (Prosser and Walley, 2006). In another study, Schneeweiss et al. (2005) quantified the relative contributions of patient versus physician factors to the decision to prescribe selective COX-2 inhibitors during the first 2 years of their availability. The authors found that twice as much variability in COX-2 prescribing could be explained by physician preferences than by the five gastrointestinal toxicity risk factors alone, indicating that safety may not be an overriding concern. One explanation may be that if a medicine has a novel mechanism of action, or belongs to a class of medicines with few alternatives, clinicians are more likely to consider it favourably as a prescribing option (Chauhan and Mason, 2008). In support of this notion, Tett (2003) found that a strong majority of participants in the study agreed that they would prescribe a new medicine based on its comparative efficacy to others (76.1%). However, even though physicians are not risk averse, safety concerns may influence prescribing. In a study aimed at investigating which factors influence physician prescribing behaviour regarding stress ulcer prophylaxis, concerns about side effects (OR = 0.24, 95% CI 0.09, 0.61) were associated with a decrease in prescribing (Hussain et al., 2010). Even though adverse drug reactions may not appear very often, they do have a profound effect on physician prescribing patterns (Banjo et al., 2010, Theodorou et al., 2009).

Calvo and Rubinstein (2002) evaluated the impact of the publication in a leading journal of different drug studies (metformin, alendronate, terazosin, and finasteride) on the prescription behaviour of generalists and specialists. In the evaluation, three studies showed efficacy and one study showed lack of efficacy. The proportions of new prescriptions changed between a 6-month period before publication and a 6-month period after publication. Others have also found that efficacy influences physician prescribing behaviour. For example, efficacy and utility of the drug was found to be a distinctive factor influencing prescribing of statins (Tusek-Bunc et al., 2010). Furthermore, Theodorou et al. (2009) found that clinical effectiveness is the most important factor, reaching 94.9% and 93.3% in Greece and Cyprus, respectively, and that there was no statistically significant difference between the two countries.

In a seminal study addressing the issue of attributes of medicine as a factor influencing physician prescribing behaviour, Venkataraman and Stremersch (2007) investigated the effect of promotional effect across brands. The database used for the study included, at the monthly level, all prescriptions within the examined medicine categories by a panel of 2774 physicians. This resulted in just under 40000 observations for the 12 brands included in the study. Detailing was found to have a more positive effect on prescriptions for more effective medicines as compared to less effective medicines, and for medicines with more side effects as compared to medicines with fewer side effects. In other words, it was found that that the effects of marketing efforts and patient requests on physician prescription behaviour do indeed vary by brand. Furthermore, medicine attributes such as effectiveness and safety moderate the response by physicians to promotional efforts on physician prescribing behaviour.

Kurdyak et al. (2007) studied whether five regulatory agency advisories concerning the possible increased risk of suicidal behaviour during antidepressant therapy had an effect on antidepressant prescription trends in Ontario. The authors claim that safety advisories did not influence physician prescribing in North America, but similar advisories led to a decrease in prescribing in the UK in 2003. Thus, there may be geographical variations in the effect of safety advisories provided by regulatory agencies. In another study, Saad et al. (2010) investigated the warnings from the Food and Drug Administration (FDA) on the use of antipsychotics in the management of dementia. The authors found that information about medicine attributes may be effective and that the main barrier to change is the lack of treatment alternatives. However, medicine attributes may not be the only moderator. Weatherby et al. (2002) retrospectively investigated the effect of FDA warning letters in order to determine how such letters may be improved. The authors conclude that explicit wording can aid in changing physician prescribing behaviour.

On the basis of biopharmaceuticals being one of the fasted growing segments of the pharmaceutical industry, Nonis and Hudson (2009) investigated the effect of physicians' beliefs about genetic engineering on physician prescribing. There appears to be a lack of trust in the technology, driven by a fear of unknown consequences. On this basis, the authors claim that genetic modification as an

attribute influences physician prescribing behaviour by decreasing the likelihood in the decision making process leading to a prescription.

From the evidence presented in this review, there appears to be a consensus on medicine attributes as a factor influencing physician prescribing behaviour, see Table 3-38 Summary of medicine attributes. Physicians appear to place great value on clinical efficacy and seem willing to take risks under certain conditions. Thus, the benefit-risk profile of a medicine is not a static factor, but a dynamic one moderating physician prescribing behaviour. Therefore, in conclusion, evidence of influence is felt to be high.

Table 3-38 Summary of medicine attributes

Medicine Attributes			
Component	**Mechanism**	**Theory**	**Evidence of influence**
Efficacy	Modulate uncertainty	TPB	High
Safety	Modulate uncertainty	TPB	High
Benefit-Risk	Modulate uncertainty	TPB	High

3.4.1.6 Geography

Geographical variations in the delivery of health care have been described in the literature by several authors (Wennberg et al., 2002, Calleri et al., 2008, Sturm et al., 2007, Webster et al., 2009). Whether geography is an independent factor influencing physician prescribing behaviour, therefore, becomes an important question to address.

Wennberg et al. (2004) note that Medicare spending varies across regions and that these variations persist after differences in health status are accounted for. This would suggest that increased spending does not necessarily lead to better health outcomes. Furthermore, the authors note that the main drivers for variable spending are increased use of supply-sensitive physicians' services, specialist consultation, and hospitalization for patients with chronic disease. Calleri et al. (2008) claim that geographical variations in prescribing of malaria chemoprophylaxis in Europe can largely be accounted for by variability in evidence based on efficacy and tolerability. Sturm et al. (2007), on the other hand, conclude that it remains to be established which factors within a given health-care system are responsible for the observed effects. Finally, Webster et al. (2009) find that early opioid prescribing for low back pain is almost fully explained by state-level contextual factors.

In summary, geography remains a complex issue when it comes to discerning influencers on physician prescribing behaviour. However, based on the stated variability in health care spend and delivery without apparent health-outcome effects, it seems reasonable to argue that geography is not an independent influencer of physician prescribing behaviour, but represents a variable collection of factors and contexts. Based on the evidence presented in this review, evidence of influence is low.

3.4.1.7 Theoretical Considerations and Summary

Evidence of influence by contextual factors on physician prescribing behaviour is in general low, with the notable exception of physician-level habit persistence, patient-level bio-medical factors and medicine attributes. This conclusion is largely driven by the fact that the evidence addressing contextual factors is detached from the bio-medical circumstances known to influence health status and the consequent need for prescription medicines.

The identification of habit persistence as a strong influencer on physician prescribing is not surprising when considering the complexities of medical decisions. Three main theoretical perspectives may be adopted to explain this observation. Firstly, physicians rely heavily on heuristics during the clinical decision process as a means for effort-reduction (Shah and Oppenheimer, 2008, Elstein, 1999). Second, from an economic theory perspective, it may be argued that the habit persistence is brand loyalty created by persuasive pharmaceutical promotion (Hurwitz and Caves, 1988). Finally, from an agency perspective, it may be argued that habit persistence embodies adverse selection.

Medical literature abounds with effect measures of therapy, and the literature addressing medical decision-making focuses on the uncertainty associated with the benefit-risk of any medical intervention intended to address a bio-medical need in a clinical setting. It has indeed been stated that uncertainty is the main driver of physician behaviour (Arrow, 1963), and patient-level bio-medical factors may therefore be argued to influence physician prescribing behaviour by modulating uncertainty. Similarly, when Venkataraman and Stremersch (2007) compellingly argue the moderating effect medicine attributes have on the effect of detailing across brands, it is the uncertainty associated with prescribing that is the contextual component influencing physician prescribing.

Contextual factors that have been suggested to have a bearing on physician prescribing behaviour have been inadequately investigated, and thus evidence of influence in general is low. However, three notable exceptions exist; physician-level habit persistence, patient-level bio-medical factors and medicine attributes. Evidence of influence for these exceptions is high, as is the level of influence.

3.4.2 Pharmaceutical Promotion Interventions

The pharmaceutical industry is central in the delivery of modern health care. However, it also influences the way medicine is practiced, specifically how medicines are prescribed, through the use of promotional interventions (Sufrin and Ross, 2008). In this review, samples, detailing, academic journal advertising and sponsored medical education were identified as promotional interventions used by the industry. This broadly represents the categories identified by others (Gallan, 2005, Kremer et al., 2008). In each of the following sections, effect, mechanisms and context are addressed, and finally the evidence identified is linked with previously identified theoretical constructs relevant to this topic (Mikkelsen, 2010). Finally, a summary including a table listing the main findings is provided.

3.4.2.1 Samples

The provision of samples by the pharmaceutical industry has been the focus of investigation by several authors due to the effect it has on physician prescribing behaviour and potential impact on patient safety. The European Federation of Pharmaceutical Industries and Associations' (EFPIA) code of practice states that medical samples should be provided "...to health professionals so that they may familiarise themselves with the medicines and acquire experience in dealing with them" (EFPIA, 2011 p15). Furthermore, the code of practice dictates that "medical samples must not be given as an inducement to recommend, prescribe, purchase, supply, sell or administer specific medicinal products, and should not be given for the sole purpose of treating patients" (EFPIA, 2011 p15). However, samples are clearly part of the marketing mix employed by the pharmaceutical industry and, as such, an instrument critical in driving the adoption of new medicines (Groves et al., 2003). Both physicians and the pharmaceutical industry see value in samples which are provided, under the assumption that they do more good than harm (Groves et al., 2003). However, the literature addressing sampling is lacking in both quantity and quality, maintaining a heated debate on its use. Sales representatives may use samples to gain access and influence prescribing behaviour through detailing. On the other hand, samples can provide the physician with an opportunity to gain experience with new and innovative medicines early, and provide the opportunity to start treatment of financially stretched patients. Evidence also suggests that own experience with a medicine may reduce the uncertainty associated with future prescribing (Groves et al., 2002), a topic which is further addressed below. The following sections start by comparing and contrasting the available evidence on the effect of sampling on physician prescribing behaviour. Then under which contexts sampling is conducted is addressed. Next, the possible mechanisms by which sampling may influence physician prescribing behaviour are contextually examined. Following this, effect, context and mechanism are linked by applying theoretical constructs identified during the scoping study. Finally, a summary is provided.

Groves et al. (2003) critically evaluated existing research on the topic of samples for prescription medicines in the context of a classical marketing theory perspective. The review included 23 original research papers for critical review and 17 summary papers as background information. In all, 16 articles were found to be related to the influence on prescribing behaviour. The authors note that the studies conducted on the effect of samples on prescribing behaviour lack rigor, as all studies were observational, direct observation or questionnaires administered to nonrandomized samples. Even though rigor may be lacking, the authors claim that available literature is highly suggestive of samples influencing physician prescribing behaviour - and may in fact increase demand. Furthermore, the authors are critical of the finding that samples are almost exclusively provided for newer medicines during the two first years on the market. This notion is further supported by (Gallan, 2005) in another systematic review on factors influencing physician prescribing behaviour.

In a later study, following the same observatory path as critiqued by Groves et al. (2003), Schumock et al. (2004) investigated and compared the opinions of

physicians, clinical pharmacists, and formulary committee members on the factors influencing prescribing of medicines and community hospitals. The authors found that physicians rated the availability of samples as more influential on prescribing behaviour than did clinical pharmacists and formulary committee members. Furthermore, physicians rated personal experience as an important factor influencing prescription behaviour; however, clinical pharmacists and formulary committee members did not. Both personal experience and the availability of samples may therefore be involved in reducing uncertainty surrounding this decision of whether to prescribe or not. Since clinical pharmacists and formulary committee members are not directly involved in the decision to prescribe and, as such, are insulated from the uncertainty associated with the prescribing act, it is hardly surprising to find that physicians rate the importance of personal experience and the availability of samples higher.

Adair and Holmgren (2005) departed from the path critiqued by Groves et al. (2003), and employed a prospective randomized trial design when investigating whether access to drug samples influenced the prescribing behaviour of internal medicine residents. Highly advertised drugs were matched with generics or non-advertised drugs. The authors found that residents who had access to samples were less likely to prescribe unadvertised medicines and recommend over the counter medicines. From a more theoretical perspective, Campo et al. (2006) performed an in depth analysis of physician prescribing decisions using a grounded theory approach, as described by Straus and Corbin (1990). Both GPs and specialists in the US were included. The authors found that sales representatives are valued as a source of information and may have a long lasting effect on prescription behaviour. There was also evidence suggesting a clear preference for oral information over written. Detailing was found to increase prescribing. However, samples were not found to directly increase prescribing except for in the early phases of a medicine's commercial life cycle. Furthermore, it was found that free conference participation may in some situations also influence choice of medicines.

Three further studies (Gönül et al., 2001, Rizzo, 1999, Venkataraman and Stremersch, 2007) provide academic rigor in that empirical techniques were employed. Gönül et al. (2001) investigated the effects of price, type of insurance, and direct selling efforts on prescription choice by employing a multinomial logit model, as suggested by (McFadden 1974). The authors found that physicians show limited price sensitivity and that detailing and sampling have mostly an informative effect on physicians. However, this notion is challenged by the findings of (Rizzo, 1999), who found detailing to substantially lower price sensitivity through a strong advertising effect. In another study by (Mizik and Jacobson, 2004), the impact of detailing and use of samples on physician prescribing behaviour using a dynamic fixed-effects distributed lag regression mode was investigated. The authors made use of pooled time series cross-sectional data involving 3 medicines, 24 monthly observations, and 74075 individual physicians. Based on the results of the study, the authors claim that detailing and free medicine samples have positive and statistically significant effects on the number of new prescriptions issued by a physician; however, the magnitudes of the effects were found to be relatively small. In a seminal study

addressing the issue of attributes of medicine as a factor influencing physician prescribing and sampling behaviour, Venkataraman and Stremersch (2007) investigated the effect of promotional effect across brands. The database used for the study included, at the monthly level, all prescriptions within the examined medicine categories by a panel of 2774 physicians. The authors found that medicine characteristics such as effectiveness and side effects, moderate the response by physicians to marketing efforts and detailing of their sampling behaviour.

More recently, Pinckney et al. (2011) investigated the effect of availability of samples in clinical practice on prescribing behaviour of physicians. Prescribers were presented with two clinical vignettes and asked to provide the name of the medicine they would prefer to prescribe considering the information provided. The results were compared with the responses to those of physicians without samples in their clinic. 631 physicians were included and 206 responded, giving a responder rate of 32.6%. The authors found that 70% of physicians with samples would prescribe a generic diuretic for hypertension compared with 91% for those without available samples. For the management of depression, the rates were 91% versus 100%, respectively. Both findings were statistically significant. Post-hoc analyses of the data confirm that none of the physician characteristics (age, gender and time in practice) or practice characteristics in the model had a statistical significant association with prescribing. The authors concluded that physicians with samples available in their clinics were less likely to prescribe preferred medications for hypertension and depression.

The evidence presented is strongly suggestive of the fact that the provision of samples has the power to influence physician prescribing behaviour. However, little is known about the contexts in which these effects are exerted, but there are three explicitly stated contexts in which sampling takes place, which may inform the topic. Firstly, it takes place in the context of detailing, and therefore any effect may be tightly linked to detailing (Brundage, 1999). Secondly, it is almost exclusively provided for new medicines, driving the uptake of medicines early in their life cycle (Groves et al., 2003) when the level of personal experience by the physician is at its lowest. Lastly, physician characteristics do not seem to play a significant role (Pinckney et al., 2011).

From a theoretical perspective, the provision of samples may play a role in influencing intent to prescribe by modulating the level of uncertainty. A prescribing decision will be taken under conditions of uncertainty, and it has been claimed that uncertainty is the strongest driver of physician behaviour (Arrow, 1963). The provision of samples gives the physician an opportunity to personally gain experience with new medicines in a clinical setting, and thus build the basis for adoption and further prescribing (Groves et al., 2002). The Theory of Planned Behaviour, at its simplest, predicts behaviour on the basis of intent (Ajzen, 1991). One of the components of intent is attitude, influenced by behavioural belief, being the belief in the consequence of the behaviour (Ajzen, 1991). Therefore, it may be argued that the mechanism by which the provision of samples may exert its effect is through the modulation of uncertainty in a clinical decision context. Furthermore, the contexts in which samples are provided may give further

credence to this claim, as according to Groves et al (2003), samples are almost exclusively only provided for new medicines. This is when the level of uncertainty would be greatest, as the experience base would be at its lowest (Groves et al., 2002). In addition, sampling more often than not takes place in the context of detailing, providing the sales representative with the opportunity to underline the positive benefit-risk profile of the detailed medicine. This allows influence to be exerted, which may affect the level of uncertainty and lay the ground for the physician to give the sample to a patient and gain personal experience with its benefits and risks.

The five main points made in this review on sampling will now be summarized. Firstly, there is agreement in the literature that the practice of providing samples to physicians by the pharmaceutical industry influences physician prescribing and increases demand, but these effects are small. However, there are opposing views on the effect of price sensitivity. Secondly, most of the available literature lacks rigor, and studies empirically testing the hypothesis are few, therefore weakening any argument made on its basis. Thirdly, samples are almost exclusively provided for new medicines, driving the uptake of new medicines. Fourthly, the use of samples more often than not take place in the context of detailing, and any effect is therefore linked (Brundage, 1999). Furthermore, medicine attributes, efficacy and safety, may modulate physician sampling behaviour. Lastly, the provision of samples may influence the intent to prescribe by modulating the level of uncertainty in a clinical decision setting. In conclusion, evidence of influence is high, but the level of influence is modest.

3.4.2.2 Detailing

Detailing is defined in this review as the visit to prescribing physicians by pharmaceutical sales representatives, and remains the most important promotional instrument available to the industry (Singh and Smith, 2005). The reality of detailing is in fact sales promotion (Greene, 2004), and of all promotional interventions employed by the pharmaceutical industry directed at influencing prescribing behaviour, detailing is the most appreciated by physicians (Hemminki, 1975, Avorn et al., 1982, Vancelik et al., 2007). Furthermore, it is widely stated that detailing increases prescribing by physicians, but the effect has been found to be modest (Kremer et al., 2008, Manchanda and Chintagunta, 2004, Mizik and Jacobson, 2004). Due to the emerging controversy surrounding detailing in recent years, largely fuelled by the high rate of spend per physician (8,000 – 13,000 USD in 2008), several authors have investigated its effect on physician prescribing behaviour (Sufrin and Ross, 2008).

In the following section, the effects of detailing on physician prescribing behaviour are first addressed. Then, the contexts under which detailing takes place are examined. Next, the mechanism by which detailing may exert its effect on physician prescribing behaviour is addressed. Finally, a link to theory is presented before a summary is offered.

3.4.2.2.1 Effects of Detailing

It is widely stated that detailing influences physician prescribing behaviour (Gönül et al., 2001, Kremer et al., 2008, Windmeijer et al., 2006, De Laat et al., 2002, Fullerton et al., 2010, Muijreres et al., 2005, Naik et al., 2009, Pinto et al., 2010, Rizzo, 1999, Roberts et al., 1997, Tett, 2003, Theodorou et al., 2009, Vancelik et al., 2007, Manchanda and Honka, 2005, Manchanda and Chintagunta, 2004, Parson and Abeele, 1981, Manchanda et al., 2005, Narayanan et al., 2003, Mizik and Jacobson, 2004, Narayanan et al., 2004, Chintagunta and Desiraju, 2005, Hurwitz and Caves, 1988, Leffler, 1981). At first glance, it may be evident that detailing increases prescribing at the physician level. Strong evidence to support this notion stems from the fact that the pharmaceutical industry invests heavily in the use of this promotional instrument. However, the picture painted in the literature is not as clear as it may appear at first glance. Effects of detailing on physician prescribing behaviour can loosely be categorised into two categories: increased prescribing and mixed effects.

Several authors find that detailing increases prescribing on the physician level (Gönül et al., 2001, Manchanda and Chintagunta, 2004). However, the effect is not linear and shows diminishing returns (Manchanda and Chintagunta, 2004) and heterogeneity in physician responsiveness to detailing (Narayanan and Manchanda, 2005, Janakiraman et al., 2008). Furthermore, using aggregate sales or prescription data, several authors also find that detailing increases prescribing (Narayanan et al., 2005, Narayanan et al., 2004, Rizzo, 1999, Chintagunta and Desiraju, 2005). In the mixed effects category, several authors also found that detailing increases prescribing, but that the effect is small (Mizik and Jacobson, 2004, Kremer et al., 2008). Also, some authors have found no significant effect of detailing on physician prescribing (Rosenthal et al., 2003), and others have even found a negative effect (Parson and Abeele, 1981). However, there exists a general consensus that detailing increases prescribing, but the effect is modest (Kremer et al., 2008).

Evidence of effects other than increased prescribing can also be found in the literature; notably, quality related effect parameters and effect on price sensitivity at the physician level. Fullerton et al. (2010) evaluated whether pharmaceutical promotion influences off-label prescribing, especially in situations where options are limited. The study used an observational study design, utilising Medicaid administrative and Verispan marketing data focusing on gabapentin and psychiatrist prescribing. The authors found that pharmaceutical prescribing rates tracked promotional efforts from 1994 to 2002. In conclusion, pharmaceutical promotion increased prescribing rates of gabapentin and may lead to off-label prescribing in conditions of limited choice. In another study, Muijreres et al. (2005) undertook a cross-sectional survey of 1434 GPs in The Netherlands in 2001 in order to examine the influence of pharmacists and pharmaceutical sales force representatives on prescribing behaviour. The authors found a negative correlation between quality of prescribing by solo GPs and frequency of visits by pharmaceutical industry representatives. There was a higher number of detailing in the solo practice group versus the non-solo practices, at 5.7 versus 3.8 visits per month, respectively. Furthermore, 4.6% of solo practice physicians were

female compared with 26% for non-solo practices. In conclusion, more frequent visits from pharmaceutical industry representatives were associated with a lower quality of prescribing.

Two academically rigorous studies addressing the effect of detailing on price sensitivity have been identified. Rizzo (1999) tested the hypothesis that advertising decreases the price elasticity of demand and found strong evidence to support the hypothesis. In other words, detailing was found to systematically lower price sensitivity at the physician level. In a similarly designed study, Windmeijer et al. (2006) found that general practitioners' price sensitivity is small, but adversely affected by promotion. Furthermore, Rizzo's findings are consistent with those of Hurwitz and Caves (1988), who also found that detailing inhibits entry into market by way of decreasing price sensitivity at the physician level. However, the findings of Hurwitz and Caves (1988) contrasts those of Leffler (1981). This incongruence may in part be explained by the inclusion of generics in the model employed by Hurwitz and Caves (1988), a component excluded in the study by Leffler (1981). Even though no consensus exists in the literature on the effect of price sensitivity on pharmaceutical demand, there is solid evidence to suggest an effect on price sensitivity at the physician level.

The source of information concerning medicines may influence prescribing in itself. Jones et al. (2001) found that GPs in general prescribe more new medicines when compared to specialists (internists and psychiatrists), and that pharmaceutical sales representatives were an important source of information for GPs. Others further support the finding that physicians may prefer commercial sources of prescribing information (Avorn et al., 1982, Theodorou et al., 2009).

3.4.2.2.2 Contexts of Detailing

Available literature acknowledges that detailing by the pharmaceutical industry affects prescribing; however, in which contexts influence is exerted is less well established. Pharmaceutical sales representatives have at their disposal several tools to increase the effect of a promotional message, which may be categorized as gifts (Wazana, 2000) and includes: token gifts, samples, meals, funding for attending educational symposia and continuous medical education (CME) sponsorship. Detailing must therefore be evaluated in the context of gifting. In addition, the attributes of medicines have recently been advocated to be a determining factor of physician prescribing behaviour (Venkataraman and Stremersch, 2007). Furthermore, characteristics of physicians, practices and patients may provide a moderating contextual influence on the effect of detailing. These topics are discussed in detail in Section 3.4 from page 104 and will therefore only be briefly mentioned in this section.

Wazana (2000) conducted a systematic literature review, investigating the relationships between pharmaceutical sales representatives and physicians, with the focus on their impact on physician prescribing behaviour. The author identified a total of 538 studies by searching MEDLINE from 1994 to 2000, and found that 29 satisfied pre-specified inclusion criteria. In all, 16 studies were identified to address effects of interaction on physician prescribing behaviour. The studies employed cross-sectional, case control or pre- and post-interaction

methods to evaluate the impact. Detailing by sales representatives was associated with changes in prescribing behaviour and requests for adding medicines to hospital formularies. More specifically, these interactions were found to "…impact the prescribing practice in terms of prescribing cost, non-rational prescribing, awareness, preference and rapid prescribing of new drugs, and decreased prescribing of generic drugs" (Wazana, 2000 p375). Furthermore, detailing was found to take place in the context of gifting. Gifting is related to the provision of token gifts, samples, meals, funding for attending educational symposia and continuous medical education (CME) sponsorship.

Even small gifts can be powerful influencers of behaviour, and may therefore contribute to possible conflicts of interest for the physician (Dana and Loewenstein, 2003). In a 2001 study by Steinman et al. (2001), it was found that 61% of physicians believe that they are not influenced by gifts provided by sales representatives. However, this was only 16% for their colleagues. Gifting in the context of samples has been addressed in this paper and will not be further discussed here. Literature on token gifts and meals is scant and not of adequate rigor to be included in this review. However, several authors have addressed education in broader terms, and this issue is addressed briefly.

Hemminki (1975) summarizes the few studies on the effect of education that were available prior to 1975 (Becker et al., 1972, Joyce, 1970, Lee et al., 1965). There appears not to be any difference in prescribing patterns for graduates from different medical schools; however, it has been shown that higher postgraduate qualifications result in lower rate of prescription of any kind. Hemminki (1975) concludes that there is evidence to suggest that there is a link between education and quality of prescribing. More recently, Carroll et al. (2007) investigated educational interventions and regulatory policies on trainee perceptions of the pharmaceutical industry. The authors performed a literature search using Medline and bibliographies or review articles of relevant studies. Articles published before 1991 were excluded. The review suggests that well-designed seminars, role playing and focused curricula can affect trainee attitudes and behaviour, but whether the effect is sustainable over time is still unknown. Ellison et al. (2009) investigated post-activity Continuing Medical Education (CME) evaluation surveys. The background for the survey was the concerns raised around possible bias in commercially supported CME activities. The authors conclude that 93% of physicians participating claim to perceive no bias. Ross and Loke (2009) performed a systematic review of literature, investigating whether educational interventions improve prescribing by medical students and junior doctors. The authors searched MEDLINE, EMBASE, Educational Resource Information Centre, British Education Index, PsycINFO, CINAHL, TIMELIT, Cochrane Trials Database and grey literature. Of the 3189 studies identified for initial screening, only 22 studies were included in the review. The World Health Organization (WHO) Good Prescribing Guide is the most widely tested and has demonstrated efficacy. However, the authors conclude that further work is needed to produce high-quality interventions. Further support can be found in the work by Tett (2003), where factors such as access to continued medical education were confirmed as having an influence on prescribing.

Other contextual factors identified as possibly having a bearing on the influence of detailing on physician prescribing behaviour are physician characteristics, practice characteristics, patient characteristics and medicine attributes.

Physician characteristics include specialty, age, gender and time in practice. The available literature addressing physician characteristics as an influencing factor on physician prescribing behaviour is limited and inconclusive. However, evidence supporting physician-level habit persistence as a factor influencing physician prescribing behaviour is strong, as noted in Section 3.4.1.1. It can therefore reasonably be argued that physician-level habit persistence must be overcome for detailing to impart meaningful influence on physician prescribing behaviour. Conversely, it can therefore also be argued that physician-level habit persistence modulates any influence imparted by detailing on physician prescribing behaviour.

Practice characteristics include location, organisation and academic status. In addition, on this topic, the evidence is limited and inconclusive, as noted in Section 3.4.1.2. Therefore, no conclusion can be drawn with respect to any modulating effect on the influence that detailing may have on physician prescribing behaviour.

Patient characteristics include age, gender, race and social factors. However, none of the factors distinguished from biomedical contexts known to influence health and the consequent need for prescription medicines, although bio-medical factors as an influence of physician prescribing is presumed to be high on the basis of general medical literature, as noted in Section 3.4.1.3. The direct link to effects on detailing is lacking, but it can reasonably be argued that patient level bio-medical factors may impart an indirect modulating effect on the influence of detailing on physician prescribing behaviour.

Medicine attributes is one of the key topics covered in any detailing event. Thus, it is reasonable to expect an effect on the influence which detailing may have on physician prescribing behaviour. In a seminal study, Venkataraman and Stremersch (2007) investigated the effect of promotions across brands and found that medicine attributes modulate the influence of detailing on physician prescribing behaviour.

In summary, evidence of influence of continued medical education, physician characteristics, practice characteristics and patient characteristics is low. However, notable exceptions of physician-level habit persistence and patient-level bio-medical factors may clearly moderate the influence detailing may have on physician prescribing behaviour. The same can also be said for medicine attributes, and the evidence for this is stronger and more directly linked.

3.4.2.2.3 Mechanisms of Detailing Effects

Detailing serves two roles: information and persuasion (Hurwitz and Caves, 1988). Narayanan et al. (2005) argue that information may serve to reduce cognitive uncertainty, whereas persuasion serves to induce positive affect. Interestingly, habit persistence is noted in the literature as a possible residue of early experience with the use of new medicines (Jones et al., 2001), and has

been acknowledged by several authors (Jones et al., 2001, Lilja, 1976, Janakiraman et al., 2008, Venkataraman and Stremersch, 2007). “The unique contribution of habit would lie in finding a residue of past experience that leads to habitual rather than reasoned responses” (Ajzen, 1991 p. 203). Habit persistence, in the context of detailing, may be considered brand loyalty (Grabowski and Vernon, 1992). Several authors find that detailing mostly serves a persuasive role (Hurwitz and Caves, 1988, De Laat et al., 2002). Habit persistence is not associated with a reasoned response (Ajzen, 1991), and it may therefore be argued that detailing can influence physician prescribing behaviour through habit formation. On the other hand, detailing may involve reasoned responses to clinical challenges, and detailing may be argued to influence physician prescribing by modulating the cognitive uncertainty associated with prescribing medicines through an informative role.

Jones et al. (2001) found that GPs in general prescribe more new medicines when compared to specialists (internists and psychiatrists), and that pharmaceutical sales representatives were an important source of information for GPs. Others further support the finding that physicians may prefer commercial sources of prescribing information (Avorn et al., 1982, Theodorou et al., 2009). Janakiraman et al. (2008) explored the effects of habit persistence on prescribing behaviour by examining 9672 prescriptions written for depression by 108 physicians of non-specified specialities over a four-year period in the US. A two-state model was adopted, based on the assumption that physicians can be either persistent or non-persistent. The authors investigated whether persistent physicians responded differently to detailing, out-of-office meetings and symposium meetings. There is compelling evidence to show significant cross-sectional levels of persistence in decisions concerning the prescription of medicines. Practice type may play a role, as it was found that physicians working in smaller practices are more likely to be persistent. Furthermore, age and detailing acceptance also play a role in defining persistence. Older physicians and those more accepting of detailing stand a higher chance of being persistent. Both persistent and non-persistent physicians appear to be responsive to symposium meetings; however, only non-persistent physicians were found to be responsive to detailing. Out-of-office meetings had no effect on prescribing behaviour. Venkataraman and Stremersch (2007) also found that there is substantial habit persistence in physician decision making. Lilja (1976) performed an empirical study utilizing a mailed questionnaire examining how GPs (180) in Sweden chose medicines. The data was analysed using linear regression modelling. The author found a positive effect on habitual choice with increasing age. Highest weight was given to curing effect of medicines prescribed. In addition to physician age, it was found that disease severity was a determining factor. Moreover, no significant relationships for background variables of physician were found. “The unique contribution of habit would lie in finding a residue of past experience that leads to habitual rather than reasoned responses” (Ajzen, 1991 p. 203). Furthermore, this finding was corroborated by Coscelli (2000), who found that doctors' prescribing behaviour shows habit persistence. In addition, early experience of using a new drug seems to strongly influence future use (Jones et al., 2001).

In summary, it may appear that detailing serves an informative and persuasive role. Both roles play a part in the modulation of uncertainty and lay the foundations for behaviour and experience, leading to the formation of habit. The evidence presented provides a solid foundation for such arguments, but the lack of theoretically based evidence may only serve to weaken the arguments.

3.4.2.3 Academic Journal Advertising

Advertising by the pharmaceutical industry in academic journals is a time honoured practice dating back to the 1860's when Park Davis first advertised in a journal directed at physicians (Leffler, 1981). Advertising serves two purposes: information and persuasion (Hurwitz and Caves, 1988). Most of the evidence pointing to its effect on physician prescribing stems from panel data on pharmaceutical advertising spend and consequent sales. However, a few studies addressing the effect of academic journal advertising on the physician level have been found in the literature and are included in this review. Walton (1980) investigated the effect of 354 ads on 1000 physicians and claim that there is a link between journal adverting and increased prescribing. More specifically, the authors note that within 60 days of a quarterly period of advertising, the physicians who recalled ads became prescribers more often than those that did not recall. Avorn et al. (1982) investigated the impact of commercial versus non-commercial sources of information on physician prescribing behaviour and found that academic journal advertising for medicines was believed to have little influence on physician prescribing by 68% of the participants; 28% of the participants believed that there was a moderate influence and only 3% a strong influence. Physicians who held advertising-oriented beliefs about the index medicines were generally unaware that they were strongly influenced by non-scientific sources (Avorn et al., 1982). In another study investigating advertising, Azoulay (2002) found that the journal advertising increased prescribing and that the finding was marginally significant. Furthermore, journal-advertising expenditures increase with the number of indications recently approved by the Federal Drug Administration (FDA), USA (Azoulay, 2002). It may therefore be argued that the effect of journal advertising in part is due to the medicine attributes advertised. In addition, Campo et al. (2006) claim that physicians' views of the effectiveness of lipid lowering drugs and the decision to prescribe such drugs is affected by the predominant use of reduction of relative risk in trial reports and journal adverting.

There is limited evidence to support that academic journal advertising increases physician prescribing. The dual function of advertising may provide a possible explanation of the mechanism by which the effect is exerted. Advertisements directed at physicians may inform or indeed persuade the physician about the attributes of a specific medicine. According to Gönül et al. (2001), advertisements may have a positive effect in that information about efficacy and safety is provided, thereby reducing cognitive uncertainty. It has been widely stated that physicians prefer and often rely on commercial sources for information when prescribing (Azoulay, 2002, Avorn et al., 1982); this may be problematic in that the accuracy of journal advertisements has been questioned (Wilkes et al., 1992). There is also evidence to suggest that verbal information is preferred over written

(Robertson et al., 2003, Wensing et al., 2009, Straus and Corbin, 1990). Thus, it may be inferred that evidence of influence in support of academic journal advertising as a factor influencing physician prescribing behaviour is low. In addition, the evidence presented points to the fact that any primary effect on physician prescribing behaviour is very limited.

3.4.2.4 Theoretical Considerations and Summary

It is widely stated that detailing influences physician prescribing. However, the components of contextual circumstances under which this influence is exerted lack credible evidence, with three notable exceptions: physician-level habit persistence, patient-level bio-medical factors and medicine attributes.

Physician-level habit persistence has been widely stated (Janakiraman et al., 2008, Venkataraman and Stremersch, 2007, Jones et al., 2001, Lilja, 1976, Coscelli, 2000) and is a context invariably present before, during and after detailing. The Theory of Planned Behaviour predicts behaviour by proxy of behavioural intent, which is modulated by cognitive processes focused on the balance between attitude, social norm and control beliefs (Ajzen, 1991). Habit persistence, on the other hand, is the residue of past behaviours and experiences, and by definition, does not involve conscious processing. From a decision theoretical perspective, it can be argued that habit reduces the effort associated with decision making in complex clinical settings (Payne et al., 1993). Furthermore, it is widely stated that physicians make extensive use of heuristics when making clinical decisions, including those pertaining to the prescription of medicines (Bornstein and Emler, 2001). Thus, habit persistence may simply be driven by the economy of decision-making; in other words, it is necessary for the physician to form habits to reduce the burden of decision making related to the act of prescribing. When combining the two theoretical perspectives, Theory of Planned Behaviour and decision under uncertainty, it can be further argued that the mechanism by which habit persistence modulates the influence of detailing on physician prescribing behaviour is related to attitude formation. This can be explained by the fact that that the physicians' beliefs about consequence play a central role when evaluating benefit-risk of any treatment prescribed in a clinical setting. Janakiraman et al. (2008) claim that only non-persistent physicians are sensitive to detailing.

Patient-level bio-medical factors lie at the core of modern medical practice and, as such, influence physician prescribing behaviour. Detailing designed to influence physician prescribing does so by way of information and persuasion (Hurwitz and Caves, 1988). Information may reduce the cognitive uncertainty and persuasion positive affect associated with the act of prescribing the medicine being detailed. From a cognitive behaviour theoretical perspective, detailing thus modulates behavioural intent by influencing both attitude and social norm. It can therefore reasonably be argued that patient-level bio-medical factors play a central role in modulating the level of uncertainty, as they are directly involved in the benefit-risk evaluation of any prescribed treatment. Therefore, patient-level bio-medical factors may modulate the influence of detailing on physician prescribing behaviour through attitude formation.

Medical literature abounds with effect measures of therapy, and the literature addressing medical decision-making focuses on the uncertainty associated with the benefit-risk of any medical intervention intended to address a bio-medical need in a clinical setting. Benefit-risk assessments are also a central part of any marketing authorization for medicines, and continued safety surveillance and updates to the labelling ensures up to date information on benefit-risk for medicines (Permanand, 2006). Venkataraman and Stremersch (2007) argue compellingly for the moderating effect medicine attributes have on the effect of detailing across brands. Furthermore, it has been argued that detailing may have both an informative and persuasive role. Narayanan et al. (2005) argue that information may serve to reduce cognitive uncertainty, whereas persuasion serves to induce positive affect. Both may impact on the intent to prescribe by altering the balance of normative and subjective beliefs, as described in the Theory of Planned Behaviour by Ajzen (1991). Thus, detailing influences physician prescribing behaviour, and the effect is moderated by medicine attributes through modulation of intent.

It is widely stated that pharmaceutical promotion increases demand and may decrease price sensitivity. However, the observed effects are limited and modulated by three contextual factors (physician-level habit persistence, patient-level bio-medical factors and medicine attributes). Thus, evidence of influence is high and level of influence is low (see Table 3-39 Summary of pharmaceutical promotion).

Table 3-39 Summary of pharmaceutical promotion

Pharmaceutical promotion					
Component	**Effect**	**Mechanism**	**Theory**	**Influence**	**Evidence of influence**
Detailing	Increase demand Decrease price sensitivity	Modulate uncertainty	TPB Agency	Low	High
Sample	Increase demand Decrease price sensitivity	Modulate uncertainty	TPB Agency	Low	High
Academic journal advertising	Increase demand Decrease price sensitivity	Modulate uncertainty	TPB	Low	Low

3.4.3 Regulation and Control Interventions

In all aspects concerning prescription medicines, regulation and control is prevalent. It is therefore worthwhile considering the potential influence that regulation and control may exert on physicians when prescribing. In this review, audits, formularies and preferred medicines lists have been identified as influencing factors; these factors are discussed sequentially in this section.

3.4.3.1 Audits

Audits have been suggested to influence physician prescribing and are actively used as an intervention to achieve this effect. Several authors have addressed the topic, and the ensuing prolific literature follows two separate streams: effect and none-to-little effect.

Evidence supporting the hypothesis that audits influence physician prescribing behaviour is provided by only a handful of authors identified in this review. Melander et al. (1999) evaluated the effect of using the Audit Project Odense (APO) model for registration and quality development to reduce the prescribing of antibiotics in respiratory tract infections. “The Audit Project Odense (APO) method is an increasingly popular quality improvement concept including GPs' repeated registrations of their own activities, feedback, additional interventions and a final evaluation” (Sondergaard et al., 2006 p.198). The proportion of patients not receiving an antibiotic increased from the first to the second registration in both groups, in the intervention group from 45 to 55% ($p < 0.001$) and in the control group from 36 to 40% ($p = 0.0298$). The authors conclude that it is possible to achieve a change in the prescribing of antibiotics in the treatment of respiratory tract infections using audits. In a literature review, Gill et al. (1999) addressed interventions influencing physician prescribing, and identified 79 studies and 96 separate interventions. The authors found that “Studies that have used patient mediated interventions only yield the highest proportion of positive results. Next come interventions, which provide outreach (‘academic detailing’), and audit and feedback (including reminders). The least effective were distribution of educational materials (43%, 13%-78%)” (Gill et al., 1999) p.163. Overall, the authors found that 51% of interventions demonstrate a significant influence on physician prescribing. More recently, Baehren et al. (2010) studied the influence of the Ohio automated prescription reporting system data on clinical management of emergency department patients with painful conditions. The authors found that the 18 clinicians in this study changed their opioid prescription plan for 41% (74/179) of patients after reviewing the patients’ prescription histories. In two systematic reviews addressing interventions to improve prescribing and how medication prescribing is ceased, it was found that regulatory intervention was an effective influencer on physician prescribing (Ostini et al., 2009, Ostini et al., 2011). However, the two audits differ in the findings on audits and feedback. Ostini et al. (2009) found that audits and feedback were partially effective, whereas (Ostini et al., 2011) found that audits and feedback consistently showed positive results.

On the other hand, evidence pointing in the direction of a none-to-little effect of audits on physician prescribing has also been identified. O'Connell et al. (1999) evaluated the effect on general practitioners' prescribing of feedback on their levels of prescribing and found no evidence of influence. Furthermore, the authors note that the form of feedback (mailed, unsolicited, centralized, government sponsored), based on aggregate data, had no impact on the prescribing levels of general practitioners. Further support is provided in a Cochrane review by Arnold and Straus (2005), where the authors estimated the effectiveness of professional interventions, alone or in combination, in improving the selection, dose and treatment duration of antibiotics prescribed by health care providers in the outpatient setting. The authors claim that audit and feedback alone resulted in no or only small changes in prescribing.

Evidence supporting audit influence on physician prescribing is not consistent. On one hand, there is credible evidence that an influence is present. However, there is also credible evidence rejecting the hypothesis. In other words, the

evidence is strong but no consensus exists. Thus, it must be concluded that influence is low and the evidence of influence is inconclusive.

3.4.3.2 Formularies and Preferred Drug Lists (PDLs)

Even though physician autonomy is under pressure, managed-care notwithstanding, the physician acts as a decision maker on behalf of payers and patients when administering prescription medicines. Physician authority and control concerning decision outcome remains intact, but the spectrum of outcomes are typically preselected (Miller, 1989), by measures such as formularies and preferred drug lists (PDLs). This review has only identified seven studies addressing the question of formularies and PDLs.

Deviating from the trusted path of qualitative analysis employed by previous researchers in the field, Pippalla et al. (1995) quantitatively analysed the evaluations of formularies on physician prescribing behaviour. The results from 26 published studies were pooled before analysis. Based on the analysis, the authors claim that prescribing restriction through formularies may be an effective intervention influencing prescribing behaviour of physicians. Nutescu et al. (2005) found efficacy, formulary status, and policies restricting drug use to be highly influential in the decision to prescribe low molecular weight heparin instead of another anti-coagulant. In another study exploring the differences among GPs in their decisions to prescribe new medicines, it was found that physicians prescribing new medicines infrequently adopt a more cost-conscious approach to prescribing than frequent prescribers (Jacoby et al., 2003). Furthermore, the authors found that physicians prescribing new medicines less frequently were more likely to conform to a practice norm that encourages use and compliance with prescribing formularies. Schumock et al. (2004) investigated the opinion of physicians, clinical pharmacists, and formulary committee members with respect to key factors that influence medication prescribing in community hospitals; it was found that formulary status and restrictions on prescribing were considered highly influential by all participants. The effect of restrictive formularies has been claimed to also influence physician prescribing behaviour for other patients with more generous drug benefit; so-called “spill over effects” (Wang and Pauly, 2005). In a study on off-label prescribing of gabapentin, the authors of another study conclude that “restrictive formulary policy can alter prescriber behaviour away from targeted pharmacologic treatments” (Fullerton et al., 2010 p.372). In a study employing a quasi-experimental study design, Virabhak and Shinogle (2005) investigated the extent to which the strictness of the criteria used to control utilization of medicines not on a Medicaid PDL changes physician prescribing for non-Medicaid patients. The authors found strong evidence of relatively large direct and spill over effects of Medicaid PDLs across Medicaid, third-party payer, and cash markets. Furthermore, the authors also note that even under conditions that are more lenient, the influence on physician prescribing behaviour was significant.

There is apparent consensus on the restrictive effect of formularies and PDLs on physician prescribing behaviour, which is in line with the general findings of Miller (1989). There is a limited quantity of studies addressing this issue; however, in general, restrictions influence choice in almost every decision (Botti et al., 2008).

Even though the quantity of evidence identified in this paper is limited, it is felt that when considering the evidence in the context of choice under restrictions, evidence of influence is medium.

3.4.3.3 Theoretical Considerations and Summary

Audits and feedback provide the physician with summary information on their prescribing practice over time. Even though the evidence of influence is inconclusive and level of influence low, audits and feedback information serve a quality assurance role for the physician. It may be argued that such information may influence the physician's perception or subjective belief of what is acceptable, both from a medical and regulatory perspective, thus influencing and forming the physician's attitude toward the prescribing behaviour. Ajzen (1991) argues that the attitude is a component of intent, which in combination with perceived behaviour control, accounts for a considerable variation in behaviour. On the other hand, following traditional economic theory, it may be argued that the physician acts in self-interest when prescribing. Audit and feedback may therefore influence the physician-patient agency by providing a focus on the patient, whereby physician prescribing behaviour is governed by the concern for the patient and not self-interest. However, this leads back to the question concerned with acceptable prescribing behaviour, in terms of the Theory of Planned Behaviour.

Botti et al. (2008) p. 183, note that "nearly every decision a person makes is restricted in some way"; and formularies and PDLs are intended to restrict a physician's spectrum of choice when prescribing. A central component of the Theory of Planned Behaviour is perception of behavioural control (Ajzen, 1991). In the case of restrictive interventions such as formularies and PDLs, it may therefore be argued that the restrictions on choice imposed by the interventions modulate prescribing behaviour through their effect on the physicians' perceptions of behavioural control, see Table 3-40 Summary of regulation and control.

Table 3-40 Summary of regulation and control

Regulation & Control					
Component	**Effect**	**Mechanism**	**Theory**	**Influence**	**Evidence of influence**
Audits	Increase guideline adherence and quality of prescribing, and decrease prescribing	Modulate perceived control and subjective norm	TPB Agency	Medium	Medium
Formulary and PDL	Limit choice and decrease prescribing of branded medicines	Modulate perceived control	Agency	High	Medium

3.4.4 Economic Factors

In this section, evidence on economic factors and their influence on physician prescribing behaviour are presented. In this review, price/cost, reimbursement,

financial incentives and managed care have been identified as economic factors having a bearing on physician prescribing.

3.4.4.1 Price/Cost

At first glance, it appears that there is wide consensus in the literature on the fact that promotion lowers price sensitivity at the physician level (Kremer et al., 2008, Manchanda and Honka, 2005, Rizzo, 1999). However, others have found that physicians demonstrate a basic lack of price sensitivity (Gönül et al., 2001). This finding may be due to low physician awareness of price (Ryan et al., 1990, Ryan et al., 1996, Ryan et al., 1992). The rise in overall health care expenditure has been out-paced by the increase in cost of medicines (Theodorou et al., 2009), and this has sparked an interest in the influence of price and cost of medicines on physician prescribing. The literature shedding light on the issue follows two main streams: effect or no effect.

From the literature, there is more evidence supporting an influence of price/cost on physician prescribing than not. Ryan et al. (1996) convincingly argue that physicians in general exhibit low price awareness. Furthermore, with the exception of Gönül et al. (2001), there is credible evidence supporting that physicians' price sensitivity may be modulated by detailing (Kremer et al., 2008, Manchanda and Honka, 2005, Rizzo, 1999) and samples (Campo et al., 2006). Campo et al. (2006) and Kahan et al. (2006) claim that the effect on price sensitivity is due to increased price knowledge and that pharmaco-economic information as such may influence prescribing. In a study exploring the determinants of uptake and geographical variations of new medicines, Mason (2008) p. 7, claims "that self-reported evidence indicates that cost may inform prescribing decisions, but is not a barrier to uptake of new medicines". Furthermore, it has been found that cost may influence hospital prescribing of new medicines, but is rated as less influential on prescribing than medicine attributes (Chauhan and Mason, 2008, Jernigan et al., 1996, Rodriguez-Calvillo et al., 2011).

In general, it is widely stated that physicians rate cost to be an important influencer of prescribing behaviour (Theodorou et al., 2009, Tusek-Bunc et al., 2010, Hyde et al., 2005). However, when compared to clinical pharmacists, physicians rate the cost of medicines lower when considering influence on prescribing behaviour (Nutescu et al., 2005). Furthermore, it is claimed that the opinion held by physicians that price comparison is important strongly influences prescribing of cheaper alternatives (Wensing et al., 2009). Investigating factors influencing prescribing in Italy and the UK, Hassell et al. (2003) found that UK GPs employ cost reduction strategies when prescribing on the basis of high rate of patient co-payment and that reimbursement in Italy pre-empts the Italian physician from adopting the same strategies as their UK counterparts. However, the co-payment influence on physician prescribing is not supported by (Pham et al., 2007 p. 663), who found that "physicians do not routinely consider patients' out-of-pocket costs when making decisions regarding more expensive medical services".

Available evidence also suggests that price/cost may not influence physician prescribing. Exploring the differences among GPs in their decisions to prescribe new medicines drugs, Jacoby et al. (2003) p. 121, found that "high prescribers more often expressed themselves to be indifferent to medicine costs and a shared practice ethos". In another study, Rice (2009) estimated whether health maintenance organizations (HMO) physicians are more price sensitive than non-HMO physicians in their prescribing behaviour of brand-name substitutes. The results indicate that the price of medicines does not influence physician prescribing concerning whether a physician will choose to prescribe a common medicine, or alternate prescriptions among therapeutic substitutes. Patients increasingly face co-payment schemes, influencing out-of-pocket expenses (Pham et al., 2007). Addressing this issue, it is claimed that "physicians do not routinely consider patients' out-of-pocket costs when making decisions regarding more expensive medical services" (Pham et al., 2007 p. 663).

3.4.4.2 Reimbursement

Literature addressing the effect of reimbursement on physician prescribing directly is limited, but influence of reimbursement on prescribing behaviour is widely stated (Tett, 2003, Dybdahl et al., 2005, Fretheim et al., 2006, Oxman et al., 2007, Hyde et al., 2005, Kahan et al., 2006, Steffensen et al., 1997, Theodorou et al., 2009).

Reimbursement has an effect on patient co-payments for prescription medicines, and hence, price perceptions by both patients and physicians are influenced (Dybdahl et al., 2005); in other words, reimbursement affects price (OECD, 2008). Whether the physician is sensitive to price at the patient or payer level thus becomes an important aspect to bear in mind when considering reimbursement as a factor influencing prescribing. Literature addressing patient price sensitivity in the context of prescription medicines has not been found, but in general, it seems reasonable to assume that to a greater or lesser extent, price sensitivity at the patient level exists.

There is conflicting evidence supporting physician sensitivity to patient price/costs perceptions. However, from an industry perspective, the fight for reimbursement is critical to pharmaceutical sales; for example, the loss of reimbursement of Lipitor in Spain caused a loss in revenue for Pfizer Spain of 396 million USD over a three year period (Alvarez, 2011). The effect on pharmaceutical sales supports the notion of an influence of price on prescribing, but the evidence suggesting a possible mechanism of influence is not clear. On one hand, physicians' demonstrated price sensitivity could be modulated by interventions such as detailing and samples. Furthermore, physicians do no exhibit strong price awareness. Observations of reimbursement effects on pharmaceutical sales indicate a strong relationship and an implicit although indirect impact on physician prescribing. At the same time, evidence supporting price/cost concern on behalf of the patient is lacking. What remains is the price sensitivity at the patient level. At this point, it seems reasonable to argue that a plausible mechanism by which reimbursement influences physician prescribing is by way of patient level price sensitivity and an expectation of the cheaper alternative, given equal health benefits. Thus, the spectrum of choice available to

the physician when prescribing is limited by the patient expectation driven by price sensitivity at the patient level. However, as noted previously, it may be the physician's perception of the patient expectation that is the real driver. Evidence of influence is high, but the mechanism by which influence is exerted remains elusive.

3.4.4.3 Financial Incentives

Economic theory predicts that self-interest is a strong motivator for behaviour (Arrow, 1963), and it may therefore be argued that physicians are not much different from the population in general. However, it is argued that the physician's behaviour is governed by the concern for the patient and not by self-interest (Arrow, 1963). In an intellectual project for understanding, (McGuire 2001) has provided a comprehensive review of the topic of agency from a health economic perspective. Interestingly, the author concludes that economic models often ignore uncertainty and informational asymmetry inherent in modern health care (McGuire 2001, p. 496). The authority of the physician is strong and plays a central role in any decisions related to medical care (McGuire 2001, p.463). In light of the central role played by physicians in medical decisions, it is important to address aspects of moral hazard and adverse selection in the context of this review.

Moral hazard is said to take place when an individual not fully exposed to a risk would behave differently than if fully exposed to the risk (Gaynor and Gertler 1995). Both physician and patients are insulated from the financial realities of medical decisions (Illert and Emmerich, 2008), and thus subject to forces of moral hazard. Both the physician and the patient may therefore engage in behaviour motivated by self-interest. The physician may drive demand beyond what would be the case if exposed to the financial risk implicit in making the decision (McGuire 2001, p.503). A physician may also influence quantity of care, and this is achieved by: setting the level of non-contactable input (quality), influencing patient preference and physician induced demand (McGuire 2001, pp.503-519). Increasing quality may increase cost, changing patient preference in accordance with physicians, and self-interest may have the same effect. Physician induced demand will occur if the physician uses his "superior" knowledge to his benefit, driving use of health care resources to a higher level than would be the case if information was symmetric between agent and principal (McGuire 2001, p.503). On the other hand, the patient may seek to engage in behaviour driving the consumption of health care. A patient may, for example, simply opt for taking a pill for high cholesterol rather than engaging in lifestyle changing behaviour such as exercise and eating healthy. Thus, patient preference may therefore influence demand for health care services from physicians.

The literature addressing the influence of financial incentives on physician prescribing behaviour is both limited and inconclusive. Chauhan and Mason (2008) found that the impact of financial prescribing incentives on secondary care prescribing is unclear. In the context of clinical studies, Glass (2003) found that investigators receiving higher grant payments were more likely to prescribe the study drug at any of the time points covered in the study. In a later study under the same context, the same author found no effect (Glass, 2004). On a more

positive note, (Sturm et al., 2007) financial incentives may aid in limiting the volume of prescribed medicines. (Chauhan and Mason, 2008, Mason, 2008) claims that financial incentives positively influence prescribing quality, as measured by guideline adherence. Furthermore, behaviour independent financial incentives have been claimed to aid in changing prescription behaviour of GPs, but effects are small-scale and temporary (Martens et al., 2007). Finally, fundholding may influence prescribing when measured at the total prescription cost level (Wilson et al., 1996).

In conclusion, evidence of influence is low and the level of influence is unclear. The underlying basis for financial incentives in health care may be questioned, as the intent is to drive behaviour in a given direction driven by self-interest. Self-interest driven behaviour at the physician level is not deemed appropriate and would potentially put the patient at risk due to conflict of interest created by the intervention. It may therefore be argued that financial incentives without adequate regulation are inappropriate in this context.

3.4.4.4 Managed Care

Physicians have autonomy in decision making on the basis of an understanding that they will act in the best interests of their patients (Arrow, 1963). However, it has been argued that managed care may threaten the physician's loyalty to the patient (McGuire, 2001 p. 520). The physician is an agent for both the patient and the payer, potentially resulting in a loyalty conflict and cognitive dissonance. A payer can take advantage of the ethical constraints imposing payment systems that force the physician to personally take on more of the effort to attain an acceptable outcome for the patient (Fugh-Berman and Ahari, 1997).

Managed care in its nature is prescriptive and thus choice limiting. Literature addressing the topic is limited, but consensual as to the influence on physician prescribing. It is widely stated that the administrative interventions represented by managed care have a significant impact on physicians' prescribing behaviour, resulting in cost savings (Ahluwalia et al., 1996, Avorn and Soumerai, 1982, DeWitt et al., 2006, Ohlsson and Merlo, 2009, Rice, 2009, Fullerton et al., 2010).

Managed care also influences the share of cost for medical services, including prescription medicines, carried by member patients. The patient cost share has been found to influence physician prescribing by way of inequities in reimbursement between treatment options (Campo et al., 2006, DeWitt et al., 2006). This does not seem to be influenced by physician characteristics (Biga et al., 2007). However, Ohlsson et al. (2009) found that private and public physicians show a difference in the early adoption of medicines. Furthermore, Rice (2009) claims that managed care physicians are more price sensitive and prescribe a wider range of medicines than non-managed care physicians. Granlund et al. (2006) evaluated the effect of fixed versus open-ended budget on prescription behaviour, and found that the introduction of fixed pharmaceutical budgets did not affect physicians' prescription behaviour.

Managed care is primarily designed to reduce the cost of health care and achieves this effect through two separate mechanisms affecting physician

prescribing behaviour: first, the spectrum of choice available to the physician when prescribing is limited; and second, the physicians' price sensitivity at the patient level is influenced.

3.4.4.5 Theoretical Considerations and Summary

Economic interventions focusing on limiting choice are in general more effective than those that do not, see Table 3-41 Summary of economic factors. Price/cost is widely studied, but physicians generally exhibit a low degree of price sensitivity. However, reimbursement is an important and strong influencer of physician prescribing, indicating that the physician price sensitivity may not be at the system level, but rather at the patient level. Furthermore, this implies that the principal-agent relationship between physician and patient may be stronger than that between physician and payer.

From an economic theory perspective, it is claimed that self-interest is a key driver of behaviour (Arrow, 1963). Thus, economic interventions focused on self-interest as a motivator for behaviour lie within the remit of Agency Theory. It may therefore be argued that the central theme is conflict of interest and that economic interventions are used to modulate both level and direction of interest. Considering the patient needs, it is evident that balancing the triad of interests defined by the key stakeholders (payer, provider and patient triad) is a complex and arduous task. Further complicating the picture is the question addressing what constitutes optimal consumption of health care services. Given that the conflict of interest is defined by the triad of stakeholders, loyalty to the principal may come under attack in the context of a principal-agent relationship.

Table 3-41 Summary of economic factors

Economic factors					
Component	**Effect**	**Mechanism**	**Theory**	**Influence**	**Evidence of influence**
Price/Cost	Influence demand	Modulate perceived control and moral hazard	TPB Agency	Low	High
Reimbursement	Limit choice and decrease prescribing of branded medicines	Modulate perceived control and moral hazard	Agency	High	Medium
Financial incentives	Shift prescribing in line with incentives	Modulate self interest	Agency	Medium	Low
Managed care	Limit choice and decrease prescribing of branded medicines	Modulate perceived control	TPB Agency	High	High

Payers must balance the needs of the individual against those of society, prioritizing the distribution of health care in a welfare context. The physician-patient relationship is focused on the individual, and may therefore be at odds with the priorities defined by payers. Furthermore, patients and physicians are often insulated from the economic consequences of medical decisions. Therefore, in the context of physician prescribing behaviour, economic interventions focus on two mechanisms. First, economic interventions focus on

reducing the spectrum of choice available for the physician when prescribing. Second, the focus is on affecting the price sensitivity at the patient-level. The consequence is a reduction of moral hazard and adverse selection by influencing the spectrum of choice and patient-level price sensitivity, respectively.

3.4.5 Non-Economic Factors

Non-economic factors influencing physician prescribing behaviour have been widely investigated, but the number of factors is many and evidence of influence varies across the identified factors.This section begins by presenting evidence of influence on physician prescribing behaviour on the following identified non-economic factors: peer effects, academic detailing, guidelines, academic literature, bio-medical, clinical research participation, legal concerns and technology. Finally, the evidence is considered from a theoretical perspective, before a summary is provided.

3.4.5.1 Peer Effects

It is widely stated that peer effects can have a strong influence on physician prescribing. This is claimed to be especially true for GPs and for specialists when prescribing outside their specialist domain (Gallan, 2005, Jones et al., 2001, Jones et al., 2001, Lapeyre-Mestre et al., 1998, Tusek-Bunc et al., 2010). For specialists, the support structures within the facilities where they provide health care services may shape specialist prescribing (Chauhan and Mason, 2008). Further investigating this context, Prosser and Walley (2006) p. 1565, found that “prescribing was often influenced by ‘tacit’ knowledge derived from social influence, interpersonal relations and professional networks”, and that “this information was an authoritative influence, representing a legitimate and decisive interchange through which doctors acquire knowledge and experience of new drugs”. Lewis and Tully (2009) employed the critical incident technique and in-depth interviews in investigating the influence of team interactions on prescribing behaviour. The authors found that physicians’ prescribing decisions were strongly influenced by relationships with other team members. Furthermore, physicians admitted to prescribing to preserve relationships, often at the cost of non-compliance with hospital regulations and guidelines. Glass and Rosenthal (2005) investigated the influence of clinical investigators on physician prescribing behaviour, and found that clinical investigators play an important role in influencing the prescribing behaviour of their specialist peers.

Peers also influence GP prescribing behaviour. Naik et al. (2009) found that local physician experts interpret and provide context for new clinical evidence, practice guidelines, and pharmaceutical marketing. However, the effect of marketing efforts on key opinion leaders is not symmetric (Nair et al., 2010). Advice from colleagues had similar, but less important status than academic literature (Arnold and Straus, 2005). In another study, Altiner et al. (2007) found that peer visits that focused on doctor–patient communication and patient empowerment is an effective concept to reduce antibiotic prescriptions in primary care. Furthermore, GPs are influenced not only by their immediate peers, but also by specialists (Tett, 2003, Taketomo et al., 1989) and pharmacists (Thornton et al., 1991). In another study investigating factors influencing physician prescribing behaviour,

Schroder-Bernhardi and Dietlein (2002) found that hospitals significantly influence the prescribing behaviour of general practitioners.

There is sufficient evidence to claim that peers influence physician prescribing behaviour. However, it is important to bear in mind that the majority of evidence is within the context of adoption of new medicines. Specialists rely on peers, especially when prescribing outside of their specialist domain, and the context created within a secondary care facility provides social reinforcement through which specialists acquire knowledge and experience of new drugs. In addition to the context provided by the local expert, specialists and hospital practices also influence GPs. It may therefore be argued that observed practice and communicated experience of peers serve to reduce uncertainty when prescribing new medicines.

3.4.5.2 Academic Detailing

Academic detailing in this context involves non-commercial-based educational outreach, and is widely stated to influence physician prescribing behaviour by affecting the level of guideline compliance (Avorn and Soumerai, 1983, Ostini et al., 2011, Ostini et al., 2009, Lundborg et al., 1999, Klein et al., 1981, Herbert et al., 2004, Greving et al., 2006, Melander et al., 1999, Seneviratne et al., 1998, Newton-Syms et al., 1992, Fretheim et al., 2006, Welschen et al., 2004, Watson et al., 2001, Lagerlov, 2000, Bingle et al., 1991, Cochella and Bateman, 2011, Nilsson et al., 2001, Schuit et al., 2000). In addition, academic detailing is found to be most effective when conducted face-to-face (Pippalla et al., 1995). In a study by Arnold and Straus (2005), it was found that interactive educational meetings appeared to be more effective than didactic lectures. However, academic detailing conducted in groups may not be effective (Simon et al., 2006). Further support is provided by Goldstein et al. (2005) p. 677, who found that “individualized advice regarding drug therapy for hypertension given to the clinician at each patient visit was more effective in changing clinician prescribing behaviour than implementation of a general guideline”. Addressing the level of influence, Avorn and Soumerai (1983) found mixed results. In another study, Herbert et al (2004) found the level of influence to be modest, but meaningful. However, several authors have found the level of influence to be high (Klein et al., 1981, Kralj et al., 2003, Soumerai and Avorn, 1987, Welschen et al., 2004, Watson et al., 2001, Seneviratne et al., 1998, Pippalla et al., 1995), but repetition may be necessary for full effect (Schuit et al., 2000).

The influence of academic detailing on physician prescribing behaviour measured by guideline compliance is widely stated. Furthermore, it is also widely stated that the level of influence is high, but no absolute consensus exist. The level of influence is found to be positively associated with individualized and face-to-face communication. Thus, it may be argued that academic detailing is effective in driving physician guideline adoption.

3.4.5.3 Guidelines

Guidelines in the context of this review aim to influence decisions regarding prescription of medicines. The guideline content is based on examination of

available evidence in the context of evidence-based medicine, resulting in consensus statements on best practice within a therapeutic area. As guidelines are not mandatory, the level of prescriptive influence may therefore be variable. Guideline adherence is thus dependent on whether the physician decides to follow the guidance when prescribing. It is widely stated that the level of guideline adherence is variable (Smolders et al., 2007, Lagerlov, 2000, Chauhan and Mason, 2008, Nast et al., 2009, Rashidian and Russell, 2011); in fact, it has been found that in some cases, more than 50% of decisions resulting in a prescription contradict clinical practice guidelines (Ventelou, 2010). The literature addressing the topic is in general focused on interventions to influence guideline adherence and follows two main streams: effective and non-effective interventions.

Digital decision support systems have been shown to increase guideline adherence across therapy areas (Bertoni et al., 2009, Bouaud et al., 2001, Filippi et al., 2003). However, patient level bio-medical factors such as disease severity, have been shown to modulate guideline adherence (Filippi et al., 2003). Doyon et al. (2009) evaluated physicians' compliance with guidelines before and after dissemination. The intervention period was divided into two temporal phases without overlap. In the first phase, consultation by peer leaders and networking was employed, whereas in the second phase, dissemination of official guidelines and of a pre-printed prescription sheet, an educational session led by a peer leader for residents and further networking was used. "An improvement in compliance over the intervention phase 1 (47.0%) and the intervention phase 2 (64.3%) periods was observed: a difference of 17.4 (95% CI 8.2, 26.0)" (Doyon et al., 2009 p. 1111). Nast et al. (2009) found that the proportion of prescribed systemic treatments for patients with moderate to severe psoriasis increased as a result of guideline publication. In another study, educational intervention based on management guidelines was found to influence prescribing behaviour of physicians (Zwar et al., 2002). Furthermore, the majority of physicians (80%) felt that the guidelines had led to changes in their prescribing, whereas 20% stated that the guidelines had had no impact on prescribing (Nast et al., 2009). More recently, Leslie et al. (2010) investigated the effect of introducing absolute 10-year fracture risk reporting on physician prescribing. The authors found that a system based on absolute 10-year fracture risk was associated with increased guideline adherence.

However, simple publication of guidelines may not be enough to influence prescribing behaviour of physicians. (Lagerlov, 2000) investigated the effect of guideline publication on physician prescribing behaviour and found that publication of guidelines did not influence physician prescribing patterns for urinary tract infections. In another study, it was found that conducting a trial sponsored by a pharmaceutical company had no significant impact on physicians' adherence to international treatment recommendations, but increased their use of the trial sponsor's drugs (Andersen et al., 2006). Furthermore, it is claimed that mailed dissemination of guidelines has little or no effect on GP prescribing (Watson et al., 2001, Sondergaard et al., 2002, Filippi et al., 2003, Hunskaar et al., 1996). However, when guidelines are included in an on-going educational series of letters, they have been found to be effective (Dormuth et al., 2004).

In a study looking at the guideline adherence in asthma patients in five European countries, it was found that “although many doctors in different health care contexts have accepted the recommendations given in guidelines, the proportion of their patients treated accordingly differed” (Lagerlov et al., 2000 p. 25), indicating geographical difference in guideline adherence. Furthermore, individualized advisory regarding drug therapy for hypertension given to the clinician at each patient visit is claimed to be more effective in changing clinician prescribing behaviour than implementation of a general guideline (Goldstein et al., 2005).

In summary, it is recognized that guidelines have the power to influence physician prescribing behaviour. However, guideline adherence is widely stated to be variable, and much of the research on guidelines is focused on finding effective interventions to influence guideline adherence, thereby influencing physician prescribing. Evidence of influence is medium and due to the high degree of variability in guideline adherence, the level of influence is low.

3.4.5.4 Bio-Medical Factors

Medicine in general is concerned with the pathological states of anatomy or physiology having a meaningful impact on health and its diagnosis, treatment and/or prevention (bio-medical). Medicines are important when treating ailments within the context of modern medical practice (Lilja, 1976, Hemminki, 1975). It is widely stated that diagnosis, signs, symptoms and disease severity across therapy areas are all positive predictors of prescriptions (de Jong et al., 2009, Hussain et al., 2010, DeWitt et al., 2006, Hummers-Pradier et al., 1999, Hyde et al., 2005, Mesker et al., 2009, Pressman et al., 2001, Solomon et al., 2003, Tan et al., 2009, Biga et al., 2007, Van der Ent et al., 2009, Macfarlane et al., 1997). In addition, it has been claimed that psychiatric co-morbidities in patients with anxiety may influence prescribing by physicians (Smolders et al., 2007). Wanting to limit treatment failures have been found to influence prescribing (McGregor et al., 2007). Bio-medical effects caused by medicines may also influence prescribing. Choudhry et al. (2006) found that a physician’s experience with bleeding events associated with warfarin can influence prescribing warfarin, but adverse events that are possibly associated with underuse of warfarin were not found to affect subsequent prescribing. Furthermore, pharmaceutical knowledge (efficacy and safety) does not significantly influence prescribing range (de Bakker et al., 2007). In the context of preventive medicine, Izuora et al. (2011) investigated the influence of the World Health Organization Fracture Assessment Tool on physician prescribing behaviour for the prevention of osteoporosis. The authors found no influence of the tool on physician prescribing.

In conclusion, there is credible evidence for bio-medical factors influencing physician prescribing behaviour across therapeutic areas. This may seem like stating the obvious, as medicines are designed to address bio-medical needs at the patient level, but it is worth noting that the influence is universally applied across therapy areas.

3.4.5.5 Academic Literature

Academic literature is widely stated to be a valuable and preferred source of information among physicians (Gallan, 2005, Naik et al., 2009, Theodorou et al., 2009, Avorn et al., 1982, Prosser et al., 2003, Adair et al., 2005, Azoulay, 2002). In the context of this review, academic literature refers to peer-reviewed literature (paper or digital) used as sources of new evidence and practice guidelines relating to prescription medicines.

Academic literature plays an important role, but figures more strongly in determining prescribing behaviour in specialists than GPs (Gallan, 2005). Specialists have been found to prescribe based mainly on scientific literature and meetings (Jones et al., 2001), but this is not universally true, as GPs are claimed to place more importance on official data than psychiatrists (Lapeyre-Mestre et al., 1998).

Not only is academic literature an important source of information, but also the type of information that may play a role in influencing physician prescribing behaviour. Fullerton et al. (2010) p. 372, found that "publication of scientific evidence had the combined effect of decreasing the predicted probability of receiving gabapentin by 5.4% at one year from 17.1% to 11.7%". In another study, Calvo and Rubinstein (2002) investigated the proportions of new prescriptions changed between a 6-month period before publication and a 6-month period after publication of alendronate, metformin and finasteride. The authors found a heterogeneous response and that the prescription patterns of all physicians showed a clear temporal association with the publication of new evidence. More importantly, the authors note that "the greater change observed for generalists could be explained by their lower baseline use of the drugs and a more conservative behaviour that might defer the adoption of new treatments until they are supported by strong evidence published in major journals" (Calvo and Rubinstein (2002) p.457). Furthermore, Menon et al. (2010) found that a rapid and sustained reduction in the frequency of aspirin clopidogrel use in ischemic stroke and transient ischemic attack was observed after publication of the MATCH[5] trial in the absence of MATCH-specific GWTG[6]-Stroke initiatives and preceding an American Heart Association guideline update.

The manner in which information is provided may also play a role in modulating the influence of academic literature on physician prescribing. For example, physicians' views of the effectiveness of lipid lowering drugs and the decision to prescribe such drugs is affected by the predominant use of reduction of relative risk in trial reports and advertisements (Bucher et al., 1994).

Ideally, the doctors preferred to prescribe drugs for which they had scientific knowledge; "They all rated independent research evidence as the key source of empirical validation for a new drug, more than drug company funded studies" (Prosser et al., 2003 p. 61).

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[5] Management of Atherothrombosis With Clopidogrel in High-Risk Patients (MATCH)
[6] Get With The Guidelines (GWTG)

From the evidence presented, it is reasonable to argue that that academic literature serves as a valued and preferred source of information in influencing physician prescribing. However, to what extent influence is exerted is not fully understood.

3.4.5.6 Clinical Study Participation

Clinical study participation exposes the physician to new medicines in a well-defined and monitored setting, providing useful experience with efficacy and safety. Literature addressing the issue is limited and reported results heterogeneous, indicating that no consensus exists as to its influence on physician prescribing behaviour.

Using a matched case–control design, Corrigan and Glass (2005) investigated whether participation in Phase III trials influenced the prescription of study medicines 18 months after trial closure. The authors found that for all indications, investigators prescribed the study drug more often than control physicians did. Three months after the product launch of the new drug, the number of prescriptions for the clinical trial drug written by the investigators accounted for a statistically significant higher share than did the number of prescriptions written by controls (26% vs. 16%; $P \leq .001$), even with controlling for the additional variables used in the multiple analysis-of-covariance model. In another study, (Glass, 2003, Glass and Rosenthal, 2005) investigated the participation in Phase III and IV studies and the subsequent influence on prescribing behaviour by physicians. The authors found that there was a stronger relationship in Phase III studies than in Phase IV studies between participation in clinical trials and increased study drug prescribing, and no causal relationship between trial participation and additional sponsor company prescribing for other, non-study drugs was found.

However, it has also been claimed that conducting a trial sponsored by a pharmaceutical company had no significant impact on physicians' adherence to international treatment recommendations, but increased their use of the trial sponsor's drugs (Andersen et al., 2006). Importantly, Chauhan and Mason (2008) p. 339, note that “clinical trial investigators and physicians who sit on decision-making bodies such as formularies and appear to have a special influence due to their proximity to their research and understanding of evidence base”.

Evidence of influence of clinical study participation is limited and non-consensual. However, clinical investigators in central positions on formularies may influence decision-making through their proximity and understanding of the evidence.

3.4.5.7 Legal Concerns

Physicians are liable under a negligence rule of liability, and as many as 1% of all hospital admissions in the US may involve legal action due to negligence (Danzon, 2000). Therefore, it may be assumed that there are legal constraints on physicians’ choices in the practice of medicine. However, the same rate of litigations is not seen in Europe (Anderson et al., 2005). None the less, legal constraints limit choices, but may also drive behaviour leading to the practice of defensive medicine, which occurs when a physician practices medicine to protect

him/herself against litigation (Danzon, 2000). The resulting practice of defensive medicine may drive demand for care higher than would otherwise be the case.

Only two studies with reference to legal concerns having a bearing on physician prescribing behaviour were identified. Hussain et al. (2010) studied which factors influence physician prescribing behaviour regarding stress ulcer prophylaxis. The authors employed multivariate analysis and found that legal repercussions of not prescribing stress ulcer prophylaxis led to increased prescribing. In a systematic review of factors that influence physician prescribing of medicines, Gallan (2005) did not identify credible evidence to support an influence and merely stated that further research is needed.

Evidence of influence uncovered in this paper is very limited, and any conclusions on this basis may not be drawn. However, legal constraints limit choice and as such have been addressed by background literature, providing some clues to the possible mechanisms. In conclusion, further research on the topic is needed.

3.4.5.8 Technology

Technology touches the practice of medicine in ever increasing and novel ways and is widely stated to influence physician prescribing behaviour (Greving et al., 2006, Fischer et al., 2008, Martens et al., 2007, Ostini et al., 2011). In this review, the technology identified to influence physician prescribing is computerised decision support systems (Pearson et al., 2009), electronic reminders (Filippi et al., 2003), electronic prescribing (Fischer et al., 2008) and computerised order entry forms (Teich et al., 2000).

In a systematic review of the literature (1990-2007), Pearson et al. (2009) investigated computerised clinical decision support systems (CDSS) for prescribing change practice. The authors note that “the most consistently effective approaches used system-initiated advice to fine-tune existing therapy by making recommendations to improve patient safety, adjust the dose, duration or form of prescribed drugs, or increase the laboratory testing rates for patients on long-term therapy” (Pearson et al., 2009 p. 1). At the time of initiating therapy, CDSS is claimed to be more effective after rather than before the selection of medicines has taken place, and may be effective in monitoring therapy. However, CDSS was not found to be effective in stopping prescribing. Furthermore, CDSSs may perform better in institutional compared to ambulatory settings, and when decision support was initiated automatically by the system as opposed to user initiation. CDSSs implemented with other strategies such as education were no more successful in improving prescribing than standalone interventions. In a study by Berner et al. (2006), it was found that physicians provided with a PDA-based CDSS for NSAID prescribing made fewer unsafe treatment decisions than participants without the CDSS. In a well-designed study not identified or included in the work by Pearson et al (2009), McMullin et al. (2005) found that electronic prescribing system with integrated decision support shifted prescribing behaviour away from high-cost therapies and significantly lowered prescription drug costs. The savings associated with altered prescribing behaviour offset the monthly subscription cost of the system. Use of the CDSS was also associated with significant shifts in prescribing behaviour. Within the eight targeted therapeutic

categories, prescriptions for high-cost target medications overall decreased by a relative 9.1% in the intervention group (from 39.4% to 35.8%) and increased by a relative 8.2% in the control group (from 40.1% to 43.4%). Compared with the control group, the prescription ratio for high-cost medicine classes was a relative 17.5% lower in the group using the CDSS (35.8% versus 43.4%, P=0.03). Clinicians using electronic prescribing with formulary decision support were significantly more likely to prescribe tier one-medications (Fischer et al., 2008). On the topic of cost, computerised feedback on drug costs increased generic prescribing (Beilby and Silagy, 1997). Zuker et al. (2011) found that physicians selectively complied with electronic recommendations to substitute less costly for more costly drugs. Compliance was neither automatic nor thoughtless and entailed cost containment with possibly marginal compromise on quality of care or none at all, as compliance mostly involved substituting generic for patent drugs.

Filippi et al. (2003) argue convincingly that electronic reminders influence prescribing behaviour of GPs. However, the adherence to the advice provided by the DSS is not 100 % for the physicians using such system. Physicians not using the DSS will be less adherent to the guideline advice provided by the DSS (de Jong et al., 2009). In another study, no favourable effects were found for computerised reminders with the message to prescribe certain medicines. On the other hand, computerised reminders with the message not to prescribe certain medicines sometimes positively influence the prescribing behaviour of GPs (Martens et al., 2007, Henderson et al., 2008). Simon et al. (2006) found that age-specific alerts resulted in a continuation of the effects of the medicine-specific alerts without measurable additional effect, but the age specific alerts led to fewer false-positive alerts for clinicians. GPs who reported use of a prescribing decision support system were less likely to prescribe angiotensin II receptor blockers (Greving et al., 2006). Furthermore, computerized physician order entry was found to be a powerful and effective tool for improving physician prescribing practices (Teich et al., 2000, Christakis et al., 2001).

Two authors have addressed quality of prescribing as measured by guideline adherence. The first study indicated that a multifactor intervention including personal digital assistant–based decision support may improve primary care physician adherence to the ATP III guidelines (Bertoni et al., 2009). The second study found that physicians' compliance with OncoDoc was significantly improved ($p < 0.001$) to reach 85.03% after using the CDSS (Bouaud et al., 2001).

Strom et al. (2010) investigated the effect of CDSS on preventing medicine interactions, specifically between non-steroidal anti-inflammatory analgesics (NSAIDs) and warfarin. The authors found that customized warnings that required a physician's response did not meaningfully influence concomitant prescribing of NSAIDs and warfarin when compared to commercially passive alerts.

Evidence of influence of technology on physician prescribing behaviour is widely stated. The aim of technological interventions is firstly to improve prescribing by increasing adherence to guidelines, and secondly, as a cost control measure. However, the technology identified in this review is closely associated with the

decision process, and no information as to the effect of technologies not directly involved with the decision process was identified.

3.4.5.9 Theoretical Considerations and Summary

The plethora of non-economic factors influencing physician prescribing behaviour speaks to the complexities surrounding the issue being addressed. Non-economic factors influencing physician prescribing behaviour have been widely investigated, but the number of factors is many and evidence of influence varies across the identified factors.

Peers are widely stated to be a powerful influencer on physician prescribing. In this context, peer interaction provides authoritative influence, representing a legitimate and decisive interchange through which doctors acquire knowledge and experience of new drugs. The mechanism by which peers influence prescribing can therefore be argued to be related to the level of uncertainty associated with prescribing medicines. Uncertainty is stated to be the main driver for physician behaviour (Ajzen, 1991), and factors modulating uncertainty in the context of prescribing will potentially have an effect.

Academic detailing is widely stated to influence physician prescribing and is possibly the most potent influencer identified in this review. Mechanisms by which academic detailing exerts influence on physician prescribing is not explicitly stated in the literature. However, breaking the factor into separate components may help in shedding light on the subject. What are the components of academic detailing? First, it is an information channel. Second, it is often a peer interaction. Finally, academic detailing embodies guidelines - the essence of evidence-based practice.

Considering academic detailing as an information channel provides the implied context of unbiased and legitimate information concerning prescribing behaviour. It is also a two-way communication channel, providing the opportunity for individualized guidance based on the physician's need. Furthermore, it provides a social network context. The provision of balanced information from legitimate sources provides the base of strong influence to be exerted (Hunt, 2002). Individualized information is claimed to provide stronger influence than general information (Goldstein et al., 2005). On the topic of guidelines, it is widely stated that the effect on prescribing behaviour is variable. However, individualised information in a trusted and legitimate social context positively modulates guideline adherence. Thus, it can be argued that academic detailing increases guideline adherence and so approximates the practice to that of evidence-based medicine. The effect is therefore, in essence, one of perceived social norm. It can therefore be argued that academic detailing influences physician prescribing behaviour by modulating the perceived social norm related to intent, as proposed by Ajzen (1991) in the Theory of Planned Behaviour.

The influence of guidelines on physician prescribing behaviour is widely stated to be variable. The nature of guidelines provides the option for a physician to adopt them or not, and therefore the literature addressing the topic is mainly concerned with interventions designed to influence guideline adherence. In a theoretical

perspective, guidelines provide a best practice suggestion and thereby may constitute an acceptable social norm. It may therefore be argued that guidelines exert influence on physician prescribing behaviour in two ways: firstly, being the socially accepted norm linked to the Theory of Planned Behaviour; and secondly, by being the measure of success of interventions designed to influence physician prescribing.

Academic literature is a source of peer-reviewed information. Information in this context can influence physician prescribing by simply creating awareness of more complex modulation of uncertainty. Furthermore, information presented as evidence may also influence normative beliefs. From a theoretical perspective, academic literature therefore influences physician prescribing through the balance of value beliefs and strength of beliefs, in addition to effects on normative beliefs. Thus, behavioural intent, an immediate precursor to behaviour, may be influenced.

Bio-medical factors are natural influencers of physician decision making, but uncertainty related to the outcome of any therapeutic intervention is consistently present and considered the main driver for physician prescribing in general (Ajzen, 1991). From a theoretical perspective, bio-medical factors can be argued to influence both the evaluation and strength of beliefs associated with uncertainties of prescribing medicines. Thus, bio-medical factors may influence prescribing by modulating the intent to prescribe. In this review, however, bio-medical factors were not explicitly addressed, but it follows from general medical literature that bio-medical factors are at the core of any medical decision. Therefore, on the basis of general medical literature, evidence of influence is assumed to be high.

Clinical study participation gives the participating physician experience with new medicines in a controlled environment. It has been stated that early experience with new medicines is an important influencer of physician prescribing (Jones et al., 2001). Thus, it may be argued that clinical study participation can influence physician prescribing by building habit persistence. However, no consensus has been reached by scholars, and as such, it remains a hypothesis to be tested.

Technology identified in this review is directly linked with the decision process involved in prescription decisions. In this context, technology has three central roles: distribution of information, control and feedback. Based on guidelines, technology may aid the physician in choosing the correct medicine supported by available evidence. From a theoretical perspective, this makes for economic decision-making and removes some of the effort associated with prescribing. Technology can apply control in real time, and thus effectively limit available choice. Furthermore, feedback may be provided and function as a base for learning through experience.

Legal concerns may influence physician prescribing by modulation perception of control and normative beliefs, thus influencing intent to prescribe and finally prescribing behaviour. Furthermore, in an agency context, legal concerns may induce prescribing behaviour that may be defensive in nature, and so serve the physician's self-interest rather than the principal.

Table 3-42 Summary of non-economic factors

Non-economic factors					
Component	**Effect**	**Mechanism**	**Theory**	**Influence**	**Evidence of influence**
Peer effects	Influence prescribing in line with peer practice and guidance	Modulate uncertainty	TPB	High	High
Academic detailing	Increase guideline adherence	Modulate uncertainty	TPB	High	High
Guidelines	Improve quality of prescribing in line with available evidence	Modulate uncertainty	TPB	Low	Medium
Academic literature	Increase guideline adherence	Modulate uncertainty and perceived control	TPB	Medium	Low
Bio-medical	Central to all medical decisions and is the basis for uncertainty	Modulate value of belief and control belief	TPB	High	Low
Clinical study participation	Increase prescription of study medicine and other medicines in sponsor portfolio	Modulate uncertainty	TPB Agency	Medium	Low
Technology	Increase guideline adherence	Limit choice and modulate normative beliefs	TPB	Low	Low
Legal concerns	Limit perceived control and choice	Modulate perceived subjective norm and perception of control	Agency	Low	Low

3.4.5.10 Summary

There is credible evidence to support the influence on physician prescribing behaviour by interventions across different contexts. Bio-medical factors lie at the core of any medical decision and are central to physicians prescribing.

From a theoretical perspective, the most effective interventions are those that influence through control beliefs. Uncertainty is a strong driver of physician behaviour, and interventions designed to modulate uncertainty may therefore have the potential to be effective influencers. However, uncertainty is complex, and from a theoretical perspective, the belief strength is counterbalanced by value beliefs. Thus, interventions focused on influencing physician prescribing through attitude have been shown to be less effective than choice limiting measures.

In economic theory, self-interest is a strong influencer of behaviour. The information asymmetry inherent in medical practice, combined with multiple principal-agency relationships, provides a fertile ground for behaviour driven by self-interest. Interventions based on financial incentives are designed to take advantage of this very fact. However, evidence of influence is low, which may in part be because literature addressing the issue is limited. From an agency perspective, however, it is clear that moral hazard is prevalent and may be driven by the fact that both physician and patient are insulated from the economic realities of any decisions made regarding prescription medicines.

3.4.6 Key Gaps in the Literature

This section begins with a brief summary of the evidence that the systematic review has uncovered concerning factors and contexts influencing physician prescribing behaviour, before addressing the key gaps in the literature.

Interventions designed to influence prescribing behaviour modulate perception of control, attitude toward the behaviour and/or the perception of what is expected from health care stakeholders and society at large (social norm). The most effective interventions are those that influence the physician's perception of control, followed by social norm and attitude formation, respectively. Perception of control was found to be most affected by implementing choice limiting measures, such as formularies, preferred medicine lists, managed care and reimbursement, thus affecting the spectrum of choice available for the physician when prescribing. Social norm was found to be most affected by interventions making use of bio-medical factors, academic detailing and peer effects, respectively. Physicians' attitudes toward prescribing were found to be relatively resistant to interventions, and consequently, the effect of pharmaceutical promotion was found to be modest. However, face-to-face interventions such as detailing were found to be more effective than less direct measures, signalling a relationship effect often exploited by the pharmaceutical industry.

Based on the findings of this systematic review, key gaps in the literature addressing factors and contexts influencing physician prescribing behaviour can be divided into five categories: outcomes data, theoretical framework, agency (moral hazard and adverse selection), and feedback and learning. These categories will be addressed below.

It has been widely stated that any intervention influencing physician prescribing behaviour may affect patient outcomes (Klein, 2005). There is no consensus on what constitutes optimum pharmaceutical consumption (Rizzo, 1999), and none of the authors of publications included in this review have attempted to address the outcome of interventions or contexts influencing physician prescribing behaviour. However, several authors have studied the effect of interventions against guideline adherence as a proxy for prescribing quality (Smolders et al.,2007, Lagerlov et al., 2000, Chauan and Mason, 2008, Nast et al., 2009, Rashidian and Russel, 2011). The same authors have described the variability in guideline adoption, and in addition, it has been found that more than 50% of prescriptions may contradict clinical guidelines. In conclusion, the consistent lack of patient outcomes data is the most notable gap in the literature.

There is apparent consensus on the fact that medical decisions are made under conditions of uncertainty (Reyna, 2008), but no grand theory of medical decision exists (Reyna and Rivers, 2008). Medical decision-making employs adaptive decision strategies (Payne, 1993), but the cognitive behaviour theory, Theory of Planned Behaviour, most used to predict actual behaviour (Godin et al., 2008), lacks feedback mechanisms. Furthermore, there is consensus about conflict of interest being at the centre of the agency problem related to the presence of multiple principal.-agent relationships at the time of prescribing (Eisenhardt,

1989). Literature addressing moral hazard and adverse selection in the context of multiple principal-agent relationships influencing physician prescribing has not been found. Thus, there are basic deficiencies within the theoretical constructs used to explain physician prescribing behaviour, and attempts to link the constructs have not been made.

3.5 Conclusion

In this section, a brief summary of the findings and insights that emerged from the review are presented. In so doing, the key theoretical lenses that explain physician prescription behaviour are summarised in order to build up a framework that both synthesises the systematic review and provides a first step towards empirical research.

3.5.1 Theoretical Perspectives

In this section, the theoretical perspectives that best explain physician prescription behaviour are presented, starting with the Agency Theory, before specific aspects of cognitive behavioural theory are addressed. Following this, a model linking the theoretical perspectives is presented.

3.5.1.1 Agency Theory

In an intellectual project for understanding, Eisenhardt (1989) undertook a thorough review of agency and Agency Theory. The basis for agency is that one party (principal) delegates work to another (agent), and Agency Theory is concerned with two problems occurring in agency relationships (Eisenhardt, 1989). The first problem relates to conflict of interest (moral hazard) and the second to risk sharing (adverse selection). Studies of agency relations date back to the early sixties, and the seminal work done by Arrow (1963) is central in defining the difference in attitudes toward risk from an economic perspective (Arrow 1963). From the same perspective, Jensen and Meckling (1976) and Ross (1973) introduce the concept of different goals and division of labour (Ross, 1973). (Mitnick (1986), 1994) takes on a political science perspective and challenges the positivist views presented by Arrow (1963) and Ross (1973), arguing that the central problem with Agency Theory is the lack of consensus as to what the agency problem really is all about. Moral hazard and adverse selection lie at the core of Agency Theory, and both presume a conflict of interest between agent and principal (Mitnick 1994). Moral hazard occurs when a person is insulated from risk and behaves differently than he/she would if exposed to the risk (Arrow 1963). Adverse selection refers to a situation when undesired results occur on the bases of the principal and agent having different information (asymmetry of information) (Arrow 1963). From the health care value chain perspective, physician agency is of importance as it may have a bearing on prescription behaviour, as detailed in the health economic domain of literature, and this is addressed in detail below.

3.5.1.1.1 Physician Agency

Uncertainty is the most important factor influencing physician behaviour (Arrow, 1963) and has been addressed in the context of physician agency. In an intellectual project for understanding, McGuire (2001) provided a comprehensive review of the topic from a health economic perspective. The author concludes that economic models often ignore uncertainty and informational asymmetry inherent in modern health care (McGuire, 2001 p. 496). Perfect physician agency may exist if agent and principal have the same information, but no demand on the quality of information is made. Thus, perfect agency can be based on imperfect information (Mitnick, 1994). According to Eisenhardt (1989), moral hazard refers to the lack of effort by the agent, and adverse selection refers to the misinterpretation of ability by the agent. Asymmetry of information concerning these two aspects may be considered an advantage when the agent acts in the best interests of the principal, and if used inappropriately, be against the interests of the principal.

The physician plays the role of agent for several principals in the health care value chain. First and foremost, the physician is an agent on behalf of the patient. Asymmetry of information regarding diagnosis and treatment options is a natural consequence of the physician's extensive training and resultant expertise. This training is complex, time consuming and costly, creating a situation where it is not possible for a patient to correctly verify quality or utility of health care provided. It has been argued that only about 25 % of patients are reasonably well informed about the care they receive (McGuire 2001, p.465). Physician agency may also exist, with payers and/or employers as principals. Given the potential complexity of physician agency with several simultaneous principals, physician loyalty will be under pressure and may be influenced by shifting power between principals, thus having a bearing on patient health. However, the authority of the physician is still strong and plays a central role in any decisions related to medical care (McGuire 2001, p.463). In light of the central role played by physicians in medical decisions, it is important to further address aspects of moral hazard and adverse selection in this context.

Moral hazard is said to take place when an individual not fully exposed to a risk would behave differently than if fully exposed to the risk (Gaynor and Gertler, 1995). Both physician and patients are insulated from the financial realities of medical decisions (Illert and Emmerich, 2008), and thus subject to forces of moral hazard. Both the physician and the patient may therefore engage in behaviour motivated by self-interest. The physician may drive demand beyond what would be the case if exposed to the financial risk implicit in making the decision (McGuire 2001, p.503). A physician may also influence quantity of care, and this is achieved by: setting the level of non-contactable input (quality), influencing patient preference and physician induced demand (McGuire 2001, pp.503-519). Increasing quality may increase cost, and changing patient preference in accordance with physicians' self-interests may have the same effect. Physician induced demand will occur if physicians use their "superior" knowledge to their benefit, driving use of health care resources to a higher level than would be the case if information was symmetric between agent and principal (McGuire 2001,

p.503). On the other hand, the patient may seek to engage in behaviour driving the consumption of health care. A patient may, for example, simply opt for taking a pill for high cholesterol rather than engaging in lifestyle changing behaviour such as exercise and eating healthy. Thus, patient preference may impact demand for health care services from physicians.

Moral hazard, as illustrated above, is but one outcome of the agency problem. Physician agency may also have an impact on public policy through mechanisms of adverse selection. In certain circumstances, it will be impossible to know what the physician did or knew (Pauley, 1978) at the time of prescribing. This extreme form of informational asymmetry may lead to uninformed decisions by the principal, and consequently, adverse selection (McGuire 2001, p. 498).

It is widely stated that behaviour which is motivated by self-interest of the agent lies at the heart of the principal-agent problem (Eisenhardt, 1989). The physician is an "experience good", as the patient cannot reliably measure quality of health care provided before it is experienced (Gaynor, 1994). Consequently, a patient will not know the quality of care before having experienced the care provided by the physician. McGuire (2001, p. 502) argues that learning is slow, and therefore the reward for quality is likely to be inadequate. Thus, the physician may be given room to adjust quality as an input factor (effort) according to prevailing motivations, including self-interest. Furthermore, credible evidence suggest that compensation arrangements with high degree of revenue sharing reduces physician effort (Gaynor and Gertler, 1995).

Since the introduction of the Hippocratic Oath in 4th century BC, ethics have played a central role in the practice of medicine. Physicians have autonomy in decision making on the basis of an understanding that they will act in the best interests of their patients (Arrow 1963). However, it has been argued that managed care may threaten the physician's loyalty to the patient (McGuire, 2001) (McGuire 2001, p.520). The physician is an agent for both the patient and the payer, potentially resulting in a loyalty conflict and cognitive dissonance. A payer can take advantage of the ethical constraints, imposing payment systems that force the physician to personally take on more of the effort to attain an acceptable outcome for the patient (Fugh-Berman and Ahari, 1997).

In addition to ethics, legislation also plays a central role in the practice of medicine. Legal constraints limit choices, but may also drive behaviour leading to the practice of defensive medicine, which occurs when a physician practices medicine to protect him/herself against litigation (Danzon, 2000). The practice of defensive medicine may drive demand for care higher than would otherwise be the case.

3.5.1.1.2 Summary

At the heart of Agency Theory lays the conflict of interest concept between agent and principal. However, conflict of interest may also be present between simultaneous principals, further complicating physicians' agency by influencing physician loyalty and possibly affecting patients' health outcomes. Uncertainty and asymmetry of information play a central role in influencing physician

behaviour and can negatively influence public policy decisions and outcomes through adverse selection. Furthermore, physicians may drive health care demand by changing quality of service, influencing patient preference and using asymmetry of information to drive demand for care. Ethical and legal constraints of decision choices exist, and may be exploited by both agent and principal in addition to motivating the practice of defensive medicine. Thus, Agency Theory and, more specifically, physician agency illuminates the contextual framework of the payer-physician-patient interaction and is suggestive of factors of practice and organization having a bearing on physician prescribing behaviour. Furthermore, academics investigating physician agency have largely ignored uncertainty and informational asymmetry when modelling and investigating physician agency, thus weakening any arguments made.

3.5.1.2 Theory of Reasoned Action and Theory of Planed Behaviour

Theory of reasoned action (TRA) is concerned with what determines intention. Intention to perform a certain action is a function of two factors: attitude and subjective norm (perception of importance). Determinants of attitude have been identified as: evaluation of belief and strength of belief (O'Keefe, 2002 pp. 103-109). Perceived lack of ability may have an impact on intention to perform an action. In 1991, Ajzen revised the theory, and in so doing, added a third factor, perceived behavioural control, leading to the Theory of Planned Behaviour (TPB) (Ajzen, 1991). Persuasive efforts from a TRA perspective may take three forms: changing the attitudinal component, changing the normative component or the relative difference between the two (O'Keefe 2002, p.109).

In a systematic review of health care professionals' intentions and behaviours, Godin et al. (2008) included studies that aimed to predict health care professionals' intentions and behaviours, with a clear specification of relying on a social cognitive theory. This study shows that the theory most often used as reference was the Theory of Reasoned Action (TRA) or its extension, the Theory of Planned Behaviour (TPB); and the authors suggest that the TPB appears to be an appropriate theory for predicting actual behaviour, whereas other theories better capture the dynamic underlying intention (Godin et al., 2008). Finally, the authors provide a hypothetical framework for studying health care professionals' intentions and behaviours, as shown in Figure 3-4 Hypothesized theoretical framework. The framework has explanatory power, as it provides a simple and credible explanation. However, it is not fully supported by the findings of this systematic review, as physician characteristics in general, with the notable exception of physician-level habit persistence, have not been shown to influence physician prescribing behaviour. Furthermore, the framework lacks the provision for feedback, a central element of dynamic decision making central to medical decision making in general (Kleinmuntz, 1993). Furthermore, it lacks testability and may therefore not be regarded or used as a well-established method.

In a study designed to look at factors affecting antibiotic prescribing in a managed care setting, the authors found that behavioural intention was significantly correlated with both attitude and subjective norms, but was not predictive of actual prescribing behaviour (Lambert et al., 1997). The authors thus posit that it is possible that prescribing behaviour is influenced by non-psychological factors.

Furthermore, physician autonomy is challenged, and it can be argued that a system-level approach may be needed to yield a descriptive model of physician prescription decisions. In concordance with this notion, it is found in this review that physician prescribing behaviour is best described using three theoretical lenses: Decision Theory, cognitive behaviour theory and Agency Theory. However, the resulting proposed framework has yet to be tested.

3.5.2 Proposed Framework

Prior to undertaking this systematic review, a scoping study was conducted (Mikkelsen, 2010), which identified three theoretical domains that help explain the physician's prescription behaviour: cognitive decision theories, economic theories and behaviour theories.

Decision making is important in medical practice, and because health outcomes are probabilistic, most decisions are made under conditions of uncertainty (Kaplan and Frosch, 2005, Elstein and Schwarz, 2002). Medical science has not yet solved the uncertainty surrounding many medical decisions (Gillett, 2004), and as a consequence, medical decision making is the least developed aspect of evidence-based practice (Spring, 2008). Furthermore, uncertainty has been characterized as the most important factor influencing physician behaviour (Arrow, 1963). Thus, uncertainty is central to Decision Theory concerned with medical decision-making.

In an intellectual project for understanding, (McGuire, 2001) has provided a comprehensive review of the topic from a health economic perspective. Interestingly, the author concludes that economic models often ignore uncertainty and informational asymmetry inherent in modern health care (McGuire, 2001 p. 496). Perfect physician agency may exist if agent and principal have the same information; however, no demand on the quality of information is made. Thus, perfect agency can be based on imperfect information (Mitnick, 1994). According to Eisenhardt (1989), moral hazard refers to the lack of effort by the agent, and adverse selection refers to the misinterpretation of ability by the agent. Asymmetry of information regarding these two aspects may be considered an advantage, and if used inappropriately, may be unbeneficial to the principal.

From an agency perspective, the physician may play the role of agent for several principals. First and foremost, the physician is an agent on behalf of the patient. Asymmetry of information regarding diagnosis and treatment options is a natural consequence of the physician's extensive training and resulting expertise. This training is complex, time consuming and costly, creating a situation where it is not possible for a patient to correctly verify quality or utility of health care provided. In other words, the provision of health care is experience goods. It has been argued that only about 25 % of patients are reasonably well informed about the care they receive (McGuire, 2001 p. 465). Physician agency may also exist with payers and/or employers as principals. Given the potential complexity of physician agency with several simultaneous principals, physician loyalty will be under pressure and may be influenced by shifting power between principals, thus having a bearing on patient health. However, the authority of the physician is still strong and plays a central role in any decisions related to medical care (McGuire,

2001 p. 463). In light of the central role played by physicians in medical decisions, it is important to consider aspects of moral hazard and adverse selection from an agency perspective.

The theory of reasoned action and its extension, the Theory of Planned Behaviour, is the most studied theoretical framework informing on the topic of physicians' cognition leading to decision behaviour. In addition, Agency Theory plays a central role in defining contextual contributors to the decision making process. Despite being highly trained, doctors are prone to making mistakes, and cognitive biases may detract from the use of logical and statistical decision heuristics. Given the multidimensional theoretical framework having a bearing on medical decision-making, deciding how to decide is central.

The theoretical construct having a bearing on physician prescribing behaviour, therefore, should include Decision Theory (under uncertainty), Agency Theory and Theory of Planned Behaviour; please see Figure 3-3 Theoretical domains. However, the Theory of Planned Behaviour speaks to attitude in the context of belief strength. It can therefore reasonably be argued that uncertainty from a Theory of Planned Behaviour perspective is a component of attitude.

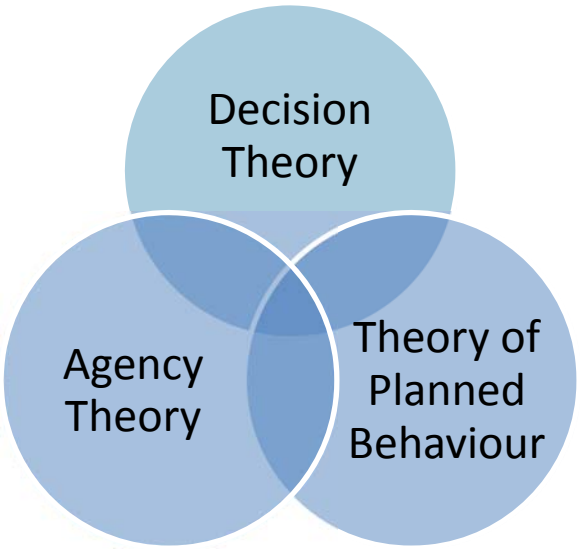

Figure 3-3 Theoretical domains

Godin et al. (2008) argue convincingly that among cognitive behaviour theories, the Theory of Planned Behaviour has the highest predictive power for physician behaviour. However, the authors conclude that the theory has insufficiencies and propose a new framework; please see Figure 3-4 Hypothesized theoretical framework. The framework has explanatory power, as it provides a simple and credible explanation. It purports that physician characteristics, role, and identity are factors influencing behavioural intent. Furthermore, physician-level habit persistence is added as a separate factor modulating intent.

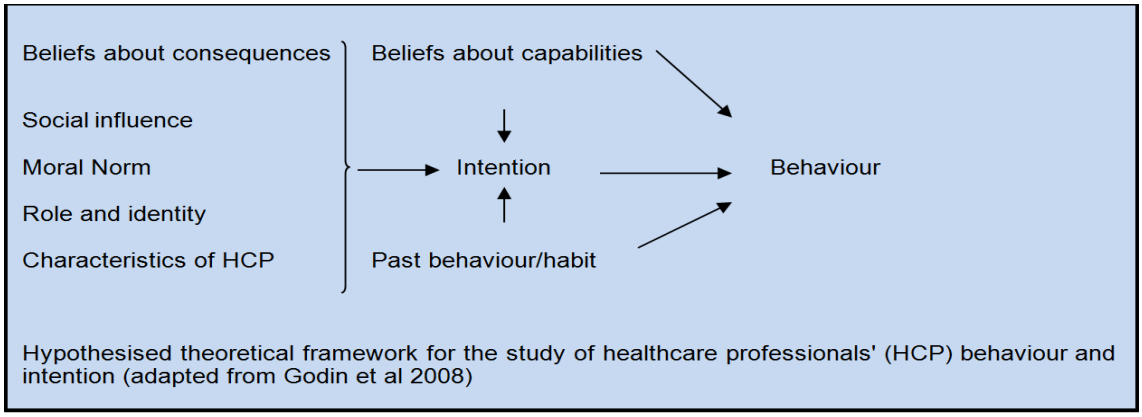

Figure 3-4 Hypothesized theoretical framework

The framework proposed by Godin et al. (2008), as an extension to the Theory of Planned Behaviour, is not fully supported by the results of this review. The deficiency is highlighted by the fact that physician characteristics is not found to be a key factor influencing physician prescribing behaviour. Godin et al. (2008) argue that role and identity, beliefs about capabilities and past behaviour/habit are distinct from physician characteristics. From the findings in this review, two counter points are presented. First, role and identity is tightly linked with specialty, which has been found to be integral to the definition of physician characteristics. Second, beliefs about capabilities are related to attitude. Thus, only past behaviour/habit remains, which has been found to be a component of physician characteristics. In fact, habit persistence is found to be a strong influencer of physician prescribing behaviour, whereas other components of physician characteristics have not been found to influence physician prescribing behaviour. In addition, the framework proposal does not agree with the premise of dynamic decision making, as feedback is lacking from the framework. Feedback from previous action is precisely what makes dynamic decision strategies effective (Kleinmuntz, 1993), and not including feedback limits the validity of the proposed framework.

The question that remains to be answered is whether the Theory of Planned Behaviour is a “good” fit for physician prescribing behaviour. In essence, the Theory of Planned Behaviour can account for the majority of the factors, but it does not account for habit persistence and information asymmetry; please see Table 3-5 Strength of Influence for further details. Habit persistence can be considered as residues of experiences and past behaviours. Information asymmetry is inherent to the practice of medicine, and when coupled with uncertainty, it is the driver of moral hazard and adverse selection. Furthermore, the theory lacks feedback or learning, and so discounts the temporal aspects of medical practice.

Thus, it may be argued that the Theory of Planned Behaviour does not fully explain the observed behaviours uncovered in this review. As proposed by Godin et al. (2008), further development of the Theory of Planned Behaviour is needed to fully explain physician prescribing behaviour. Based on the evidence uncovered in this review, the framework depicted in Figure 3-6 Proposed

conceptual framework is therefore proposed in order to explain physician prescribing behaviour.

The proposed framework is based on the evidence of influence uncovered in this systematic review. Furthermore, the model should be subject to operationalization employing qualitative methodology, and finally, quantitatively tested in a clinical setting. For instance, further research could focus on the model fit concerning prescribing pain medication for cancer patients. Further work would also be needed to ascertain the internally consistency of the model, and this may be the focus of future doctoral research. In addition, based on the fact that most (70%) of all physician-patient consultations result in the prescription of a medicine as part of the treatment, physician prescribing may be considered a proxy for medical decision making by physicians in general. Thus, it is also proposed to test whether the framework is a good fit for medical decision making by physicians in general.

In summary, the framework outlines how components from cognitive behaviour theory, Agency Theory and Decision Theory are interlinked to explain physician prescribing behaviour.

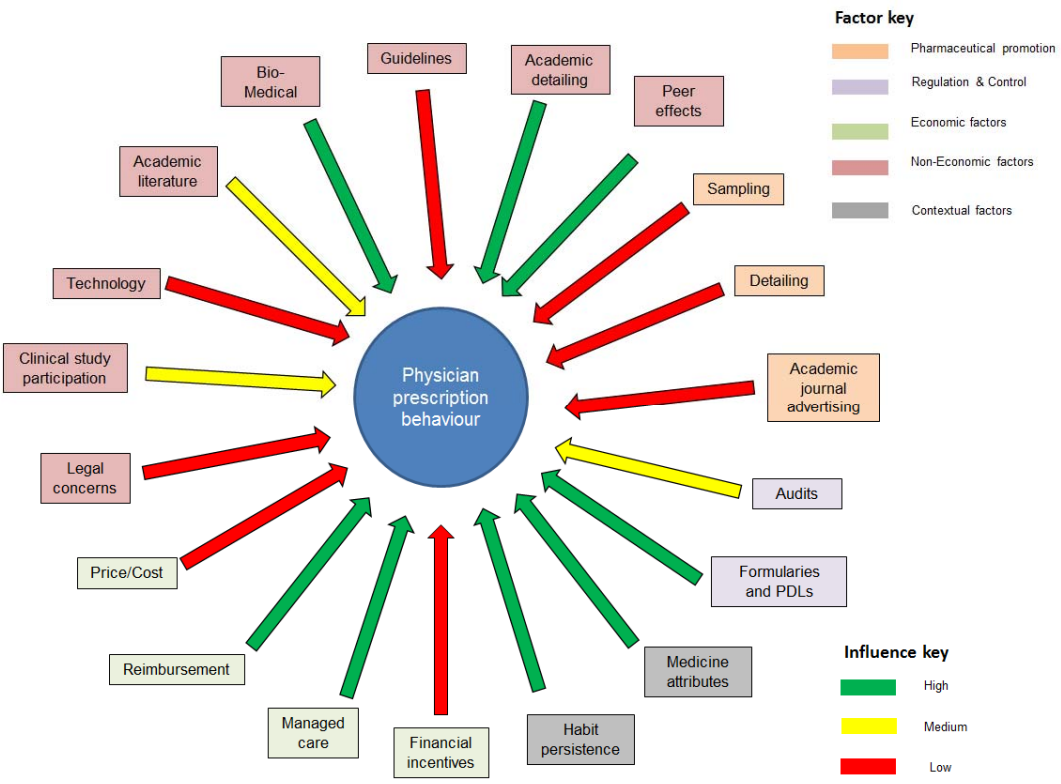

Figure 3-5 Strength of influence

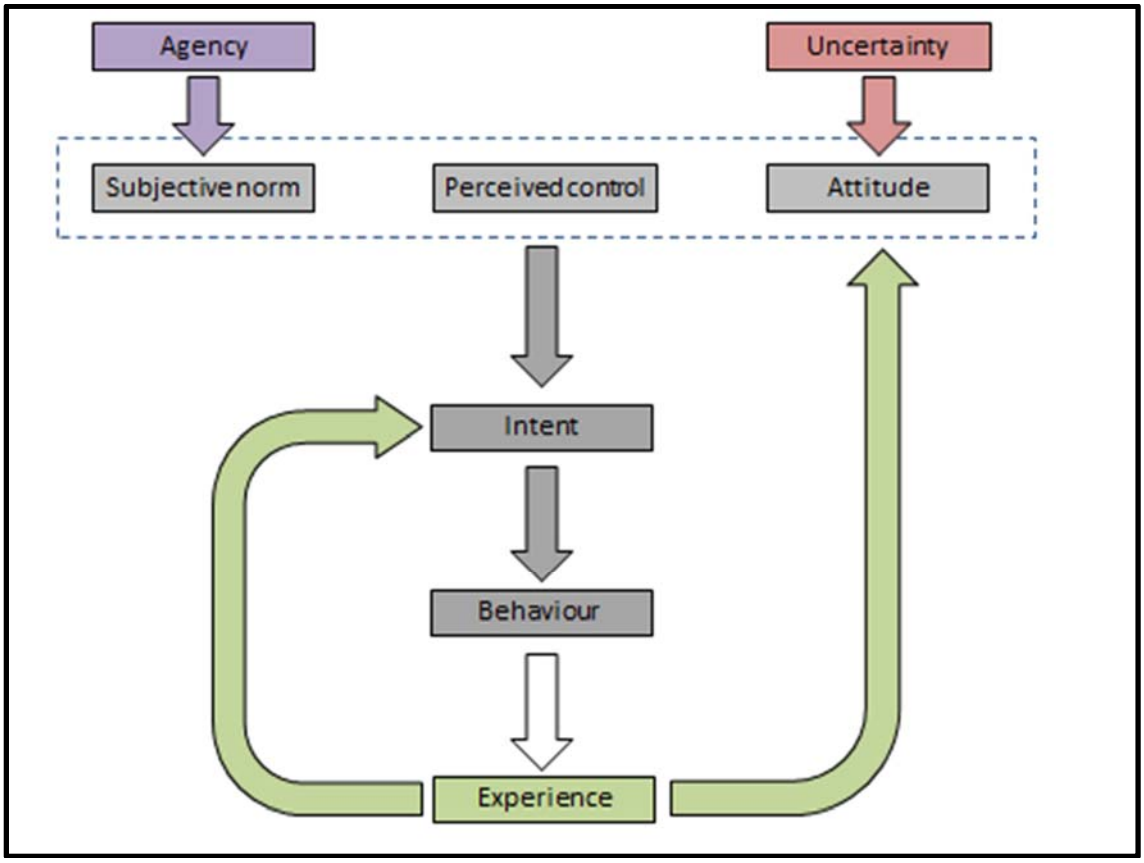

Figure 3-6 Proposed conceptual framework

The proposed framework illustrated in Figure 3-6 Proposed conceptual framework is derived from the three theoretical domains (agency, decision under uncertainty and TPP) that help explain physician prescription behaviour and that were identified in the scoping study (Mikkelsen, 2010) and further substantiated by the evidence presented in this systematic review. Following an explanation of the conceptual framework, origin and flow of influence on behaviour in the context of physician prescribing is addressed.

TPP assumes that subjective norm, attitude and perceived control influence behavioural intent, the immediate antecedent to behaviour (Ajzen, 1991). Subjective norm consists of normative beliefs that are influenced by the stakeholders, with a bearing on physician prescribing behaviour. The physicians' perception of social normative pressures of whether to perform the behaviour or not is argued to be influenced by agency. Both the physician and patient are largely insulated from the economic realities of any decision made in the context of prescribing medicines. This creates a situation where conflict of interest exists between the physician and payer, and moral hazard may be present.

Furthermore, the inherent information asymmetry of agency may also lead to adverse selection (Eisenhardt, 1989). In this context, it could be argued that agency effects may in part be caused by an influence on social normative pressures, thus influencing physician prescribing. For example, patient expectations and the physician's perception of patient expectations may lead to overprescribing of antibiotics.

From the TPP, it can be assumed that attitude consists of behavioural beliefs influenced by the probability of the behaviour producing the desired outcome, and the physician's positive or negative self-evaluation of the behaviour, thus forming the attitude component of the theory (Ajzen, 1991). From a physician prescribing behaviour perspective, there is an overlap between the attitude component of the Theory of Planned Behaviour and the uncertainty inherent in any medical decision. Therefore, it may be argued that uncertainty modulates the perceived probability of desired outcomes as a result of behaviour.

Perceived control is a central element of TPB and represents the difference between TPP and the preceding theory of reasoned action. The concept is based on the assumption that an individual's perceived ease or difficulty of performing the particular behaviour is that perceived behavioural control is determined by the total set of accessible control beliefs; presence of factors that may facilitate or impede performance of the behaviour (Ajzen, 1991).

Intention is an indication of a physician's readiness to prescribe, and it is assumed to be an immediate antecedent of prescribing behaviour. Behaviour is an individual physician's observable response in a given situation with respect to prescribing. Ajzen (1991) claims that behaviour is a function of behavioural intent and perception of control. Perceived behavioural control is therefore assumed to moderate the effect of intention on physician prescribing behaviour. Thus, favourable intention produces a prescription only when perceived behavioural control is strong. For example, a physician will only prescribe medicines in the geographic area where he/she has a licence to practice.

Experience from own behaviour is expected to form the basis of a learning process which may influence future behaviour. "Learning is the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). Prior experience is expected to moderate future physician prescribing behaviour (Webb and Lloyd, 1994). In fact, physicians may exhibit overreliance on personal experience as compared to scientific data when prescribing (Soumerai et al., 2000). Thus, experience may feedback and moderate subjective norm, attitude and control beliefs. For instance, in cases where a physician has a positive experience with a medicine, with regards to efficacy and safety, this is likely to reinforce future prescriptions, and negative experiences will have the opposite effect.

3.5.3 Implications for Practice

Before addressing what the implications for practice of the findings of the review may be, it is important to identify for whom the review may be relevant; in other words, who are the stakeholders? Burns et al. (2002) and Stremersch (2008) have identified health care stakeholders from a value chain perspective, as illustrated in Figure 3-7 Health care value chain (Stremersch, 2008). Burns et al. (2002) p. 18, claim that the stakeholders in health care contest access to and control over three critical flows: products, money and information. From a payer and public policy perspective, there are three different policy inputs regulating medicines: public health (quality, safety and efficacy), health care (financing and

reimbursement of medicines), and industrial policy (Permanand (2006) p. 4). From a delivery perspective, competitive forces prevail as individual companies pursue profits in order to fulfil the primary goal of survival (Hunt, 2002 p. 262). Therefore, it can be argued that the stakeholders for whom this review may be relevant are payers, providers and producers.

Figure 3-7 Health care value chain (Stremersch, 2008)

3.5.4 Implications for Payers

From a payer perspective, the physician-payer agency should be the prevailing force driving the delivery of health care. However, this review has shown that this is not necessarily the case, as physician prescribing is driven by bio-medical factors governing the physician-patient agency relationship. The autonomy of the physician remains strong, and asymmetry of information is present. Effective regulatory and cost containment interventions regulate the spectrum of choice available for the physician when prescribing. The payer may also take advantage of the ethical constraints, imposing payment systems that force the physician to personally take on more of the effort to attain an acceptable outcome for the patient.

3.5.4.1 Implications for Providers

In this case, the central provider is the physician, but in the context of practice characteristics, it may also be larger organizational units such as hospitals. For simplicity, the physician will suffice, as the review has not revealed practice characteristics as a potent influencer on physician prescribing behaviour.

Uncertainty remains a strong contributor of behaviours associated with physician prescribing. Factors influencing or modulating the level of uncertainty will be potentially valuable for the physician. However, uncertainty remains in an agency context, simply due to the inherent information asymmetry associated with the practice of medicine. This asymmetry of information leads to heated debates driven by self-interest as a potent preserver of status quo when challenged by interventions designed to drive cost effectiveness to higher levels.

The problem lies not only in the information asymmetry, but the fact that no consensus exists on what constitutes optimum pharmaceutical consumption. This stems from the inability to define and agree on standard quality measures on which innovation can be based within a constrained fiscal budget. Innovation is the key to future health care, as it is deemed necessary to drive efficiencies to meet future demand without crippling health care providers.

Providers, therefore, must realise their role in innovation and the use of technology to achieve these goals in order to ensure the future delivery of health care within a welfare context.

3.5.4.2 Implications for Producers of Medicines

It can be argued that the two sides of the health care value chain are driven by different logics in the contest for flow of products, money and information.
Payers are focused on welfare and producers on profit maximisation. In the middle sits the provider, acting out of self-interest. Mechanisms to regulate the flow of information, money and products are therefore central to the future of health care where prescription medicines will continue to play an important role. The model successfully utilized by the pharmaceutical industry for more than a century is at odds with the future needs of patients, payers and providers. This is highlighted by the recent McKinsey report (Q4 2011), addressing the pharmaceutical industry, where it is evident that change must come swiftly if competitive advantage is to be maintained. Loss of exclusivity of block buster medicines and generic competition, combined with a lean pipeline of new and promising products, has led the industry down the path of extensive cost cutting (Hunt et al., 2011). However, cost cutting alone will not sustain investor relations in the long term. Thus, a new model must be successfully implemented. The main ingredients are innovative partnerships and technology.

3.5.5 Limitations of the Systematic Review

In this review, every effort has been made to follow the steps designed to reduce bias and increase rigor and transparency by systematically searching all available literature and extracting relevant evidence. However, as with any academic work, this review is associated with limitations. The aim of this section is therefore to clarify the three main limitations of this systematic review.

First, only one reviewer was employed in this review, and the possibility for researcher bias is therefore present. By following a strict and predefined protocol and carefully documenting each step, attempts have been made to reduce any untoward bias during the search, extraction and synthesis of the evidence presented in this paper.

Second, interventions reviewed were often based on previous research and therefore lacking a strong theoretical basis. The research on interventions identified in this review typically focus on the clinical or administrative needs for interventions. As no consensus on what constitutes optimal pharmaceutical consumption, and outcomes data on administrative interventions are lacking, it appears that the choice of intervention is not well grounded in theory and at the same time may be inadequately described in the literature (Theory of Planned Behaviour, Agency Theory and decision under uncertainty). However, each study has been evaluated from the theoretical perspectives identified in the scoping study, and mechanisms of influence have been identified within the same theoretical domains.

Finally, no restriction on study type for inclusion was made. The tendency for reviews published within the medical domain of the literature (approximately 80%) is focused on randomized controlled trials as the gold standard. This positivist approach may not be the best when dealing with complex issues such as physician prescribing behaviour, and elements of realist synthesis have therefore been employed.

3.5.6 Next Steps

3.5.6.1 Dissemination of the Review

The aim of this review is to fulfil the DBA requirements of the Cranfield School of Management. The review will be updated on an on-going basis, using an automatic alert from the British Library. Identified literature titles will be collected and stored and added as part of an update prior to publication of the study.

After successful completion of the requirements for the Cranfield DBA, the review will be adapted for publication as one practitioner paper and one academic paper. Adaptation for publication will be conducted in close collaboration with the review panel during the first half of 2014.

3.5.6.2 Further Research

The review has uncovered key gaps in the literature related to quality in health care.. Since physicians make decsions on behalf of patients and stakeholders in health care alike, Project Two of the DBA will be concerned with the understanding of physicians' perception of quality in healthcare. Thus, the following research question has been formulated for Project Two:

How do physicians construct quality of health care in a hospital setting?

Physicians make decisions on behalf of patients and stakeholders when delivering health care (Vogel et al. 2003). In other words, physicians are relied upon to decide the clinical content of health care delivery. Thus, physicians invariably supply decision effort into the delivery of health care. Physicians' effort supplied into the delivery of health care is comparable to quality (Ma & McGuire, 1997) and therefore a key component of quality in health care). Hence, physician decision-making is employed as a proxy for quality in this research.

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CHAPTER FOUR: PROJECT TWO

Chapter Three set out the research question for this study. The research strategy and method is detailed in Appendix B, and this chapter uses the research strategy and method to explore the gap identified in the first project of the Executive Doctorate Programme. The academic and business context of the project forms the introduction of the chapter. Following this introduction, the detail of the research question for Project Two, the research strategy and methods used during Project Two are discussed. The chapter further describes the pilot study that was conducted, which is followed by the description of how the main study is carried out. The findings and the results of Project One are then discussed in detail.

4.1 Introduction & Background

This project, the second of the DBA, is concerned with quality of health care delivery from a physician perspective. The reason for this focus of the project and its link to the first project of the DBA is now explained.

The health care system may be conceptualised as a value chain of which key constituencies are the payer (public bodies and insurers), the pharmaceutical companies and the physicians (Burns et al., 2002). It also includes heath care providers, regulators and patient groups. Even though physician autonomy is under pressure, managed-care notwithstanding, the physician acts as a decision maker on behalf of payers and patients when diagnosing and treating patients (Vogel et al., 2003). Stakeholders in the value chain therefore have a vested interest in influencing physicians and their decisions when providing health care services. Physician authority and control with regards to clinical decisions is generally granted, but the spectrum of choices available to physicians is typically preselected (Miller, 1989). Factors influencing physician decisions have been widely stated, but the linkages amongst these factors and how these influencers impact patient outcomes is lacking (Gill et al., 1999).

Stakeholders in the supply chain fight for access to and control over three critical flows: products, money and information (Burns et al., 2002). Interactions between stakeholders are addressed using agency as a theoretical framework. The profit maximizing hypothesis posits that physicians will act in a context of imperfect information and in a manner motivated by financial self-interest (Hunt et al., 2002). Asymmetry of information may perpetuate self-interest behaviour in a manner not beneficial to either side of the value chain, and thus lead to poor decisions being made on behalf of the principal (Eisenhardt, 1989, McGuire, 2001). Loyalty issues having a bearing on patient health may arise as a consequence. The practice of medicine is further complicated by the context of ethical and legal constraints on decision choices (Ma and McGuire, 1997, McGuire, 2001).

It has been widely recognized that access to medical interventions necessitates physician initiative and concurrence (McGuire, 2001). Furthermore, it is widely recognized that because medical decisions have an impact on patients' health, they should be of high quality (Klein, 2005). There appears to be consensus that

decision making in medicine is made under uncertainty (Bornstein and Emler, 2001, Elstein, 1999, Elstein and Schwarz, 2002, Payne et al., 1993, Reyna and Rivers, 2008, Spring, 2008). However, no general theory of medical decision has been formulated, but the Theory of Planned Behaviour is the most studied theoretical framework informing on the topic of physicians' decision behaviour (Reyna, 2008). Given the complexities of medical decision making and that no grand theoretical framework exists, deciding how to decide is central (Payne et al., 1993). Despite being highly trained, doctors are prone to making mistakes, and cognitive biases may detract from the use of logical and statistical decision heuristics (Hershberger et al., 1994). Mistakes in medicine are well documented, and the Institute of Medicine has reported that close to one million people per year are injured and close to one hundred thousand people a year die as a result of preventable medical errors (Kohn et al., 1999). As a consequence, standardization of the provision of care in hospitals has come into greater focus. Implementing a systematic approach to the implementation and compliance with guidelines can help reduce variation in core processes of organizations (Flynn et al., 1994) and, at the same time, increase the quality of health care provided (Leape, 1994).

Thus, a systematic literature review was conducted (Project One) to investigate influencers on physician prescribing behaviour. The review identified two sets of categories of key influencers of physician decisions; interventions and contexts. Interventions refer to proactive techniques, processes or actions introduced to create change in physician decisions. Contexts are the set of circumstances or facts surrounding decision events; see Section 1.8.1.1 on page 20, for further details.

In performing their duties, physicians must decide how to decide. Information is not equally shared between physicians, patients and stakeholders. The physician has far more information than the patient and stakeholders, so physician decisions are made in the context of information asymmetry. However, physicians rarely have perfect information about clinical work (diagnostic, interactions, response to treatments), thus decisions are also made under uncertainty. Physicians rely heavily on past experience, forming constructs guiding future choice and action (Ajzen, 1991 p. 203). Therefore, influence of physicians' decisions can be investigated by adopting experiential constructivism and personal construct theory.

Improving quality of health care has two main approaches: clinical and experiential quality. Clinical quality is aimed fundamentally at reducing variation, in recognition of large numbers of preventable medical errors leading to injury or even death. On the other hand, experiential quality relates to "responsiveness to the needs and preferences of the patient" (Chandrasekaran et al., 2012) p.1. Increasing academic attention is being paid to the balance between clinical and experiential quality; however, no "magic bullet" exists to improve professional practice (Oxman et al., 1995).

In order to gain insight into how key influencers of physician decisions may ultimately impact quality of health care, it is important to first understand how

quality of health care is perceived by physicians. Therefore, the following research question (RQ) is posed:

> RQ: How do physicians construct quality of health care delivery in a hospital setting?

The patient-physician encounter takes place in the context of information asymmetry, and decisions are made under uncertainty. Uncertainty is the main driver of physician behaviour (Arrow, 1963) and has received less attention than information asymmetry (Rizzo, 1993). Perceived behavioural control is assumed to reflect past experience (Ajzen, 1991), and may therefore influence uncertainty. Each patient-physician encounter is different and forges a set of temporal experiences unique to each physician. To gain insight into how factors influencing physician decisions impact quality of health care, it is important to better understand how those in charge of providing health care (the physicians) construct the perception of quality of health care delivery. Thus, physicians' perceptions about quality of health care delivery can be investigated by adopting experiential constructivism and personal construct theory. George Kelly developed the repertory grid interview technique (RGT) in the 1950's, which was designed in order to surface subconscious insights about a phenomenon of interest. Therefore, RGT is adopted as the research methodology for answering the research question.

4.2 Theoretical Positioning

In the preceding systematic literature review, three theoretical domains of physician decision behaviour were identified; see Figure 4-1 Theoretical domains. The focus of this study is the physicians' perceptions of quality of health care delivery. The practice of clinical medicine requires knowledge about the science of medicine and applied practice. Personal experience plays a central role in physician decisions and consequently influences the practice of medicine, and it is therefore legitimate to adopt experiential constructivism and personal construct theory as a framework for investigating how physicians perceive and construct quality of health care delivery. The following theoretical domains are described briefly: Agency Theory, Theory of Planned Behaviour, Decision Theory and personal construct theory. A definition of quality is also provided in this section.

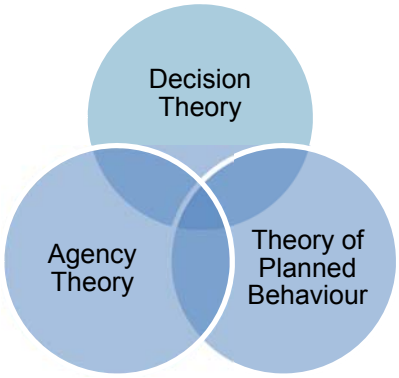

Figure 4-1 Theoretical domains

4.2.1 Agency Theory

In an intellectual project for understanding, Eisenhardt (1989) undertook a thorough review of agency and Agency Theory. The basis for agency is that one party (principal) delegates work to another (agent), and Agency Theory is concerned with two problems occurring in agency relationships (Eisenhardt, 1989). The first problem relates to conflict of interest (moral hazard) and the second to risk sharing (adverse selection). Studies of agency relations date back to the early sixties, and the seminal work by Arrow (1963) is central in defining the difference in attitudes toward risk from an economic perspective (Arrow 1963). From the same perspective, Jensen and Meckling (1976) and Ross (1973) introduce the concept of different goals and division of labour (Ross, 1973). (Mitnick (1986), 1994) takes on a political science perspective and challenges the positivist views presented by Arrow (1963) and Ross (1973), arguing that the central problem with Agency Theory is the lack of consensus as to what the agency problem really is all about. Moral hazard and adverse selection lie at the core of Agency Theory, and both presume a conflict of interest between agent and principal (Mitnick 1994). Moral hazard occurs when a person is insulated from risk and behaves differently than he/she would if exposed to the risk (Arrow 1963). Adverse selection refers to a situation when undesired results occur on the bases of the principal and agent having different information (asymmetry of information) (Arrow 1963). From the health care value chain perspective, physician agency is of importance because it may have a bearing on decision behaviour, as detailed in the health economic domain of literature, and this is addressed in detail below.

4.2.1.1 Physician Agency

Uncertainty is the most important factor influencing physician behaviour (Arrow, 1963) and has been addressed in the context of physician agency. In an intellectual project for understanding, McGuire (2001) provided a comprehensive review of the topic from a health economic perspective. The author concludes that economic models often ignore the uncertainty and informational asymmetry inherent in modern health care (McGuire, 2001 p. 496). Perfect physician agency may exist if agent and principal have the same information, but no demand on the quality of information is made; thus, perfect agency can be based on imperfect information (Mitnick, 1994). According to Eisenhardt (1989), moral hazard refers to the lack of effort by the agent, and adverse selection refers to the misinterpretation of ability by the agent. Asymmetry of information concerning these two aspects may be considered an advantage when the agent acts in the best interests of the principal, and if used inappropriately, may be against the interests of the principal.

The physician plays the role of agent for several principals in the health care value chain. First and foremost, the physician is an agent on behalf of the patient. Asymmetry of information regarding diagnosis and treatment options is a natural consequence of physicians' extensive training and resultant expertise. This training is complex, time consuming and costly, creating a situation where it is not possible for a patient to correctly verify quality or utility of health care provided. It has been argued that only about 25 % of patients are reasonably well informed about the care they receive (McGuire 2001, p.465). Physician agency may also

exist, with payers and/or employers as principals. Given the potential complexity of physician agency with several simultaneous principals, physician loyalty will be under pressure and may be influenced by shifting power between principals, thus having a bearing on patient health. However, the authority of the physician is still strong and plays a central role in any decisions related to medical care (McGuire 2001, p.463). In light of the central role played by physicians in medical decisions, it is important to further address aspects of moral hazard and adverse selection in this context.

Moral hazard is said to take place when an individual not fully exposed to a risk would behave differently than if fully exposed to the risk (Gaynor and Gertler, 1995). Both physician and patients are insulated from the financial realities of medical decisions (Illert and Emmerich, 2008), and thus subject to forces of moral hazard. Both the physician and the patient may therefore engage in behaviour motivated by self-interest. The physician may drive demand beyond what would be the case if exposed to the financial risk implicit in making the decision (McGuire 2001, p.503). A physician may also influence quantity of care, and this is achieved by: setting the level of non-contactable input (quality), influencing patient preference and physician induced demand (McGuire 2001, pp.503-519). Increasing quality may increase cost, and changing patient preference in accordance with physicians' self-interest may have the same effect. Physician induced demand will occur if the physician uses his/her "superior" knowledge to his/her benefit, driving use of health care resources to a higher level than would be the case if information was symmetric between agent and principal (McGuire 2001, p.503). On the other hand, the patient may seek to engage in behaviour driving the consumption of health care. A patient may, for example, simply opt for taking a pill for high cholesterol rather than engaging in lifestyle changing behaviour such as exercise and eating healthy. Thus, patient preference may impact demand for health care services from physicians.

Moral hazard, as illustrated above, is but one outcome of the agency problem. Physician agency may also have an impact on public policy through mechanisms of adverse selection. In certain circumstances, it will be impossible to know what the physician did or knew (Pauley, 1978) at the time of clinical decision making. This extreme form of informational asymmetry may lead to uninformed decisions by the principal, and adverse selection as a consequence (McGuire 2001, p. 498).

It is widely stated that behaviour which is motivated by self-interest of the agent lies at the heart of the principal-agent problem (Eisenhardt, 1989). The physician is an "experience good", as the patient cannot reliably measure quality of health care provided before it is experienced (Gaynor, 1994). Consequently, a patient will not know the quality of care before having experienced the care provided by the physician. McGuire (2001, p. 502) argues that learning is slow, and therefore the reward for quality is likely to be inadequate. Thus, the physician may be given room to adjust quality as an input factor (effort) according to prevailing motivations, including self-interest. Furthermore, credible evidence suggests that compensation arrangements with high degree of revenue sharing reduces physician effort (Gaynor and Gertler, 1995).

Since the introduction of the Hippocratic Oath in 4th century BC, ethics have played a central role in the practice of medicine. Physicians have autonomy in decision making on the basis of an understanding that they will act in the best interests of their patients (Arrow 1963). However, it has been argued that managed care may threaten the physician's loyalty to the patient (McGuire, 2001 p. 520). The physician is an agent for both the patient and the payer, potentially resulting in a loyalty conflict and cognitive dissonance. A payer can take advantage of the ethical constraints, imposing payment systems that force the physician to personally take on more of the effort to attain an acceptable outcome for the patient (Fugh-Berman and Ahari, 1997).

In addition to ethics, legislation also plays a central role in the practice of medicine. Legal constraints limit choices, but may also drive behaviour leading to the practice of defensive medicine, which occurs when physicians practice medicine to protect themselves against litigation (Danzon, 2000). The practice of defensive medicine may drive demand for care higher than would otherwise be the case.

4.2.2 Theory of Reasoned Action and Theory of Planed Behaviour

Theory of reasoned action (TRA) is concerned with what determines intention. Intention to perform a certain action is a function of two factors: attitude and subjective norm (perception of importance). Determinants of attitude have been identified as: evaluation of belief and strength of belief (O'Keefe, 2002 pp. 103-109). Perceived lack of ability may have an impact on intention to perform an action. In 1991, Ajzen revised the theory, and in so doing, added a third factor, perceived behavioural control, leading to the Theory of Planned Behaviour (TPB) (Ajzen, 1991). Persuasive efforts from a TRA perspective may take three forms: changing the attitudinal component, changing the normative component or the relative difference between the two (O'Keefe 2002, p.109).

In a systematic review of health care professionals' intentions and behaviours, Godin et al. (2008) included studies that aimed to predict health care professionals' intentions and behaviours, with a clear specification of relying on a social cognitive theory. This study shows that the theory most often used as reference was the Theory of Reasoned Action (TRA) or its extension, the Theory of Planned Behaviour (TPB); and the authors suggest that the TPB appears to be an appropriate theory to predict actual behaviour, whereas other theories better capture the dynamic underlying intention (Godin et al., 2008). The authors provide a hypothetical framework for studying health care professionals' intentions and behaviours, as in Figure 4-2 Theoretical framework proposed by Godin (2008). The framework has explanatory power, as it provides a simple and credible explanation. However, it is not fully supported by the findings of DBA project 1, as physician characteristics in general, with the notable exception of physician-level habit persistence, have not been shown to influence physician prescribing behaviour. Furthermore, the framework lacks the provision for feedback, a central element of dynamic decision making central to medical decision making in general (Kleinmuntz, 1993). Finally, the proposed framework lacks testability, and may therefore not be regarded or used as a well-established method.

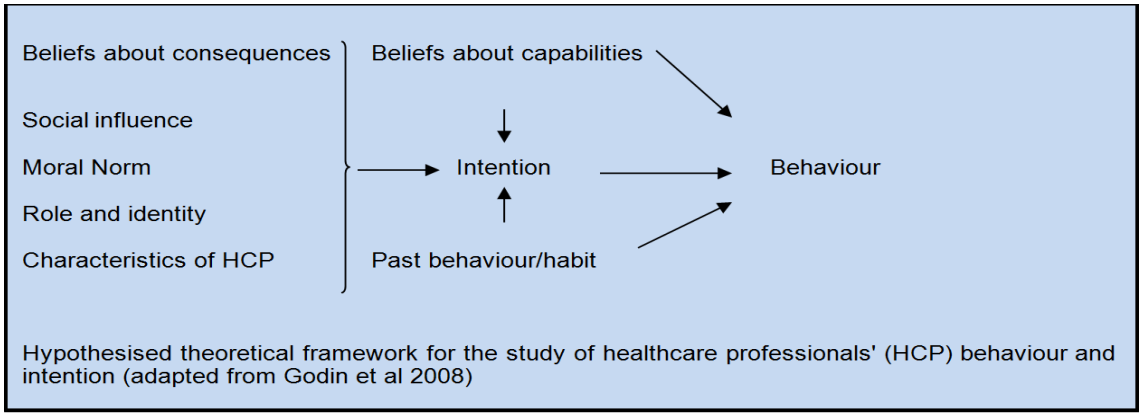

Figure 4-2 Theoretical framework proposed by Godin (2008)

In a study designed to look at factors affecting antibiotic prescribing in a managed care setting, the authors found that behavioural intention was significantly correlated with both attitude and subjective norms, but was not predictive of actual choice behaviour (Lambert et al., 1997). The authors thus posit that it is possible that choice behaviour is influenced by non-psychological factors. Furthermore, physician autonomy is challenged, and it can be argued that a system-level approach may be needed to yield a descriptive model of physician decisions. In concordance with this notion, it is found in this review that physician choice behaviour is best described using three theoretical lenses: Decision Theory, cognitive behaviour theory and Agency Theory.

4.2.3 Decision Theory

Several factors influence decision making, and understanding these factors helps understand the decision making process and potential outcomes. Because medical decisions have an impact on patient health, they should be of high quality (Klein 2005). However, medical practice is complex and time is often limited, leading to use of shortcuts to decisions, or heuristics. Unfortunately, the use of heuristics also brings with it some pitfalls (Klein 2005). Despite being highly trained, doctors are prone to making mistakes (Bornstein and Emler 2001). Cognitive biases may detract from the use of logical and statistical decision heuristics (Hershberger et al. 1994).

Decision making is important in medical practice, and because health outcomes are probabilistic, most decisions are made under conditions of uncertainty (Kaplan and Frosch 2005). Medical science has not yet solved the uncertainty surrounding many medical decisions (Gillett 2004) and is the least developed aspect of evidence-based practice (Spring 2008). Furthermore, uncertainty has been characterized as the most important factor influencing physician behaviour (Arrow 1963). Thus, understanding the role of uncertainty is central to comprehending decision processes in medical decision making.

Decision theories are developed to explain decisions under three main conditions of consequence of choice: certainty, risk and uncertainty. Decision under certainty applies when all decisions will lead to only one consequence. Decision under risk applies when a choice will have one of several possible consequences

and the probabilities of the consequences are known (Heylighen 2010). Contrary to decision under risk, decision under uncertainty applies when a choice will have one of several possible consequences, but the probabilities of the consequences are not known.

Decision theories fall into two main categories - normative and descriptive. Normative or prescriptive theories are based on idealized situations where a decision can be fully rational and all probabilities calculated. Descriptive theories work on the principle that people do not necessarily follow axioms, and thus describe what people do rather than focus on optimality. Evidence-based medicine is concerned with integrating individual clinical expertise and the best available external evidence (Sackett et al. 1996); and works on the basis of known probabilities (Kaplan & Frosch 2005). However, in a knowledge-for-critical evaluation project, Greenfeld et al (2007) address the usefulness of the results of randomized controlled trials for clinical and policy application. The authors conclude that the evidence includes patients who may have minimal benefit and that generalization to patients excluded from the study may result in overtreatment.

Thus, it could be argued that the axioms of evidence-based medicine may be invalid in individual treatment decisions, and consequently, normative decision theories explaining decisions under risk may be not be applicable in medical decision making. Further support is provided by (Eddy 1994) in that clinicians often disagree about appropriate action in similar clinical situations. In addition, there is evidence to support large geographical variations in the use health care (Wennberg et al. 2002;Wenneberg et al. 2004), and that this variation does not result in the same variation in patient outcomes (Fisher et al. 2003). This leaves descriptive theories as a possible framework for medical decision making. However, evidence based theories are not abundant, and the lack thereof to support medical decision making has led to clinical approaches and decisions tools being based on assumptions - and these assumptions have been challenged by behavioural research (Reyna 2008b). Modern theories supported by empirical evidence differ in their views of risky decision making, behavioural change, health promotion and medical decision making (Reyna 2008b). Three such theories have recently been gaining recognition: theory of reasoned action and its extension the Theory of Planned Behaviour, the trans-theoretical model and fuzzy trace theory.

4.2.4 Personal Construct Theory

The overall aim of this research project is to improve our understanding of the physicians' perception of quality in healthcare. In this research project the author; therefore turn to physicians as the experts. Physicians are actively engaged in a profession that involves diagnosing and treating patients. Thus, the aim of the project is to comprehend how physicians construct the notion of quality in health care in order to extend our understanding of quality of health care delivery from the perspective of a key stakeholder group search and compare their experience. Exploring perceptions has involved the use of qualitative interview methods with researcher-generated statements, which are prone to issues in interpretation.

The interviewers' intended meaning of a question may not reflect the interviewees' understanding and interpretation of their world experience. Overcoming these issues in a clinical setting is a challenge; however, a method that may address these issues is the repertory grid technique. The repertory grid technique is of interest because it provides an opportunity of obtaining an understanding of how the physicians see and judge their own reality while minimizing the risk of influence by the interviewer. It also provides the ability to use real patient cases provided by the respondents in the study, which is appropriate considering the special knowledge of patient care that physicians have.

In the context of uncertainty, information asymmetry and lack of a grand theory of medical decision, the repertory grid technique has been adopted to elicit embedded constructs related to how physicians perceive quality of health care delivery. However, in order to explain the repertory grid technique and why it is legitimate to use for the purpose of this study, it is important to address the underlying philosophical and theoretical assumptions inherent in the personal construct theory underpinning the development of the repertory grid interview technique (RGT).

Personal construct theory (PCT) is a psychological theory of personality, developed by George Kelly in the 1950's. PCT is based on the philosophical assumption that "…whatever nature may be, or howsoever the quest for truth will turn out in the end, the events we face today are subject to as great a variety of construction as our wits will enable us to contrive" (Kelly, 2003 p. 3). Based on its philosophical assumption, PCT falls in the category of experiential epistemology. This is in contrast to its use in psychology, where a positivist preference exists (Jankowicz, 2004 p. XVII). This has led to a heated debate addressing the utility of PCT, where proponents of qualitative methods have been pitched against those favouring quantitative methods. However, RGT as a tool for understanding all epistemologies has largely been neglected (Jankowicz, 2004 p. XVIII).

The basic postulate of PCT is: "A person's processes are psychologically channelized by the ways in which he anticipates events" (Kelly, 2003 p. 7). In his writing, Kelly puts great emphasis on anticipation and prediction as drivers of the human mind (Kelly, 1955, Kelly, 1963, Kelly, 2003). "Each person characteristically evolves, for his convenience in anticipating events, a construction system embracing ordinal relationships between constructs" (Kelly, 2003 p. 9). In other words, constructs have two extremes such as good-bad. These constructs can be said to exist at a low level of awareness. Persons, events and circumstances are characterized by the construct and the position it is given within the limits of a particular construct. According to Kelly (2003), people construe reality by 'constructing constructs'. Thus, eliciting personal constructs related to persons, events or circumstances would help understand how a person perceives reality. This led Kelly to develop the repertory grid technique in order to uncover the personal constructs.

4.2.4.1 Repertory Grid Technique

The repertory grid technique is a semi structured interview technique devised by George Kelly in the 1950's to elicit personal constructs. The grid consists of four components: a topic, elements, constructs and rating of constructs and elements (Jankowicz, 2004 p. 10). The topic is about some parts of a person's experience. "As with other topics with which it deals, personal construct theory attempts to define psychological constructs in terms of the personal experience of the individual to which they are to be applied" (Kelly, 2003 p. 19). Elements are examples or instances of the topic. Constructs can be understood as basic terms used to make sense of the elements. Rating is done using a five or seven point Likert like scale, capturing the position within constructs.

Elements are defined as: "the things or events which are abstracted by a construct" (Kelly, 1955 p. 95) and are formal aspects of constructs (Fransella et al., 2003 p. 15). Thus, it follows that constructs have formal aspects and are therefore more difficult to define. However, the most important aspect of a construct is that it is bipolar (Fransella et al., 2003 p. 15). Kelly states six assumptions for valid constructs (Fransella et al., 2003 p. 23):

1. The constructs elicited should be permeable
2. Pre-existing constructs should be elicited
3. The verbal label attached to the construct should be communicable
4. It should represent the subject's understanding of right and wrong
5. Respondents should not dissociate themselves from constructs or elements
6. Elicited constructs should be bi-polar

The repertory grid technique elicits personal constructs with minimal intervention or interpretation by the researcher, thus surfacing embedded assumptions about a topic. It is a technique that is useful to understand how a person thinks about a topic based on his/her personal experience. Repertory grid technique has been adapted since Kelly's work, and used to study different aspects in many areas of society too numerous and outside the context of this paper. For a detailed review, see Fransella et al. (2003) pp. 168-229. However, the repertory grid technique has been widely used to study a large variety of fields of management and medicine: organizational issues (Stewart and Stewart, 1981), human resource development (Easterby-Smith, 1980), operations (Goffin et al., 2006), manufacturer- supplier relationships (Szwejczewski et al., 2005), marketing (Mardsen and Littler, 1998), adolescent smoking (Lynch, 1995), low back pain (O'Farrel et al., 1993), quality of life (Kendrick et al., 1994), angina pectoris (Rowe et al., 1982), varicose veins (Baker, 1996), risk behaviour (Okoroh et al., 2006), prescription behaviour (Taylor and Bond, 1991) and effectiveness of medical interventions (Vogt et al., 2010). Thus, applying the repertory grid technique to questions related to medicine is widely accepted.

4.2.5 Definition of Quality of Health Care Delivery

Before discussing the findings of the study, it is important to define quality of health care delivery. Several authors and institutions have made attempts at defining quality in health care. Below are listed seven examples of definitions.

> *"That which consistently contributes to improvement or maintenance of the quality and/or duration of life." American Medical Association (1986)*
>
> *"That kind of care which is expected to maximize an inclusive measure of patients' welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all ill parts." (Donabedian, 1966, Donabedian, 1979, Donabedian, 1988, Donabedian, 2005)*
>
> *"Clinically effective, personal and safe." High Quality Care for All: NHS Next Stage Review, Final Report (2011).*
>
> *"Quality of care is the level of attainment of health systems' intrinsic goals for health improvement and responsiveness to legitimate expectations of the population." World Health Organisation (2000)*
>
> *"The degree to which health services increase the likelihood of desired health outcomes and are considered consistent with current professional knowledge." Institute of Medicine (2000)*
>
> *"Health care should be safe, effective, patient-centred, timely, efficient and equitable." Quality Chasm Report, Institute of Medicine (2011)*
>
> *"Medical quality is the degree to which health care systems, services and supplies for individuals and populations increase the likelihood for positive health outcomes and are consistent with current professional knowledge." American College of Medical Quality (2011)*

It is clear that a global or unified definition of quality of health care does not exist. Human health is dynamic and represented by individuals carrying unique expectations. Thus, global objective measures of health quality may be impossible. However, according to Glickman et al. (2007) p. 342, and Peabody et al. (2006) p. 1294**,** Donabedian (1978) has defined three elements of quality:

> **"Structure** refers to stable, material characteristics (infrastructure, tools, technology) and the resources of the organizations that provide care and the financing of care (levels of funding, staffing, payment schemes, and incentives).
>
> **Process** is the interaction between caregivers and patients during which structural inputs from the health care system are transformed into health outcomes.
>
> **Outcomes** can be measured in terms of health status, deaths, or disability-adjusted life years—a measure that encompasses the morbidity and

> mortality of patients or groups of patients. Outcomes also include patient satisfaction or patient response."

At the core of clinical medicine is the decision making process leading to diagnosis and treatment for individual patients and populations. The American College of Medical Quality has defined the medical decision process:

> "The medical decision-making process used in medical quality management reflects a consensus of opinion of clinical judgment that is supported by published peer reviewed scientific literature." *American College of Medical Quality (2011)*

The definition of the decision-making process makes it reasonable to assume that the process is as dynamic as is medical quality. Each physician-patient encounter is a unique experience for both the patient and the physician. Aggregation of experiences over time may therefore form constructs defining future outcome expectations. The variation created by different encounters may thus create a unique set of perceptions of quality for both the patient and the physician. However, since concordance in general is low (Stevenson et al., 2004), the physician is the main decision maker. As such, the physician's perception represents a window into the "moment of truth" (Sokol, 2010) in health care delivery, and is therefore the chosen level of measurement in this study.

4.3 Methodology

From the literature reviewed, it is clear that an empirical study is warranted to investigate how physicians construct quality of health care delivery. Thus, the research question formulated for this study was:

> *How do physicians construct quality of health care delivery in a hospital setting?*

4.3.1 Description of the Method

Repertory grid technique is based on Kelly (1955) personal construct theory, and is used to elicit a personal description about an aspect of a person's reality. Kelly was a psychologist, so the methodology was primarily designed for use in psychology (Fransella et al., 2003 p. 170). For an overview of its use in psychology, see (Winter, 2003). Repertory grid has also been used in other fields; for a detailed review, see Fransella et al. (2003) pp. 168-229.

In this study, repertory grid is used to gain a deeper understanding of physicians' perceptions of quality of health care delivery. In particular, repertory grid is used to identify the constructs physicians employ in characterizing quality in health care delivery.

The grid consists of four components: a topic, elements, constructs, and rating of constructs and elements (Jankowicz, 2004 p. 10). The topic concerns some parts of a person's experience. "As with other topics with which it deals, personal construct theory attempts to define psychological constructs in terms of the personal experience of the individual to which they are to be applied" (Kelly, 2003 p. 19). Elements are examples or instances of the topic. Constructs can be

understood as basic terms used to make sense of the elements. Rating is done using a five or seven point Likert like scale, capturing the position within constructs.

4.3.2 Conducting of the Repertory Interview

The interviews are conducted using the repertory grid technique based on Kelly's Personal Construct Theory (Kelly, 1955). This technique involves a form of structured interviews and has been found to be a powerful tool in management research (Goffin, 2002). Furthermore, the technique is useful for limiting jargon and social desirability (Goffin, 2002, Szwejczewski et al., 2005, Lemke et al., 2011). Repertory interview technique requires familiarity and skills similar to those needed to conduct interviews.

The operationalization follows Goffin (2002) by using six elicited "elements". Two basic methods for selecting elements exist: supplied and elicited. Supplied elements are provided by the researcher, whereas elicited elements are provided by the respondent. In addition, there are several rules for selecting supplied or elicited elements:

- Elements must be discrete (Stewart and Stewart, 1981)
- Elements must be homogeneous (Easterby-Smith, 1980)
- Elements must not be evaluative (Stewart and Stewart, 1981)
- Elements should be representative of the area to be investigated (Beail, 1985, Easterby-Smith, 1980)

Reger (1990) proposes three main reasons for why a researcher may want to supply elements. Firstly, the researcher may wish to learn more about a given set of elements from various respondents. Secondly, theory may guide the choice of elements. Finally, the researcher may wish to compare responses within a group or across groups. The latter instance will require a uniform set of elements to make cross group comparisons possible.

In this study, elicited elements are employed as the basis for understanding how physicians think about quality of health care delivery. Each respondent is asked to provide two examples of patient encounters where the respondent was involved and where he/she was very satisfied with the quality of health care delivery, two examples of patients encounters where the respondent was involved and where he/she was medium satisfied with the quality of health care delivery, and two examples of patients encounters where the respondent was involved and where he/she was unsatisfied with the quality of health care delivery. Each of the six elements are written down on randomly numbered cards by the respondents and presented to the respondents by the researcher during the interview.

Using the triad method from (Kelly (1955), Kelly (1963)), as described by Fransella et al. (2003), the interviewer presents the respondent with three cards asking: "How are two of these similar and different from the third in terms of quality of health care delivery?" The results are captured on a data capture sheet (repertory grid) by the researcher; please see Table B-5 Repertory Grid. Each

captured response results in a bi-polar construct; for example, construct “patient adapted communication” and construct pole “patient un-adapted communication”. The construct pole is elicited by asking what the respondent feels is the opposite of the construct.

After the meaning of the constructs has been discussed, the respondent is asked to rate all six elements on a 5-point Likert scale (Fransella et al., 2003), where 1 represents the construct and 5 represents the construct pole. The process is repeated by the researcher by presenting the respondent with another set of three cards restating the original question. The respondents are encouraged not to repeat constructs which have already been elicited. This process continues until further constructs can no longer be elicited or the time limit of 60 minutes has expired. The use of fresh triads ensure variation and has been shown to facilitate the uncovering of unconscious constructs (Bender, 1975).

A given construct is also used to gain information about the overall quality of each of the elements. The respondents are asked to rate the elements on the same Likert scale, where 1 represents “Overall quality of care delivered was high” and 5 represents “Overall quality of care delivered was low”.

4.3.3 Analysis of Repertory Grid

Repertory grids analysis may adopt a qualitative and/or quantitative approach. The fundamental task is to identify the respondents’ meanings and implications for the research being conducted. The focus of the data in this study is to characterize how physicians perceive quality of health care delivery. Therefore, the relevant analysis of the repertory grids in this study is primarily quantitative in nature, focusing on standardization of construct, categorization of constructs and identification of key constructs.

Some constructs will be provided by more than one respondent, and therefore appear in more than one grid. The grids are examined by the researcher to identify repetition of constructs, resulting in standardization of constructs. Standardized constructs are categorized by the researcher and used for characterization of constructs. Construct characterization involves identification of key constructs and their importance with respect to the aim of the study (Jankowicz, 2004 pp. 77-88). Construct characterization and identification of key constructs is accomplished by employing frequency counts and average normalized variability, as described by (Goffin, 2002, Goffin et al., 2006). Frequency is considered an indication of importance; however, frequency alone may simply indicate that it is obvious. The threshold for key construct was set at 25 % responder mention (Lemke et al., 2003). Variability is another indication of importance, as constructs with wide spread of ratings strongly differentiate among the elements. Variability is dependent on the number of constructs in an individual grid, so variability figures from grids with different numbers need to be normalized (Goffin et al., 2006 p. 19). Normalization is achieved by multiplying the variability of each construct by the number of constructs in an individual grid and dividing by the average number of constructs across all respondents, yielding a normalized variance (NV). Average normalized variability (ANV) is calculated using SPSS 19.1, employing the following formula (Goffin et al., 2006 p. 19):

$$(1)\ NV = \frac{Var\ C\ x\ N}{Mean\ C/R}$$

Equation 4-1 Normalized variance

In this sample, the average number of constructs per respondent was 8.4, so the formula for NV in this sample can be reduced to:

$$(2) NV = \left(\frac{Var\ C}{Tot\ Var}\right) x \frac{N}{8.4}$$

Equation 4-2 Normalized variance for this sample

Converting to NV (%) yields:

$$(3) NV\ (\%) = \left(\frac{Var\ C}{Tot\ Var}\right) x \frac{N}{8.4} x\ 100$$

Equation 4-3 Normalized variance (%)

Average normalized variance (ANV) % is derived by calculating the sum of all NV (%) across all respondents and dividing by the total number of mentions. For clarity of NV (%) calculations used in this study, a worked example of the first grid is provided below.

4.3.3.1 Worked Example Based on Individual Grid (Grid Number 1)

In this example, construct # 1 (Construct label: Time) is used from the Table 4-1 Grid number 1. The variance across all elements (E1-E6) is 2.57 and the sum variance in the grid is 13.47, the number of constructs in the grid is 8 and average number of constructs in the sample is 8.4. Thus, the NV (%) using formula (3):

$$NV\ (\%) = \left(\frac{2.57}{13.47}\right) x \frac{8}{8.4} x\ 100$$

$$NV\ (\%) = 18.17\ \%$$

Table 4-1 Grid number 1

#	Construct Label	Construct	E 1	E 2	E 3	E 4	E 5	E 6	Construct Pole	VAR	NV %
1	Time	Long treatment period	1	2	5	3	1	1	Short treatment period	2.57	18.15
2	Continuity	Disrupted treatment	4	5	4	2	4	1	Non-disrupted treatment	2.27	16.03
3	Physician-patient relationship	Stable alliance with patient	2	1	3	4	2	4	Ambivalent alliance with patient	1.47	10.37
4	Decision base	Clear academic foundation and methodology	3	3	2	4	4	4	Flexible foundation and methodology	0.67	4.71
5	Patient activate transfer	Patient activate negative transfer	3	3	3	1	5	2	Patient activate positive transfer	1.77	12.49
6	Patient driven	Accept and understanding of past	2	4	2	5	1	3	Focus on present	2.17	15.32
7	Context	Family context important	2	2	2	4	2	2	Family context not important	0.67	4.71
8	Effect of therapy	Effect of intervention is important	3	2	1	1	4	4	Effect of intervention less important	1.90	13.43

The overall advantage of the repertory grid is its flexibility, as it can be used for many different purposes (Jankowicz, 2004 p. 27). It constitutes a method for surfacing low awareness verbalization of how a respondent makes sense of a topic of interest without imposing the researcher's perspective. However, as with most research, repertory grid technique is also prone to researcher bias (Goffin, 2002). Furthermore, the technique may prove to be complicated and difficult to understand for the respondent. Several methods for analysis of repertory grid exist, but the problem related to data loss when aggregating across grids remains (Jankowicz, 2004).

Analysis of a repertory grid using the approach outlined above gives information about "how to say something about the different meanings being expressed in a set of grids, making general statements about the sample as a whole, while reflecting the particular meanings being offered by individual interviewees as they express their personal and, at times, idiosyncratic knowledge" (Jankowicz, 2004 p. 169). However, by employing this approach, information about what the individual respondent was saying about the topic is lost. By using Honey's (1979) content analysis, it is possible to aggregate different constructs across a sample, and this approach provides a way in which some of the individual meanings being conveyed by each respondent's ratings can be used (Jankowicz, 2004). Thus, the respondents are also asked to rate each of the constructs on a Likert scale, where 1 represents "Overall more important" and 5 represents "Overall less important". The Honey content analysis is described in detail in (Jankowicz, 2004 pp. 169-177). In brief, it aggregates constructs across the sample by employing an overall score of quality.

4.4 Results

In this section, the results of research project two are provided. First, the results from the pilot study are presented, before sample and data collection is addressed. Finally, a section on data analysis is included.

4.4.1 Pilot Study

The interview guide was piloted and amended before being employed in the study setting. The pilot study was conducted using the interview guide from the protocol. A total of three 90 minutes interviews were performed, following the protocol. The interviews were recorded and transcribed in Norwegian. During a meeting between the researcher and three academics (study panel) on July 4th 2012, the interview guide was discussed and finally agreed upon, based on the experience and results from the pilot.

Two main areas of concern surfaced. First, to what extent did the process for elicitation of elements work as envisaged? The pilot uncovered that it took between 10 and 15 minutes for the respondent to write down enough information on the supplied cards to be confident that they could remember and distinguish the cases from each other during the interview process. However, an average of more than 8 constructs were elicited, and it was felt that this would be sufficient (Goffin, 2002). Second, how well did the respondent understand the technique? The standard explanation in the guide worked for the technique. However, the original question, “How are two of these similar and at the same time different from the third?”, did not contain enough information to get the respondents to focus on quality of health care delivery. Therefore, the question was changed to: “How are two of these similar and at the same time different from the third, with respect to quality of health care delivery?”

4.4.2 Sample

The aim of the study was to include 30 physicians across different specialties in a university hospital. In total, 70 physicians were invited to participate in the study, and 43 accepted the invitation. Due to demand for physicians’ services in the clinic, it was difficult to coordinate the attendance of physicians with the researchers schedule during the study period (September 2012 to October 2012). Several physicians required rescheduled appointments a number of times, and only about 40 % (27) of the scheduled appointments by the researcher were eventually used for data collection.

Table 4-2 Respondents nominal data

ID #	Date	Time	Gender	Age (years)	Specialty
1	12/09/12	14:30	Female	55	Psychiatry
2	13/09/12	11:30	Male	53	Anaesthesiology
3	14/09/12	13:00	Male	55	Surgery (ENT)
4	18/09/12	14:30	Female	46	Infectious diseases
5	18/09/12	16:00	Male	58	Geriatrics
6	02/10/12	10:30	Male	43	Oncology
7	02/10/12	13:00	Male	60	Cardiology
8	02/10/12	15:00	Male	52	Pulmonology
9	04/10/12	10:00	Female	36	Intern (general medicine)
10	05/10/12	10:30	Male	58	Cardiology
11	17/10/12	09:30	Male	50	Infectious diseases
12	17/10/12	12:00	Female	33	Intern (general medicine)
13	22/10/12	12:30	Male	53	Neurology
14	22/10/12	14:00	Male	66	Gastroenterology
15	23/10/12	14:30	Male	70	Infectious diseases
16	24/10/12	08:00	Male	60	Pulmonology
17	25/10/12	09:30	Male	63	Haematology
18	25/10/12	11:00	Male	65	Cardiology
19	26/10/12	09:00	Male	37	Intern (general medicine)
20	26/10/12	10:30	Male	54	Paediatrics
21	26/10/12	13:30	Male	53	Psychiatry
22	29/10/12	11:00	Male	51	Anaesthesiology
23	29/10/12	12:30	Male	47	Anaesthesiology
24	29/10/12	14:00	Male	34	Intern (general Medicine)
25	01/11/12	9:30	Male	32	Intern (general Medicine)
26	02/11/12	11:30	Female	60	Cardiology
27	02/11/12	14:00	Female	46	Neurology

A sample of 27 physicians across four clinical divisions (medicine, paediatrics, psychiatry and surgery) at a university hospital in Norway was used. Respondents covered a spread of gender, age and medical specialties, ensuring extensive experience with patient care in a hospital setting; please see Table 4-2 Respondents nominal data. All the respondents were native Norwegian speakers. Respondents were invited to participate through a structured invitation in Microsoft Outlook, including a copy of the consent form (see Appendix B.1.14 Written consent form in Norwegian on page 342). The written and signed consent forms will be stored for 5 years, in accordance with hospital and university regulations.

4.4.3 Data Collection: Operationalization of the Repertory Grid Technique

The interviews were conducted using the repertory grid technique based on Kelly's Personal Construct Theory (Kelly, 1955). This technique involves a form of structured interviews and has been found to be a powerful tool in management research (Goffin, 2002). Furthermore, the technique is useful for limiting jargon and social desirability (Goffin, 2002, Szwejczewski et al., 2005, Lemke et al., 2011).

The operationalization followed Goffin (2002) by using six elicited "elements". Each respondent was asked to provide two examples of patient encounters

where the respondent had been involved and where he/she was very satisfied with the quality of health care delivery, two examples of patients encounters where the respondent had been involved and where he/she was medium satisfied with the quality of health care delivery, and two examples of patients encounters where the respondent had been involved and where he/she was unsatisfied with the quality of health care delivery. Each of the six elements was written down on randomly numbered cards by the respondents and presented to the respondents by the researcher during the interview.

Using the triad method from (Kelly (1955), Kelly (1963)), as described by (Fransella et al., 2003), the interviewer presented the respondents with three cards, asking: “How are two of these similar and different from the third in terms of quality of health care delivery?” The results were captured on a data capture sheet (repertory grid) by the researcher; please see Table B-5 Repertory Grid. Each captured response resulted in a bi-polar construct; for example, construct “patient adapted communication” and construct pole “patient un-adapted communication”. The pole was elicited by asking what the respondent feels is the opposite of the construct.

After the meaning of the constructs had been discussed, the respondents were asked to rate all six elements on a 5-point Likert scale (Fransella et al., 2003) where 1 represents the construct and 5 represents the construct pole. The researcher then repeated the process by presenting the respondent with another set of three cards restating the original question. The respondents were encouraged not to repeat constructs which had already been elicited. This process continued until further constructs could no longer be elicited or the time limit of 60 minutes expired. The use of fresh triads ensures variation and has been shown to facilitate the uncovering of unconscious constructs (Bender, 1975).

A given construct was also used to gain information about the overall quality of each of the elements. The respondents were asked to rate the elements on the same Likert scale where 1 represents “Overall quality of care delivered was high” and 5 represents “Overall quality of care delivered was low”.

Analysis of a repertory grid using the approach outlined above gives information about “how to say something about the different meanings being expressed in a set of grids, making general statements about the sample as a whole, while reflecting the particular meanings being offered by individual interviewees as they express their personal and, at times, idiosyncratic knowledge” (Jankowicz, 2004 p. 169). However, by employing this approach, information is lost concerning what the individual respondent was saying about the topic. By using Honey’s (1979) content analysis in addition to traditional bootstrapping, it is possible to aggregate different constructs across a sample, and this approach provides a way in which some of the individual meanings being conveyed by each respondents’ ratings can be used (Jankowicz, 2004). Thus, the respondents were also asked to rate each of the constructs on a Likert scale where 1 represents “Overall more important” and 5 represents “Overall less important”.

4.4.4 Data Analysis

The interviews produced rich and copious qualitative and quantitative data, captured on pre-prepared grids, and tape recording (Olympus DM-550 digital recorder) of the interviews and workshops. Recordings were transcribed in Norwegian and selected quotes were translated into English for reporting purposes by the researcher (native Norwegian speaker). One interview was translated in full by the researcher as a base for discussion with the study panel. Data analysis closely followed (Goffin et al., 2006) and also included elements from Lemke et al. (2011).

4.4.4.1 Standardization of Constructs

Some constructs were provided by more than one respondent, and therefore appeared on more than one grid. The grids were examined by the researcher to identify repetition of constructs.

4.4.4.2 Categorization of Constructs

These constructs were categorized into 33 categories, using multiple coders and inter-coder reliability checks according to Lemke et al. (2011). Inter-coder index was calculated as a percentage of agreement of allocation of the constructs between coders. The coders (1 & 2) agreed on the placement of 168 out of 227 constructs. The inter-coder index was calculated by taking the number of constructs with agreed placement (168), dividing by the total number of constructs (227) and finally multiplying by 100 to yield an inter-coder index of 74%.

4.4.4.3 Identification of Key Constructs

The most important constructs were identified using frequency count and average normalized variability, following the methodology of Lemke et al. (2003) and Goffin et al. (2006). The threshold for key construct was set at 25 % responder mention (Lemke et al., 2003). However, frequency of mention is widely stated not to be sufficient to identify key constructs. Variability is stated to be related to how important a given construct is to the respondent. A high degree of variability indicates that the respondent differentiated between the elements and that the construct is therefore more important. Thus, further selection based on variability was performed. Variability for each construct was calculated using Idogrid 2.4 and normalized by employing the methodology described by Goffin et al. (2006). Average normalized variability was calculated using SPSS 19.1. The average number of constructs elicited per respondent was 8.4. So, the average variability in the sample is 100/8.40 = 11.90. Constructs with ANV above 11.90 were considered key constructs if the 25 % responder mention threshold was met.

4.4.4.4 Honey's Content Analysis

Data on overall importance was also collected in order to be able to maintain information on an individual level through bootstrapping. The methodology was first employed by Honey (1979) and is described in detail in Jankowicz (2004) p. 169-180. In brief, Honey's content analysis is based on two basic assumptions. First, elicited constructs express personal ways by which each respondent understands the supplied construct. Second, this personal meaning can be expressed as a matter of degree. For each interviewee, the sum of differences

between the ratings of the elements on each elicited construct, and the ratings of the elements on the supplied construct, are computed and transformed to % similarity scores. “Honey’s procedure acknowledges that % similarity scores are relative, and as well as noting their actual percentage value” (Jankowicz, 2004 p. 171). The researcher then divides the result into three equal groups and denotes them high, intermediate or low (H-I-L) values.

4.5 Findings

The researcher, a native Norwegian speaker, conducted 27 interviews in the months of September and October 2012. Over 27 hours of interview data employing repertory grid technique were collected. Elements were elicited from the respondents, and this process accounts for approximately 20 % of the interview time. The average number of constructs elicited from each respondent was 8.4.

4.5.1 Full Construct Listing

From the 27 interviews, a total of 227 constructs were elicited. Several of the constructs were common, as they were mentioned by several respondents. In total, 14 constructs were mentioned by 7 (> 25%) or more respondents. Table 4-3 Collation of constructs and label generation is an example of how the constructs were collated and labels generated.

Table 4-3 Collation of constructs and label generation

ID	Construct label	Poles	Example quote	Freq
6	Early diagnosis and treatment	Early (1) Delayed (5)	“Patient X was admitted to intensive care with a SAPS score of 65% which also indicates he risk for mortality. In this case the things went according to plan and we managed to get a firm diagnosis right away and start correct therapy early. The consequence was that the patient could be discharged alive.” “Patient X was also admitted to intensive care. Management had decided that the day the experienced intensive care physicians would assist in operations leaving less experienced physicians in charge. The result was a delay in diagnosis and consequently treatment. The consequence was several more respirator days for the patient. This could have been avoided if the diagnosis had been made right away.”	18

The full construct listing is provided in Table B-4 Full listing. The constructs were grouped into categories, employing “bootstrapping” (Holsti, 1968) as a methodology for content analysis, and were further refined for use with the repertory grid technique of Jankowicz (2004) and Goffin and Koners (2011).

The 227 constructs were written on separate 3M post-it cards, including the construct term, construct poles and a representative quote. The first categorization was the result of a categorization performed by Coder 1 (researcher). The post-it cards were categorized by coder, thus generating a rough categorization. Each of the constructs was the subject of re-evaluation by the coder before yielding a final category scheme for the constructs. Each construct was given a name and defined. The result was a category scheme with names (labels), definitions and constructs allocated to each of the categories.

The next step was to involve a scholar (medical doctor), Coder 2, who had not been involved in the primary research. The scholar was given a list of categories with names and definitions and asked to categorize each of the constructs into

the categories. The researcher and Coder 2 discussed the differences and refined the allocation to categories and category definitions. Inter-coder reliability index was 74%, as the researcher and coder 2 agreed on the allocation of 168 of the 227 constructs; please refer to Section 4.3.3.1 on page 181 for further details on method for calculation. Inter-coder reliability index was comparable to that found by Lemke et al. (2011) p. 856, and further iterations of the process were therefore not performed.

4.5.2 Key Constructs

Key constructs were identified employing the methodology of Goffin et al. (2006). The lower limit threshold for key constructs was set at a mention by a minimum of 25% (25 % of 27 = 7) of the respondents. In addition, for key constructs, an average normalized variability (ANV) threshold above average was set, which for this study corresponds to an ANV greater than 11.90. Idogrid 2.4, SPSS 19.1 and Microsoft Excel 2010 were used for the calculations.

The findings show that 11 of the 33 constructs met the criteria for lower threshold > 25% and ANV > 11.90; please see Table B-3 Construct categories for explanations and further details. The remaining constructs did not meet the criteria of key constructs, as the ANV was less than 11.9. This finding shows that although these constructs were mentioned by more than 25 % of the respondents, they do not differentiate strongly

Data on overall importance were also collected in order to be able to maintain information on an individual level through bootstrapping. The methodology was first employed by Honey (1979) and is described in detail in Jankowicz (2004) p. 176. The cross tabulation of key constructs against overall importance gives the reader a chance to see the distribution of scores across the constructs; see Table 4-4 Cross tabulation of construct label * overall importance.

Theoretical saturation was evaluated by calculating the cumulative number of constructs elicited by the cumulative number of respondents (modified Lorenz curve); please see Figure 4-3 Theoretical saturation for a graphical representation. New constructs did not emerge beyond respondent 17, as shown in Table B-6 Theoretical saturation. Thus, theoretical saturation was reached, and further sampling beyond the 27 respondents was not deemed necessary.

Table 4-4 Cross tabulation of construct label * overall importance

Construct Label * Overall Importance Cross tabulation

Count

		Overall Importance					Total
		1	2	3	4	5	
Construct Label	Acute disease	2	3	1	0	1	7
	Clear presenting problem	1	2	2	0	2	7
	Communication	7	4	2	0	0	13
	Comorbidity	1	2	0	0	0	3
	Competency	8	11	0	0	0	19
	Complexity	3	2	1	2	0	8
	Context	0	3	0	0	3	6
	Continuity	8	6	1	2	0	17
	Coordination and logistics	3	3	0	0	0	6
	Correct interpretation	7	1	1	0	0	9
	Decision base	1	0	1	0	0	2
	Disease severity	2	2	2	2	0	8
	Early diagnosis and treatment	13	3	2	0	0	18
	Effect of therapy	4	3	4	1	0	12
	Information	2	1	0	3	0	6
	Intervention	0	0	4	0	0	4
	Patient activate transfer	1	5	4	2	1	13
	Patient adherence	1	2	1	0	0	4
	Patient driven	1	5	2	1	0	9
	Physician-patient relationship	2	4	3	0	0	9
	Resource availability	7	10	2	1	0	20
	Resource control	0	1	0	0	0	1
	Resource utilization	0	2	3	0	1	6
	Responsibility	1	2	0	0	0	3
	Risk	1	1	0	0	0	2
	Team approach	1	2	0	0	0	3
	Time	3	3	3	0	0	9
Total		80	83	39	14	8	227

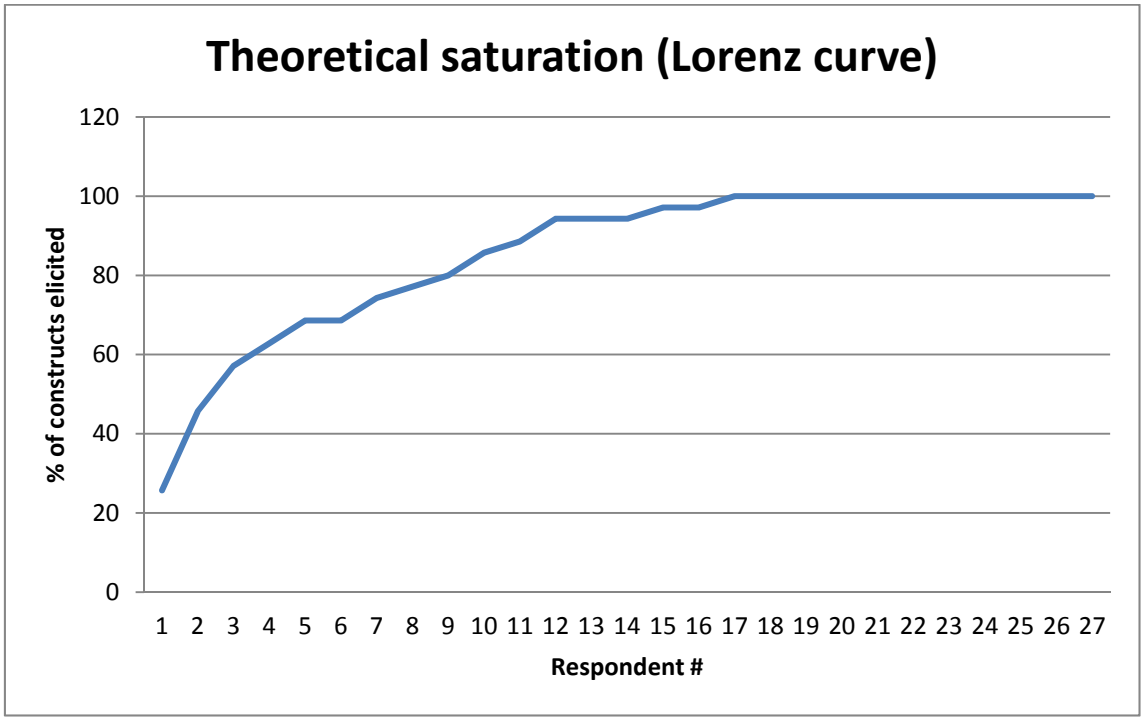

Figure 4-3 Theoretical saturation

4.5.3 Explanation of Constructs

In this section, a detailed explanation of each of the key constructs is provided. Please also see Table B-7 Key constructs on page 364 for a summary.

4.5.3.1 Communication

Emphasis on patient communication in clinical medicine is growing, but a clear definition is elusive. However, participants in the Bayer–Fetzer Conference on Physician–Patient Communication in Medical Education reached a consensus statement on essential elements of communication in medical encounters (Makoul, 2001). The consensus includes 6 main elements: open the discussion, gather information, understand the patients' perspective, share information, reach agreement on problem and plan, and provide closure.

Three aspects of communication are included in the findings of this study: physician-patient, physician-physician and technology. When addressing communication in the context of quality of health care delivery, physician perspectives are related to the quality of communication (good quality – poor quality) and are best exemplified by the following quote:

> *"It was very easy to get contact with this patient. The patient had a good understanding of his condition and was able to communicate his symptoms clearly. This other patient had a poorly developed vocabulary and did not understand that the symptoms were related to disease. It was very difficult to get through to him." (ID# 6)*

Physician-patient communication is the most prevalent component of this key construct. Correlation between effective physician-patient communication and improved patient health outcomes has been demonstrated (Stewart, 1995, Jensen et al., 2011). Furthermore, training in medical communication can improve physician communication skills (Jensen et al., 2011). Thus, this study supports previous findings on the importance of good quality physician-patient communication.

Physician-physician communication is essential to ensure the flow of information in medical practice involving several physicians responsible for the care of a patient. Communication in this setting is addressed by two other key constructs: continuity and responsibility. Continuity addresses how many physicians are involved in the care of a patient. Many exchanges of information decrease the chance of quality health care being delivered.

> *"This patient had been to several of my colleagues with stomach pain for months. A few tests had been done and the patient repeatedly sent home without further to do. When he came to me I ordered a computer tomography of the abdomen and it showed liver cancer with widespread metastasis. He died two weeks later and …." (ID # 19)*

Responsibility is related to the feeling of obligation to follow a course or take action in order to prevent the loss of health or improve health. Full responsibility denotes the fact that one physician is in charge of coordinating or providing care to the patient.

"I think this patient would have had a better outcome if I would have had the full responsibility. The problem was that I felt like a consultant without full responsibility and gave advice. If I would have had all the information and been involved from the beginning my advice would have been stressed differently. Unfortunately the poor boy died." (ID # 20)

Communication is about the flow of information, and in this context, information is the message being expressed. Information availability during the process of diagnosing and treating patients is viewed as important.

"...I had seen this patient before and had extensive knowledge about his previous diagnosis and therapy. The fact that this information was available made it simpler to treat his current problem." (ID# 12)

However, it is not only the availability of information that is important. Information is also frequently not communicated effectively by physicians (Azoulay et al., 2000).

Technology is an important and integral part of modern health care. Electronic patient journals, as information repositories and communication channels, are designed to ensure flow of information. The flow of information, or lack thereof, may impact quality of health care delivery.

"…it is not possible to order x-rays through the digital patient journal. This still has to be done the old way on paper. When the results come back from the radiologist they are not assigned to the requesting physicians and follow up based on the information becomes difficult. …….some patients have waited too long for cancer treatment as a direct result." (ID# 6)

Communication is therefore a tool to ensure correct flow of information. Both the availability and flow of information may influence the quality of health care delivery. Enhancing physician-patient communication has been widely stated to improve adherence to prescribed medical therapy (Ross, 1991, Misdrahi et al., 2002, Osterberg, 2005). Patient adherence in this study is not considered a key construct, but may be viewed as a possible mechanism influencing quality of health care delivery.

"I consider patients who abuse drugs or medicines to be unreliable. Sometimes they come to their follow-up appointments and sometimes they do not. This is a group of people requiring a lot of energy from us in order to make sure they come and get the necessary treatment." (ID# 11)

4.5.3.2 Continuity of Care

Continuity is related to how many physicians or other health care workers are involved in the care. When many are involved, information is lost during numerous exchanges. The moral obligation to perform or not to perform certain behaviours is expected to influence behavioural intent (Ajzen, 1991 p. 199). When many physicians are involved in the provision of care, information may be lost during numerous exchanges. Furthermore, feeling of responsibility may also be affected; see Section 4.5.3.8.

> *"…as few people as possible should participate in the treatment, exchange of information should be kept at a minimum to ensure continuity and preserve quality."* (ID#19)

This finding is in agreement with the literature, as it is widely stated that continuity is important for quality of care (Adler et al., 2010, Stiell et al., 2005, Love et al., 2000, Becker et al., 1974), but the effect is found to be variable (Adler et al., 2010). Lack of continuity is connected to another key construct, as early diagnosis and therapy may be influenced by lack of continuity of care.

> *"Patient X was admitted to intensive care with a SAPS score of 65% which also indicates the risk for mortality. In this case the things went according to plan and we managed to get a firm diagnosis right away and start correct therapy early. The consequence was that the patient could be discharged alive." "Patient X was also admitted to intensive care. Management had decided that the day the experienced intensive care physicians would assist in operations leaving less experienced physicians in charge. The result was a delay in diagnosis and consequently treatment. The consequence was several more respirator days for the patient. This could have been avoided if the diagnosis had been made right away." (ID# 22)*

4.5.3.3 Cooperation

Cooperation among physicians and health care workers is necessary for a team approach and its synergies of effect. The results of this study indicate that cooperation is an important element in how physicians construct quality of health care delivery.

> *"The ER is not very effective, the nurse and physician see the patient at different times and ask the same questions. It would be much better if we were there at the same time. Information would flow easily and the patient would not have to answer the same question twice." (ID# 25)*

Delivery of health care in the context of modern medicine may be considered a cooperative effort. According to Eisenhardt (1989) p. 72, "Agency Theory provides a unique, realistic, and empirically testable perspective on problems of cooperative effort". Thus, the principal-agent dyad may be considered a cooperative effort. The main tenet of Agency Theory holds that there is a conflict of interest between the principal and the agent. On one hand, asymmetry of information may drive a condition of moral hazard, and on the other, risk may cause adverse selection to occur. Even though the findings of this study support patient-physician cooperation, the main focus is on the quality of the cooperative effort among physicians and other health care workers. In this context, economic interest would drive a possible conflict of interest. However, this is not felt to be the case in this study due to the lack of evidence in support of this notion.

4.5.3.4 Interpretation

Correct interpretation of information is central to the process of diagnosing and deciding on the appropriate therapy.

"…this particular patient was a young boy with down syndrome. I was dependent on his parent's information to make a correct diagnosis. Fortunately, his parents had a high social status and it made it easy to communicate. I think this was important in getting the correct information and making the diagnosis. It has also helped in the follow-up. At the time I had two such patients with genetic heart disorders and they both lived 10-15 years longer than they might otherwise have done." (ID# 26)

Focus of attention to what the physician prefers results in differential weighting of information features. For naturally occurring phenomena, it is not clear whether people do consider base rates (Goldsmith, 1980). However, information that receives a causal interpretation is weighted more heavily in judgment than information that is diagnostic (Einhorn and Hogarth, 1981 p. 65) . Thus, correct interpretation of information may be dependent on the physician's preference of information features.

4.5.3.5 Early Diagnosis and Treatment

Early diagnosis and treatment is frequently mentioned and variability is high, indicating strong relevance. In this study, it is clear that this construct plays an important role in quality of health care delivery.

"Due to delay in diagnosis, this patient did not receive the therapy needed to save his life." (ID# 13)

Focus of medical research is on early diagnosis and treatment for different disease states. For example, the vast amount of research done on cancer in recent years have made it possible to detect, diagnose and treat cancer conditions that a few decades ago would lead to death in most patients. It has been shown that for 20 tumour types, the 5-year survival rates have increased from 1950 to 1995 (Welch et al., 2000). The main reason for this is attributed to screening, better diagnostic procedures, and resources.

"This is a case I am uncomfortable talking about. Due to a clear focus on only part of the problem the diagnosis was missed and the patient died after about two months. I can also say that this may have been attributable to the competency of the physician doing the diagnostic procedure." (ID# 4)

Thus, early diagnosis and effective and timely treatment reduces morbidity and prevents premature death from disease. Early diagnosis and consequent treatment depends on the patient and the physician's ability to interpret information correctly.

The patient plays a central role in the quality of health care delivery. Whether to seek medical attention for a problem or condition primarily relies on the patient's ability to recognize symptoms as a sign of disease.

"...it is central for the patient to associate symptoms with disease. If not the patient will not get in touch with the physician. Furthermore, I think this is one aspect of patient-delay." (ID# 6)

Physicians are the experts and must make sense of information from many potential sources when diagnosing and deciding on appropriate therapy. If the interpretation is not correct, then the diagnosis may be missed and appropriate therapy not given.

> *"The patient was complaining of chest pain after a fall. I examined the patient, but did not find anything abnormal except for pain in the region that was involved during the fall. She was later admitted to hospital with pneumothorax and was treated with a chest drain." (ID# 5)*

4.5.3.6 Effect of Therapy

Effect of therapy can be more or less effective in solving the presenting problem. Differentiation is made between curative effect and symptomatic effect. In some cases, the symptomatic effect may be just as important, dependent on the availability of curative therapies; for example, palliation for terminal cancer patients.

> *"Availability of effective therapy is definitely important for quality. In oncology we have quite a few patients that will have a good chance of survival in a few years, but today medicines that are effective are not available." (ID# 6)*

Physicians associate effective therapy with quality of care. The main premise is that there is a correlation between the availability of effective therapy and quality of care. Thus, it may be argued that effective therapy is necessary for positive outcomes related to the presenting problem. Furthermore, the effect of available therapy is not the only factor influencing outcomes. Complications of therapy are also of major concern. In 1999, the Institute of Medicines published a report documenting that 1 million people per year are injured and 100 thousand die as a result of preventable medical errors in hospitals in the USA (Kohn et al., 1999).

> *"For young patients, with a lot to lose, I sometimes choose to go outside the guidelines to give the patient a chance and get acceptable results." (ID# 17)*

4.5.3.7 Experience

Experience is a key construct informing physician perception of quality of health care delivery. From the data in this study, it is evident that physicians perceive more experience beneficial to quality of health care. This is in contrast to the findings of Choudhry et al. (2005) p.271, where the results of a systematic review on the topic "suggest that physicians with more experience may paradoxically be at risk for providing lower-quality care". The authors suggest several possibilities for their finding, but the most plausible is that a physician's "tool-kit" is developed during training and not updated on a regular basis (Choudhry et al., 2005, Carthy et al., 2000).

Experience in this study is defined as the knowledge or skill necessary to apply scientific medical knowledge to practice, gained through exposure to similar events or cases. However, in the literature, clinical experience often equates to time in practice. Time in practice was suggested by Bradley (1991) to be a

contextual component that may influence physician prescribing. However, time in practice constitutes a temporal dimension that may be further informed by investing literature addressing physician age and habit persistence.

> *"The patient came to the ER after a fight at a local bar. He was not conscious and the consultant did not come to see the patient. The hospital was full that night, but I managed to get the patient a bed on a ward. I felt uneasy about the whole thing. Later during the night I went to check on the patient and found him in a deep coma. A CT was requested and an intracranial bleeding was found. The patient was flown by helicopter to the nearest trauma centre and died on the operating table. This is a case that has been with me for years and my lack of experience made me accept the cursory advice from the consultant even though my gut feeling told me otherwise." (ID# 21)*

4.5.3.7.1 Physician Age

In a study by Bauer et al. (2008), antidepressant prescribing patterns and factors influencing the choice of antidepressant for the treatment of depression were examined. The authors found that older investigators were associated with a decreased likelihood of a serotonin-reuptake-receptor-inhibitor (SSRI) being prescribed. In another study, Biga et al. (2007) characterized profiles of physicians (GPs and rheumatologists) prescribing cyclo-oxygenase-2 inhibitors in France in 2002. A negative statistical link was found between a high level of cyclo-oxygenase-2 inhibitors prescriptions and physician age below 44 years. Harries et al. (2007) investigated whether, and how, individual doctors are influenced by a patient's age in their investigation and treatment of angina pectoris (chest pain). Physicians who were influenced by age were on average five years older than those who were not. They were significantly positively influenced by old age on decisions to change prescriptions for ischemic heart disease, in particular nitrates. It is also worth noting that female physicians were underrepresented in the study population, creating a male bias. In an Australian study aimed at investigating the effect of remuneration changes on physician prescribing behaviour, it was found that GPs aged over 55 years old were less likely to counsel their patients and more likely to prescribe medication than GPs aged under 35 years old (Scott and Shiell, 1997). Hamann et al. (2004) interviewed 100 psychiatrists on drug choice for 200 patients suffering from schizophrenia, and found that older physicians were up to five times more likely to prescribe first-generation antipsychotics. Furthermore, the authors found that patient variables did not influence treatment decisions significantly.

4.5.3.7.2 Time in Practice

Time in practice has been mentioned as a possible factor influencing physician prescribing behaviour. However, few studies addressing this issue have been found in the literature. de Jong et al. (2009) investigated the influence of child, parent and physician factors on drug prescriptions for respiratory symptoms in primary care in infancy, as respiratory symptoms account for the majority of drug prescriptions in the first year of life. The authors found that physicians with more than 15 years' experience prescribed more. In another study, Mamdani et al. (2002) examined the association between socioeconomic status, as indicated by

neighbourhood median income levels, and physician drug selection between older, less expensive generic drugs and newer, more expensive brand-name drugs for elderly patients initiating drug therapy in a universal health care system. The authors found that physician graduation year was inconsistently associated with newer brand-name drug prescribing across the three drug classes investigated in the study.

4.5.3.7.3 Habit Persistence

Janakiraman et al. (2008) explored the effects of habit persistence on prescribing behaviour by examining 9672 prescriptions written for depression by 108 physicians of non-specified specialities over a four-year period in the USA. A two-state model was adopted based on the assumption that physicians can be either persistent or non-persistent. The authors investigated whether persistent physicians responded differently to detailing, out-of-office meetings, and symposium meetings. There is compelling evidence to show significant cross-sectional levels of persistence in decisions concerning the prescription of medicines. Practice type may play a role, as it was found that physicians working in smaller practices are more likely to be persistent. Furthermore, age and detailing acceptance also play a role in defining persistence. Older physicians and those more accepting of detailing stand a higher chance of being persistent. Both persistent and non-persistent physicians appear to be responsive to symposium meetings. However, only non-persistent physicians were found to be responsive to detailing. Out-of-office meetings had no effect on prescribing behaviour. In another study, Venkataraman and Stremersch (2007) also found that there is substantial habit persistence in physician decision making. Lilja (1976) performed an empirical study utilizing a mailed questionnaire examining how GPs (180) in Sweden chose medicines. The data were analysed using linear regression modelling. The author found a positive effect on habitual choice with increasing age. Highest weight was given to curing effect of medicines prescribed. In addition to physician age, it was found that disease severity was a determining factor. Moreover, no significant relationships for background variables of physician were found. “The unique contribution of habit would lie in finding a residue of past experience that leads to habitual rather than reasoned responses” (Ajzen, 1991). Further support is provided by Coscelli (2000), who also notes that doctors' prescribing behaviour shows habit persistence. Furthermore, personal experience combined with social meaning of medicines drive prescribing behaviour during the end of life therapies (Zerzan et al., 2011); and early experience of using a new medicine seems to strongly influence future prescribing (Jones et al., 2001).

Evidence supporting the effect of age and time in practice as individual components influencing physician choice behaviour is limited. However, both age and time are temporal, and it may therefore be argued that time is a factor influencing physician choice. This review has, however, not identified any evidence to link time to physician choice directly. The third component in this section is also temporally related, as habit represents residues of past behaviour and experiences (Ajzen, 1991). Age and time in practice may therefore merely represent the temporal axis on which past behaviours and experiences are placed. The key to understanding temporal effects can thus be found in the

literature addressing habit persistence. From a theoretical perspective, temporal effects may simply reflect the sum of past behaviour, and as such, are best characterized as a reflection of all factors that determine the behaviour. The correlation between past and later behaviour is an indication of the behaviour's stability or reliability (Ajzen, 1991). Furthermore, Ajzen (1991) notes that residual effects of past behaviour may constitute habit, but can also be the result of missing or unrecognized attributable factors. However, evidence presented in this review suggests a strong influence of habit persistence on physician choice behaviour. Thus, evidence of temporal components influencing physician choice is considered high.

4.5.3.8 Full Responsibility

Full responsibility denotes the fact that one physician is in charge of the care of the patient. In other words, one person is responsible for ensuring that all the patient's needs are met. When responsibility for care is shared, roles may become unclear and the quality of care may suffer as a consequence.

> *"The problem was that I felt like a consultant without responsibility and just gave advice." (ID# 20)*

4.5.3.9 Resource Availability

Resources in this context are both human and technical in nature. Human resources are physicians and other health care personnel such as nurses and physiotherapists. Technical resources are represented by medicines, equipment and buildings. Human resources are linked to time, which will be covered in Section 4.5.3.11. The availability of requisite opportunities and resources (e.g. time, money, skills, cooperation of others) collectively represent physicians' actual control over behaviour related to health care service delivery (Ajzen, 1985, Ajzen, 1991 p. 182).

> *"Not having enough echo–resources in the cardiology department is like not having enough hammers for the carpenter" (ID# 18)*

4.5.3.10 Resource Utilization

The use of resources is related to diagnostic and therapeutic resources. Resources refer to a wide variety of resources, ranging from buildings, technical installations, IT, diagnostic and therapeutic modalities. Availability of resources is in itself not enough to ensure quality health care delivery; resources must also be used appropriately.

> *"This patient got more than what could be expected. All possible diagnostic and therapeutic avenues were tried. In other words, the health care system had no more resources available that could be used." (ID# 11)*

4.5.3.11 Time

Available time is important in order to do what is necessary; thus, time available is often determined by patients/physicians per time unit.

"I always make sure that a colleague answers my phone when I am on call and have an important patient interaction. Having the time necessary to make an evaluation and administer therapy is important." (ID# 21)

In the literature, time as a factor having an impact on quality of health care is infrequently mentioned. However, in a study investigating physicians' views on quality of health care, surveying 100 physicians, most physicians (52%) cited time spent with patients as an effective strategy in improving quality of care (Audet et al., 2005 p. ix).

In the present sample, time is related to two main paths concerning quality of health care delivery; first, time spent on direct patient care, and second, time spent indirectly on patient care.

Time spent directly on patient care is related to the time available for interaction with patient and physician or other health care workers. This is related to the communication between patient and physician and to diagnostic or therapeutic procedures, as illustrated by the following quotes.

«...I was on call and it was very hectic. I did not have enough time to evaluate the patient fully and therefore overlooked a fracture in the tibia (leg bone)...» (ID# 23)

«...I did not have enough time to explain fully the therapy to the patient and the patient's family. The patient initially denied therapy and diagnosis and treatment were delayed and the patient died later the same day on the operating table in another hospital. » (ID# 15)

«During a hectic day with many consultations, the colleague performing the initial echo of the heart only paid attention to the replacement valve and not to the whole heart. Only two months later, after looking at the recorded echo film, was it evident that the left ventricle was barely moving. At this point he was dying and therapy at this point did not have any effects. He died shortly thereafter. » (ID# 26)

Time spent indirectly on patient care is also evident from the sample. This use of time follows two main paths: first, time is spent on maintaining or improving clinical or academic competencies; and second, time is spent on reflection and evaluation of information, especially when dealing with complicated cases.

Time spent on improving or maintaining clinical or academic competencies can be illustrated by the following quotes.

«..We do not have enough time to supervise our interns. In the hospital where I worked before we had control of what our interns knew and did. Here, we do not have the time for appropriate supervision. What type of cardiologists are we getting? I honestly can't tell you....» (ID# 26)

"...I have a lot of data on the 2000 hepatitis C patients in our policlinic, but I never have the time to analyse the data. We don't know if our practice is appropriate given national and international guidelines. This is especially important for some of the patients as immune therapy can be very costly for the hospital and for the patient…" (ID# 11)

"...this one patient was admitted for COPD and treated accordingly, but the heart was not considered. If more attention had been given to the whole patient then maybe the outcome had been better." (ID# 25)

4.5.4 Patient Influence

The patient plays a central role in the provision of health care. In other words, there is no need for a health care service without patients! Even though this construct did not meet the minimum criteria for key construct, it is felt necessary to include the topic in this section to ensure a complete set of findings. The evidence in this study informing the topic can be divided into three categories. First, patients exhibit state dependence. Second, patient expectations influence physician decisions. Finally, patient delay is related to the ability to recognise symptoms as disease.

The physician's desire to preserve the physician-patient relationship as a factor that may influence physician decision behaviour has been described in the literature (Bradley, 1992). In an agency context, patient expectancy may clearly influence physician decisions. However, only a few authors included in this review address the question. Furthermore, the origin of patient expectancy is not clearly identified in the included literature, but is has been shown that patients exhibit strong state dependence (Coscelli, 2000).

"...this patient had detailed information about how to use the system to get what she wanted. She got more resources than she should have." (ID# 1)

Lundin (2000) investigated the effect of moral hazard on physician prescribing and found that patient acquired taste (preference) is an important factor, giving further support to the findings of Coscelli (2000). In addition, Naik et al. (2009) note that patients' requests for specific brands may influence physician prescribing behaviour. In a study by Tett (2003), it was found that 66.1% of GPs felt that patient expectations influence prescribing. Webb and Lloyd (1994) examined the effect of patient expectations of physician prescribing and hospital referrals. The investigators employed a self-administered survey, covering 1080 consultations with 12 GPs. Results showed that physician prescribing behaviour was most strongly associated with patients' expectations. The level of influence exerted by patient expectations on physician prescribing behaviour may be strong, as was found in a study assessing the influence of non-medical factors in the context of upper respiratory infections (Hummers-Pradier et al., 1999). The authors conclude that patient expectations are extremely important when prescribing medicines for cold and cough. This notion is further supported in a similar study investigating the prevalence of patient expectations for upper respiratory infections (Faber et al., 2010). In another study, Macfarlane et al. (1997) investigated patient expectations in the context of antibiotic prescribing,

and found that 85% of patients felt that symptoms were related to infections and that antibiotics would help (87%). The authors found that most (72%) patients wanted antibiotics and the same number of patients expected a prescription for antibiotics.

> *"...demanding patients create negative feelings and I fear I may give suboptimal therapy due to this fact..." (ID# 11)*

The literature suggests that there may be a poor correlation between patient expectation and physician perception of this expectation. Whether it is the patient expectation or the physician's perception of the patient expectation that is the influencer becomes a key question to address. Mangione-Smith et al. (1999) investigated the expectation of parents among children diagnosed with a probable viral cause. The authors found that the actual parent expectation did not influence the decision to prescribe. The authors note that there was poor agreement between actual pre-visit expectations reported by parents and the perception of expectation by the physician. In a study exploring how GPs decide to prescribe, it was found that the decision is shaped by the perception of patient expectation (Hyde et al., 2005). Lado et al. (2008) conclude along the same lines and claim that there is no association between patient expectations and physician perception of such expectations. In an observational study, von Ferber et al. (2002) found that patients' needs and expectations are lower than observed prescribing behaviour by physicians. More recently, further support to the perception of expectation is given by the work of Tusek-Bunc et al. (2010), where it was found that the physician perception of patient expectation was a significant factor influencing statin prescribing.

There is evidence suggesting that the patient pathway from symptom to diagnosis is a key determinant of outcomes in cancer patients (Walter et al., 2012). Most diseases present with symptoms, but the symptoms may be associated with common ailments and therefore not considered a sign of serious disease by the patient.

> *"The patient was admitted to hospital due to a large wound on her chest. It turned out that she had felt a lump in one breast a couple of years prior to being admitted. The lump had become larger and a wound developed. The reason she contacted her GP was the smell from the wound. It turned out to be a case of terminal breast cancer."* (ID# 6)

From the evidence presented, patient expectation, as an influencer, is not well established. However, the evidence points in the direction of the physicians' perceptions of patient expectation as an influencer of physician decisions. Furthermore, it has been suggested that there may be differences in the level of reliance on these perceptions dependent on physician specialty (Lapeyre-Mestre et al., 1998).

4.6 Discussion

The objective of the study was to investigate how physicians perceive quality of health care delivery. Although this research is exploratory, it has made several contributions to the understanding of how physicians perceive quality of health

care delivery. First, this study provides evidence on how physicians construct quality of health care delivery, and therefore represents a window into the hitherto unobservable effort (quality) input by physicians. Second, the theoretical link to the Theory of Planned Behaviour has been identified. More specifically, evidence of a link to control belief and consequent perceived behavioural control is strong. This may indicate a conflict between process management on one hand and physician effort to produce quality health care services on the other. Finally, the results from this study are homogenous in that theoretical saturation was achieved early, indicating that there is a high degree of agreement within the physician community as to the construct of quality. The most probable explanation for this last finding is that the "institution" of medicine is strong, indicating socialization and common perceptions of quality.

This study explicates some aspects of quality of health care delivery that go beyond prior related studies. Theory is advanced in this area by the exploration of how physicians construct quality of health care delivery in a hospital setting. The model presented integrates the study findings with elements of theory from different academic areas, such as medicine, economics, management and psychology.

The discussion will be structured around the identified key constructs representing physician perception of quality health care delivery, compared and contrasted with evidence from the literature. This begins by considering quality in health care, and then addresses what this study has confirmed. Next is a discussion on what the study has added, followed by what has been challenged. Following this, paradoxical findings are discussed, before the study findings are examined from a theoretical perspective. Finally, a conceptual framework for quality in health care delivery is proposed.

4.6.1 Quality in Health Care

The focus on quality of health care provision follows two main paths. First, improvement of clinical quality where clinical quality refers to performance relative to process of care performance measures, which are represented by clinical protocols of best practice to achieve high levels of patient safety (Chandrasekaran et al., 2012). Second, experiential quality is represented by the quality of care as experienced by the patient (Donabedian, 1988). It focuses on how care is provided and is distinct from the clinical quality, as it is focused on what is provided.

Tension between the two outcome paths occurs when hospital management try to balance the two, as focus on clinical quality will reduce variation and focus on experiential quality increase variation (Chandrasekaran et al., 2012). Clinical quality has been shown to be closely linked to experiential quality (Blackwell, 1973, Butler et al., 2002, Camron, 1996) and vice versa. Thus, the quality of care is dependent on both clinical and experiential quality.

The described tension between clinical and experiential quality creates a contradiction at the strategic level of health care provision. Managing strategic contradictions has been addressed by Smith and Tushman (2005), and the

authors proposed a framework for managing strategic contradiction involving paradoxical cognition:

- Articulating a paradoxical frame
- Differentiating between architecture and strategy
- Integration between architectures and frames

Articulating a paradoxical frame involves ”mental templates in which managers recognize and accept the simultaneous existence of contradictory forces” (Smith and Tushman, 2005 p. 527). Differentiating between architecture and strategy involves a cognitive process of differentiation and integration, thus enabling balanced strategic decisions (Smith and Tushman, 2005 p. 526). Even though most of the literature on the topic addresses business issues related to innovation, balancing financial and social goals has also received attention in the literature (Margolis and Walsh, 2003). Smith and Tushman (2005) p. 533, claim that managing contradiction is a window into a range of important and understudied organizational challenges.

Focus on health care delivery in a context defined by an ever increasing demand by an aging population and with limited funds makes the effective management of contradiction and paradox even more salient than before. Thus, understanding how organizations effectively manage contradictions in the health care sector remains a critical question.

It has been shown that management focused on patient centred health care delivery can mitigate the effects of the tension described above (Chandrasekaran et al., 2012). However, these findings are a result of a post hoc analysis and should therefore not be considered scientifically rigorous evidence of such an effect and require further investigation.

Overall, the findings of this study favour technical quality. The way medical education is structured may be a factor; however, physicians may learn from experience to favour behaviours which are believed to have largely desirable consequences (Ajzen, 1991 p. 191). Thus, positive attitudes are formed through clinical experience which in turn may influence behavioural intent. Furthermore, Bandura (1989 p. 1178) states that “Any factor that influences choice behaviour can profoundly affect the direction of personal development because the social influences operating in the environments that are selected continue to promote certain competencies, values, and interests long after the decisional determinant has rendered its inaugurating effect. Thus, seemingly inconsequential determinants can initiate selective associations that produce major and enduring personal changes”. Therefore, experiences early in a physician’s career may be determinant of later choice behaviour.

The effect of guidelines on physician prescribing behaviour has been extensively studied and reported in the literature. It is widely stated that the level of guideline adherence is variable (Smolders et al., 2007, Lagerlov, 2000, Chauhan and Mason, 2008, Nast et al., 2009, Rashidian and Russell, 2011). In fact, it has been found that in some cases, more than 50% of decisions resulting in a prescription

contradict clinical practice guidelines (Ventelou, 2010). Furthermore, outcomes measures of guideline implementation are largely lacking (Gill et al., 1999).

4.6.2 What has been Confirmed

In this section, the findings of the study where agreement with evidence presented in literature is high are discussed.

4.6.2.1 Communication

The effect of communication on health outcomes is widely stated (Altiner et al., 2007, Makoul, 2001, Makoul et al., 1995, Zacharie et al., 2003, Street et al., 2007, Stiell et al., 2005, Stewart, 1995, Azoulay et al., 2000, Mack et al., 2005, Kenny et al., 2010, Kaplan et al., 1989, Jensen et al., 2011). In this study, communication is a key construct, and thus represents an important aspect of physicians' perspectives on quality of health care. Therefore, this study confirms previous theory and supports prior findings on the importance of good quality physician-patient communication.

In a review of the literature, Stewart (1995) p. 1423, concludes that "most of the studies reviewed demonstrated a correlation between effective physician-patient communication and improved patient health outcomes". This is further supported by the findings in this study, as correlation between effective physician-patient communication and improved patient health outcomes has been demonstrated (Stewart, 1995, Jensen et al., 2011). Furthermore, training in medical communication can improve physician communication skills (Jensen et al., 2011).

> *"It was very easy to get contact with this patient. The patient had a good understanding of his condition and was able to communicate his symptoms clearly. This other patient had a poorly developed vocabulary and did not understand that the symptoms were related to disease. It was very difficult to get through to him." (ID# 6)*

In 1999, 21 leaders of medical education and professional organisations convened to discuss medical communication, with the intent to identify elements of medical communication in order to facilitate inclusion of medical communication in medical curricula and to inform development of standards of medical communication (Makoul, 2001). The group identified seven elements of medical communication (Makoul, 2001 p. 390): build the doctor–patient relationship, open the discussion, gather information, understand the patient's perspective, share information, reach agreement on problems and plans, and provide closure. Jensen et al. (2011) undertook a crossover randomized controlled trial in a 500-bed hospital to test whether a 20 hour communication skills course based on the Four Habits model could improve doctor-patient communication among hospital employed doctors across specialties. The Four Habits are: Invest in the Beginning, Elicit the Patient's Perspective, Demonstrate Empathy, and Invest in the End (Frankel and Stein, 1999 p. 79). Each Habit refers to a family of skills. Jensen et al. (2011) found that the Four Habits model is suitable for communication-training courses in hospital settings.

Medical communication is widely stated to be important, and correlation between effective physician-patient communication and improved patient health outcomes

exist. Furthermore, a model for effective communication exists, and training based on the model is both suitable and effective when applied to physicians in a hospital setting.

4.6.2.2 Early Diagnosis and Treatment

The findings of this study suggest that early diagnosis and treatment is an important factor influencing quality of health care delivery. In the UK, cancer survival rates are poorer when compared with other countries in Europe with similar health care expenditure (Berrino et al., 2007). Evidence suggests that pathways to initial presentation and initial management are linked with patient outcomes (Richards et al., 1999). Investigating diagnostic delay could be facilitated by use of a robust theoretical framework (Walter et al., 2012). The first and most widely cited framework, a three stage model to account for the total time from first noticing a symptom to seeking treatment, was proposed by Safer et al. (1979) and subsequently developed by Andersen et al. (1995) – the Andersen Model. The model proposed by Andersen et al. (1995) is a general model of total patient delay, which can be applied across medical disorders; see Figure 4-4 Andersen model. Findings from this study are directly related to aspects of the Anderson model, as exemplified by the quote below; thus, the study confirms previous theory.

> *"This patient came to see me regarding a rash on her left breast that she had noticed during the past few days. It turned out to be a rare form of breast cancer." (ID# 9)*

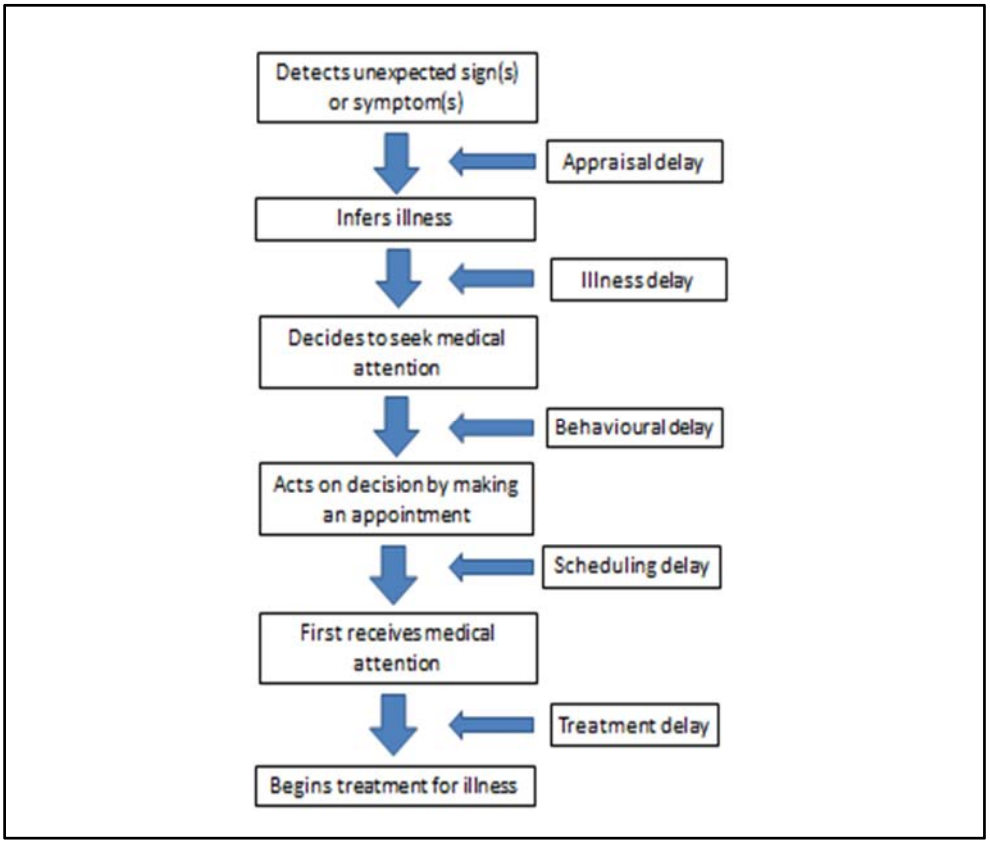

Figure 4-4 Andersen model

Walter et al. (2012) reviewed the literature reporting the use of Andersen's Model in studies assessing cancer diagnosis. The authors found that the vast majority of studies did not use a theoretical model informing data collection or reporting. Systematic focus on reducing diagnostic delays may result in improved prognosis, increase the proportion of early stage cancers identified, improve prognosis and reduce psychological distress (Risberg et al., 1996). The Norwegian system of compensation to patients claims that 160 patients died in Norway during the past five years as a direct result of delayed cancer diagnosis (Svendsen, 2012).

4.6.2.3 Continuity of Care

The results of this study suggest that continuity of care is an important factor influencing quality of care. This study provides confirmation of previous theory, as it is widely stated that continuity is important for quality of care (Adler et al., 2010, Stiell et al., 2005, Love et al., 2000, Becker et al., 1974), but the effect is found to be variable (Adler et al., 2010). Evidence provided in this study is directly indicative of quality of care being influenced by continuity, as exemplified by the quote below.

> *"This patient was in the ICU and had complications. Several physicians were involved in the care of this patient. He ended up staying longer in the ICU than what would normally be expected due test not being taken, medicines not being ordered, etc. "(ID# 4)*

Providing quality health care in an environment characterized by ever increasing demands on specialized disciplines makes modern medicine a complex exercise in logistics. Health care systems evolve to account for the complexities, and continuity of care is challenged as a result (Adler et al., 2010). Definitions of continuity of care are numerous, but are exceeded by the number of techniques used to measure continuity (Saultz, 2003, Jee and Cabana, 2006, Saultz and Locbner, 2005). Saultz (2003) proposed a hierarchical definition of continuity, ranging from informational to longitudinal to interpersonal. (Freeman et al. (2003), Haggerty et al. (2003)) described continuity of care from the patient perspective. However, attempts at providing a uniform definition and technique for measurement of continuity of care has yet to be accomplished (Haggerty et al., 2003, Saultz, 2003, Starfield, 1980, Wall, 1981, Adler et al., 2010). Thus, as global definition is lacking and numerous techniques are used to measure continuity, it is not surprising that the effect has been found to be variable.

The findings in this study suggest that continuity of care is an important contributor to quality of health care delivery. The difference between the findings in this study and evidence reported in the literature is the link between continuity of care and communication. Communication has been widely stated to be an important factor influencing the quality of care delivered(Altiner et al., 2007, Makoul, 2001, Makoul et al., 1995, Zacharie et al., 2003, Street et al., 2007, Stiell et al., 2005, Stewart, 1995, Azoulay et al., 2000, Mack et al., 2005, Kenny et al., 2010, Kaplan et al., 1989, Jensen et al., 2011), thus further supporting and confirming pervious theory.

4.6.2.4 Resources

Resources are necessary to provide modern health care, and their availability may influence the quality of health care delivered. Resource in this context is related to the total means available to solve the tasks and challenges faced by modern health care facilities.

> *"Not having enough BIPAP machines available during flu season is like asking for trouble" (ID# 16)*

This is, in other words, a necessary investment. "The most successful health care organizations must not only deliver high-quality care, but also do so with minimum waste" (Martin et al., 2009 p. 25). However, geographical variations in the delivery of health care have been described in the literature by several authors (Wennberg et al., 2002, Calleri et al., 2008, Sturm et al., 2007, Webster et al., 2009).

Birkmeyer et al. (2002) note that Medicare spending varies across regions and that these variations persist after differences in health status are accounted for. This would suggest that increased spending does not necessarily lead to better health outcomes. Furthermore, the authors note that the main drivers for variable spending are increased use of supply-sensitive physicians' services, specialist consultation, and hospitalization for patients with chronic disease. Calleri et al. (2008) claim that geographical variations in prescribing of malaria chemoprophylaxis in Europe can largely be accounted for by variability in evidence based on efficacy and tolerability. Sturm et al. (2007), on the other hand, conclude that it remains to be established which factors within a given health-care system are responsible for the observed effects. Finally, Webster et al. (2009) find that early opioid prescribing for low back pain is almost fully explained by state-level contextual factors.

Quality of health care comprises three elements: structure, process and outcomes (Donabedian, 1979) (Peabody et al., 2006 p. 1294). Evidence suggests that differences in quality may be based on the process of care (defined as what a physician or others do when seeing a patient). Physician effort, which comprises a major element of the process of care is of particular interest as a policy variables, as it is sensitive to change made in the present (Peabody et al., 2004 p. 1952).

The stated variability in health care spend and delivery without apparent health-outcome effects makes it reasonable to argue that resource availability does not necessarily equate to better quality care. However, "Adequate nurse staffing and organizational/managerial support for nursing are key to improving the quality of patient care…" (Aiken et al., 2002 p. 187).

From a process design perspective, Kano (1996) provides three possible approaches to improving the quality of a service (Martin et al., 2009 p. 33). First, "eliminate the quality problems that arise because the customers' expectations are not met". Second, "reduce cost significantly while maintaining or improving quality". Finally, "expand customers' expectations by providing products and services perceived as unusually high in value".

The process design perspective of Kano (1996) cannot be implemented in health care without due consideration of three critical factors highlighted previously. First, there is a paradoxical relationship between technical and experiential quality (Chandrasekaran et al., 2012). Thus, eliminating quality problems arising from unmet customer expectations may reduce technical quality and have an overall negative effect on total quality. Second, cost reduction in health care is challenging due to the fact that outcomes are non-contractible (Ajzen, 1991). Finally, expanding customer expectations in the context of cost saving and necessary focus on technical quality indicates the challenge of a second paradox.

4.6.2.5 Time

Time is an important factor in medicine, and in this study, time is related to two other key constructs. First, time is related to early diagnosis and treatment. In this context, time is the time it takes from symptoms being recognized until treatment starts. Second, time is related to resources, as it is a function of resources available per unit time. For example, the number of physicians available in the ER at any given time will define the physician resource available to treat patients at that time.

> *"When the ER is overcrowded with patients, I do not have enough time to provide the care I feel is necessary." (ID# 25)*

Time as a variable in relation to the construct "early diagnosis and treatment", has been discussed in Section 6.2.2 and will not be discussed further in this section.

Time as a variable of resource, however, merits further attention. It is widely stated that evidence from the literature on the quality of care in general practice has centred on the availability and use of time at consultations (Butler and Calnan, 1987, Howie et al., 1989, Howie et al., 1991, Wilkin and Metcalf, 1986, Morell et al., 1986, Risdale et al., 1989). From the general practice literature, it is evident that time as a factor influencing quality of care is related to the physician as a resource. Thus, time in this context may be considered the relationship between quantity and quality of care where the physician is the resource. Physicians are concerned that health care payments systems encourage quantity rather than quality. From the patient perspective, it is clear that patients are in general more satisfied with longer consultations (Howie et al., 1991).

The physician is the decision maker on behalf of patients, payers, providers and producers. This makes the physician a central resource in modern health care. Available time is therefore directly related to the availability of physician resources to complete different tasks associated with health care. The evidence from this study confirms prior research on the topic.

4.6.2.6 Effect of Therapy

The findings in this study suggest that effect of therapy is considered by physicians to influence quality of health care. Physicians associate effective therapy with quality of care. The main premise is that there is a correlation between the availability of effective therapy and quality of care.

"...effect of medication which can be measured." (ID# 7)

Thus, it may be argued that effective therapy is necessary for positive outcomes related to the presenting problem. Furthermore, the effect of available therapy is not the only factor influencing outcomes. Complications of therapy are also of major concern. In 1999, the Institute of Medicines published a report documenting that 1 million people per year are injured and 100 thousand die as a result of preventable medical errors in hospitals in the USA (Kohn et al., 1999).

Several authors have investigated the origin of these concerns and found that efficacy and safety are the main constituents, thus addressing the benefit-risk profile of medicines. Uncertainty is stated as the main driver of physician behaviour (Arrow, 1963), and it is therefore unreasonable to expect the benefit-risk profile of a medicine not to influence physician prescribing behaviour. Indeed, safety and effectiveness were considered highly influential by all participants in a study describing and comparing the opinion of physicians, clinical pharmacists, and formulary committee members with respect to key factors that influence medication prescribing in community hospitals (Schumock et al., 2004). Physicians, however, may not be risk averse. Pinto et al. (2010) analysed the main reasons physicians give for their prescription choices. It was found that the effectiveness of the product, tolerability, which is directly related to the abandonment rate of a given course of treatment, was considered less important by doctors in this study. The authors argue that this proves that members of the medical profession are willing to take certain risks by using more effective medicines, even if they cause more reactions that are adverse. In another study, Choudhry et al. (2006) found that adverse events that are possibly associated with underuse of warfarin may not influence subsequent prescribing. When analysing trends in rosuvastatin prescribing, Ohlsson et al. (2009) realized that the medicine was the subject of safety concerns and subsequent regulatory warnings during the observation period of the study. The authors note that these warnings may have influenced the patterns of prescription. This conclusion was drawn on the basis of an overall reduction in the prevalence of rosuvastatin prescriptions in the latter third of the study. However, the clustering of rosuvastatin prescriptions was not substantially affected by the warnings.

When Prosser and Walley (2006) investigated the range of factors influencing the prescription of new medicines, the key factors behind the first prescription of a new medicine were found to be an absence of current available treatment or expectation of better outcomes based on a medicine's alleged relative advantage over current treatment. This was largely attributed to increased effectiveness and fewer side effects (Prosser and Walley, 2006). In another study, Schneeweiss et al. (2005) quantified the relative contributions of patient versus physician factors to the decision to prescribe selective COX-2 inhibitors during the first 2 years of their availability. The authors found that twice as much variability in COX-2 prescribing could be explained by physician preferences than by the five gastrointestinal toxicity risk factors alone, indicating that safety may not be an overriding concern. One explanation may be that if a medicine has a novel mechanism of action, or belongs to a class of medicines with few alternatives, clinicians are more likely to consider it favourably as a prescribing option

(Chauhan and Mason, 2008). In support of this notion, Tett (2003) found that a strong majority of participants in the study agreed that they would prescribe a new medicine based on its comparative efficacy to others (76.1%). However, even though physicians are not risk averse, safety concerns may influence prescribing. In a study aimed at investigating which factors influence physician prescribing behaviour regarding stress ulcer prophylaxis, concerns about side effects (OR = 0.24, 95% CI 0.09, 0.61) were associated with a decrease in prescribing (Hussain et al., 2010). Even though adverse drug reactions may not appear very often, they do have a profound effect on a physician's prescribing patterns (Banjo et al., 2010, Theodorou et al., 2009).

Calvo and Rubinstein (2002) evaluated the impact of the publication in a leading journal of different drug studies (metformin, alendronate, terazosin, and finasteride) on the prescription behaviour of generalists and specialists. In the study, three studies showed efficacy and one study showed lack of efficacy. The proportions of new prescriptions changed between a 6-month period before publication and a 6-month period after publication. Others have also found that efficacy influences physician prescribing behaviour; for example, efficacy and utility of the drug was found to be a distinctive factor influencing prescribing of statins (Tusek-Bunc et al., 2010). Furthermore, Theodorou et al. (2009) found that clinical effectiveness is the most important factor, reaching 94.9% and 93.3% in Greece and Cyprus, respectively, and that there was no statistically significant difference between the two countries.

In a seminal study addressing the issue of attributes of medicine as a factor influencing physician prescribing behaviour, Venkataraman and Stremersch (2007) investigated the effect of promotional effect across brands. The database used for the study included, at the monthly level, all prescriptions within the examined medicine categories by a panel of 2774 physicians. This resulted in just under 40 000 observations for the 12 brands included in the study. Detailing was found to have a more positive effect on prescriptions for more effective medicines as compared to less effective medicines, and for medicines with more side effects as compared to medicines with fewer side effects. In other words, it was found that that the effects of marketing efforts and patient requests on physician prescription behaviour do indeed vary by brand. Furthermore, medicine attributes, such as effectiveness and safety, moderate the response by physicians to promotional efforts on physician prescribing behaviour.

Kurdyak et al. (2007) studied whether five regulatory agency advisories concerning the possible increased risk of suicidal behaviour during antidepressant therapy had an effect on antidepressant prescription trends in Ontario. The authors claim that safety advisories did not influence physician prescribing in North America, but similar advisories led to a decrease in prescribing in the UK in 2003. Thus, there may be geographical variations in the effect of safety advisories provided by regulatory agencies. In another study, Saad et al. (2010) investigated the warnings from the Food and Drug Administration (FDA) on the use of antipsychotics in the management of dementia. The authors found that information about medicine attributes may be effective and that the main barrier to change is the lack of treatment alternatives.

However, medicine attributes may not be the only moderator. Weatherby et al. (2002) retrospectively investigated the effect of FDA warning letters in order to determine how such letters may be improved. The authors conclude that explicit wording can aid in changing physician prescribing behaviour.

On the basis of biopharmaceuticals being one of the fasted growing segments of the pharmaceutical industry, Nonis and Hudson (2009) investigated the effect of physicians' beliefs about genetic engineering on physician prescribing. There appears to be a lack of trust in the technology, driven by a fear of unknown consequences. On this basis, the authors claim that genetic modification as an attribute influences physician prescribing behaviour by decreasing the likelihood in the decision making process leading to a prescription.

From the results of this study and evidence from literature, there appears to be a consensus on physicians placing great value on clinical efficacy and seeming willing to take risks under certain conditions. Thus, the benefit-risk profile of medical therapy is not a static factor, but a dynamic one moderating physician choice behaviour. The findings of this study are therefore confirming previous theory.

4.6.3 What has been Added

The moment of truth in health care is complex for five main reasons. First, physicians are the decision makers on behalf of patients, payers, providers and producers. Second, decisions are made in the context of information asymmetry and uncertainty; and no unified theory of medical decision exists. Thus, deciding how to decide is important. Third, quality is non-contractible and physician effort is unobservable. Models abstracting the complexity of medical decisions into a single measurable item give the impression that treatment decisions are more easily monitored and controlled than they really are (McGuire, 2001 p. 527). Physicians are experience goods; patients must experience the physician and make an inference about quality. Fourth, physicians may set levels of quality to influence demand, and may do so motivated by self-interest. Finally, a unified definition of quality of health care does not exist, and there are more techniques to measure it than definitions. This study adds the physician perspective of this complex and cloaked moment, employing personal construct theory. In this study, physician perspectives include the following key constructs: communication, continuity, cooperation, interpretation, early diagnosis and treatment, effect of therapy, experience, full responsibility, resource availability, resource utilization and time. Furthermore, a theoretical link to the Theory of Planned Behaviour and, specifically, control belief and consequent perceived behavioural control is found to be strong. This may indicate a conflict between process management on one hand and physician effort to produce quality health care services on the other. Finally, the results from this study are homogenous in that theoretical saturation was achieved early, indicating that there is a high degree of agreement within the physician community as to the construct of quality. The most probable explanation for this last finding is that the "institution" of medicine is strong, indicating socialization and common perceptions of quality.

4.6.4 What has been Challenged

Chandrasekaran et al. (2012) investigated the effect of Centres for Medicare and Medicaid Services (CMS) process management on quality. CMS developed a set of core measures for common and serious health conditions. The authors found a positive effect on technical quality and a negative effect on experiential quality. CMS process management aims to reduce variation, and thus experiential quality suffers as the variability necessary for meeting patient expectations is reduced (Pettersen et al., 2004).

It has been widely recognized that access to medical interventions necessitates physician initiative and concurrence (McGuire, 2001). Furthermore, it is widely recognized that because medical decisions have an impact on patient health, they should be of high quality (Klein, 2005). Thus, the physician supplies into the production of health care for the patient (McGuire, 2001). The effort supplied by physicians may also be understood as quality and is not contractible (Ma and McGuire, 1997). Therefore, focusing on CMS process management implies that the very effort of producing quality is ignored. Herein lays the challenge provided by this study; i.e. the process element of quality is dependent on physician effort, and ignoring this fact is counterproductive.

In this context, the study makes three important points. First, this study provides evidence on how physicians construct quality of health care delivery, and therefore represents a window into the hitherto unobservable effort (quality) input by physicians. Second, the theoretical link to the Theory of Planned Behaviour and, specifically, control belief and consequent perceived behavioural control is strong. This may indicate a conflict between process management on one hand and physician effort to produce quality health care services on the other. Finally, the results from this study are homogenous in that theoretical saturation was achieved early, indicating that there is a high degree of agreement within the physician community as to the construct of quality. The most probable explanation for this last finding is that the “institution” of medicine is strong, indicating socialization and common perceptions of quality.

Thus, the findings of this study challenge the simplicity by which surrogates of quality are being used to measure quality. The complexity of clinical medicine, in a context where the physician is the decision maker on behalf of the stakeholders, and the effort is non-retradable and often unobservable, cannot be measured using simple econometric models and process management.

4.6.5 Paradoxical Findings

4.6.5.1 Experience

In this study, experience is found to have a positive influence on quality of health care delivery. However, in a literature review on the topic, it has been found that “physicians who have been in practice longer may be at risk of providing lower-quality care” (Choudhry et al., 2005 p. 260). Thus, the findings in this study and that in the literature may be contradictory.

"I was experienced in evaluating patients breathing patterns and could immediately see that the patient had an obstructed airway. A foreign body was promptly removed and the patient could be discharged." (ID# 23)

There may be several explanations for this finding. First, the physicians' "toolkits" are created during training and may not be updated regularly (Carthy et al., 2000). Second, older physicians seem less likely to adopt newly proven therapies and may be less receptive to new standards of care (Choudhry et al., 2005). In addition, practice innovations that involve theoretical shifts, such as the use of less invasive medical interventions (i.e. laparoscopic versus open surgical techniques), may take longer to adopt due to habit persistence (Coleman et al., 1957, Coleman et al., 1959, Menzel and Katz, 1955, Kwong and Norton, 2007). However, when it comes to treating a particular disease, experience is an important indicator of quality. Studies show that physicians/hospitals that treat a high number of patients for a particular disease and perform large numbers of procedures/surgeries to treat it have better results (Birkmeyer et al., 2002).

Thus, consensus on the effect of experience on quality in the literature is therefore lacking. The literature points in two directions when it comes to experience. First, a body of evidence investigates experience at the physician level measured by time in practice and finds a paradoxical effect. Second, a body of evidence has examined experience in relation to specific disease and procedures and found that higher numbers of patients treated reduces mortality. This may indicate that years in practice as a measure of experience is an inaccurate measure.

4.6.5.2 Resources

In this study, resources and resource utilization are found to be key constructs, as the respondents rate these factors as high. However, there is little evidence in the literature suggesting that increased resource utilization improve outcomes (Wennberg et al., 2002, Fisher et al., 2003, Fisher et al., 2003, Sirovich et al., 2006).

Fisher et al. (2003) investigated whether regions with higher Medicare spending provide better care. The authors found that regional differences in Medicare spending are largely explained by the more inpatient-based and specialist oriented pattern of practice observed in high-spending regions, and that neither quality of care nor access to care appear to be better for Medicare enrolees in higher-spending regions (Fisher et al., 2003 p. 273). Furthermore, "Medicare enrolees in higher-spending regions receive more care than those in lower-spending regions, but do not have better health outcomes or satisfaction with care" (Fisher et al., 2003 p. 288).

Physicians may influence quantity of care provided to patients by quantity setting of a non-retradable service, influencing demand by setting the level of a non-contractible input ("quality"), and influence patient preferences. In this context, it is the quantity setting of non-retradable services and setting the level of quality that merits focus.

Physicians may influence quantity of care by setting the level of non-retradable services. This may explain why health care expenditure does not necessarily equate to better outcomes. The physician may in this instance perform more procedures than is warranted; for example, guideline adherence by physicians is in general low, suggesting that physicians may practice in a context of information asymmetry. “Economic models, abstracting the complexity of medical decisions into a single dimension of "quantity," give the impression that treatment decisions are more easily monitored and controlled than they really are.” (McGuire, 2001 p. 527). Thus, a moral hazard situation is likely to occur due to the fact that the physician is insulated from the economic realities of the diagnostic and therapeutic decisions being made.

The physician may also influence quantity by setting the level of quality. If resource levels are high, the physician may be tempted to set the quality accordingly, and increase resource utilization as a consequence. However, if resource levels are low, the opposite may occur. Physicians have been shown not to be risk averse and will, in certain circumstances, accept increased risk. Payers may even gamble on the fact that physician ethics will drive the physician to make more effort to provide appropriate care. However, the findings in this study would indicate that there is a limit at which quality will be reduced, even though physician effort may be a mitigating factor.

4.6.6 Theoretical Perspectives

In this section, the findings of the study are discussed in relation to the theoretical domains reviewed in Section 4.2. The key constructs and their theoretical foundations are summarised in Table 4-5 Key constructs by quality elements and relation to theory. The section covers Agency Theory, Decision Theory and the Theory of Planned Behaviour, before offering a summary and a conceptual framework.

In this study, the key constructs may be categorized into three separate groups, according to quality elements as defined by (Peabody et al., 2006 p. 1294): structure, process and outcome. First, constructs representing structure, referring to stable, material characteristics and the resources of the organizations that provide care and the financing of care. Constructs in this category include resources (resource availability, resource utilization and time), experience and effect of therapy. Second, constructs representing process, referring to the interaction between physicians and patients during which structural inputs from the health care system are transformed into health outcomes. These constructs include communication, correct interpretation of information, continuity and responsibility of care provision, and cooperation. Finally, constructs representing outcomes, which may be measured in terms of health status, deaths, or disability-adjusted life year. Only one construct, early diagnosis and treatment, is found in this category.

4.6.6.1 Agency Theory

Five key constructs from this study are related to Agency Theory; see Table 6: Key constructs by quality elements and relation to theory for details. First, communication is related to risk through mechanism of monitoring and

negotiation. Second, cooperation is related to moral hazard and adverse selection. Third, early diagnosis and treatment is related to risk through random market effect. Fourth, experience is related to adverse selection. Finally, time is related to moral hazard and adverse selection.

Communication is found to be an important element in how physicians construct quality of health care delivery. The main tenet of Agency Theory holds that asymmetry of information and uncertainties are the main influencers of agent behaviour. Asymmetry of information and uncertainty may in certain circumstances make it impossible for the principal to know what the physician knew or even did, and hence difficult to measure. Mooney and Ryan (1993) made the same point by stressing how health markets deviate from a standard principal-agent model because of the inability to contract on outcome. Thus, health outcomes may be considered non-contractible. In the standard agent-principal model where an outcome is observable and hence contractible, risk may be transferred to the agent (McGuire, 2001). Risk in the context of the findings of this study is related to communication. In order to manage risk, the principal will engage in monitoring of output. However, monitoring has been shown to affect communication in principal-agent dyads (Conlon and Parks, 1990 p. 607).

Uncertainty is stated as the main driver of physician behaviour (Arrow, 1963), and it is therefore unreasonable to expect the benefit-risk of clinical medical practice not to influence physician choice behaviour. Indeed, safety and effectiveness were considered highly influential of quality health care delivery in this study. If the physician (agent) is risk averse, this would require the principal to compensate the agent for accepting the risk. However, this would not apply to the patient, as the patient would carry the full biological risk of any outcome. Physicians, however, may not be risk averse. Pinto et al. (2010) argue that members of the medical profession are willing to take certain risks by using more effective medicines, even if they cause more reactions that are adverse. Thus, a situation characterised by adverse selection may arise.

Outcomes are not contractible, so the standard agent-principal model may not apply in health care where an agent serves multiple principals (Gaynor, 1994). However, time has been shown to be contractible in principal-agent dyads (Conlon and Parks, 1990 p. 619), but a principal may be unable to accurately indicate an agent's contributions because of the random market effect (Conlon and Parks, 1990 p. 610). According to Gaynor (1994), physicians may be considered “experience goods”. A patient literally has to experience a physician, and then make an inference about the quality, including any issues about a match with the patient's preferences (McGuire, 2001). The inference and consequent learning is not perfect and may in addition be slow. The reward for higher quality is therefore likely to be inadequate (Ma and McGuire, 1997, McGuire, 2001). The presence of an active payer (principal) has been suggested to challenge physician loyalties to patients (Ma and McGuire, 1997). Medical ethics has therefore been suggested to play a role in medical care (Mechanic and Schlesinger, 1996). If medical ethics operate in the way that the physician always chooses the medically correct way to proceed, financial incentives would be ineffective (McGuire, 2001). Hillman et al. (1989) p. 87, state “whereas most

physicians will act in the patients' best interests when the medical decision is clear-cut, the effect of financial incentives may be more important in areas where the correct decision is not clear." This notion was investigated by Ma and McGuire (1997), and the authors concluded that “a payer can take advantage of a physician's ethical constraint by setting up a payment system that puts the physician in the position of being forced to take more effort to make sure the patient attains an acceptable outcome” (McGuire, 2001 p. 521). This could potentially be the case when resources are scarce and management gamble on the physician ethics to deliver necessary effort by physicians to provide acceptable quality of care.

Cooperation is found to be an important element in how physicians construct quality of health care delivery. Delivery of health care in the context of modern medicine may be considered a cooperative effort. According to Eisenhardt (1989) p. 72, “Agency Theory provides a unique, realistic, and empirically testable perspective on problems of cooperative effort”. Thus, the principal-agent dyad may be considered a cooperative effort. The main tenet of Agency Theory holds that there is a conflict of interest between the principal and the agent. On one hand, asymmetry of information may drive a condition of moral hazard, and on the other, risk may cause adverse selection to occur. Even though the findings of this study support patient-physician cooperation, the main focus is on the quality of the cooperative effort among physicians and other health care workers. In this context, economic interest would drive a possible conflict of interest. However, this is not felt to be the case in this study, as evidence supporting the notion is lacking.

4.6.6.2 Decision Theory

Three key constructs from this study are related to Decision Theory; see Table 4-5 for details. First, correct interpretation of information is related to causal and diagnostic interpretation of information. Second, experience is related to habit persistence and learning. Finally, effect of therapy is related to learning.

Correct interpretation is found to be an important element in how physicians construct quality of health care delivery. Focus of attention to what the physician prefers results in differential weighting of information features. For naturally occurring phenomena, it is not clear whether people do consider base rates (Goldsmith, 1980). Base rate is critical in medicine and is often used to make comparisons. For example, this winter in a certain hospital, 220 people have tested positive for swine flu; the number in itself may seem high, but the population base is 470 000, so the base rate of positive swine flu tests this winter is 220/470 000. Information that receives a causal interpretation is weighted more heavily in judgment than information that is diagnostic (Einhorn and Hogarth, 1981 p. 65). Thus, correct interpretation of information may be dependent on the physicians’ preference of information features.

Experience is found to be an important element in how physicians construct quality of health care delivery. Physician-level habit persistence has been widely stated (Janakiraman et al., 2008, Venkataraman and Stremersch, 2007, Jones et al., 2001, Lilja, 1976, Coscelli, 2000). The Theory of Planned Behaviour predicts

behaviour by proxy of behavioural intent, which is modulated by cognitive processes focused on the balance between attitude, social norm and control beliefs (Ajzen, 1991). Habit persistence, on the other hand, is the residue of past behaviours and experiences, and by definition, does not involve conscious processing. From a decision theoretical perspective, it can be argued that habit reduces the effort associated with decision making in complex clinical settings (Payne et al., 1993). Furthermore, it is widely stated that physicians make extensive use of heuristics when making clinical decisions, including those pertaining to the prescription of medicines (Bornstein and Emler, 2001). Thus, habit persistence may simply be driven by the economy of decision-making; in other words, it is necessary for the physician to form habits to reduce the burden of decision making related to the act of prescribing. When combining the two theoretical perspectives, Theory of Planned Behaviour and decision under uncertainty, it can be further argued that the mechanism by which habit persistence modulates physician choice behaviour is related to attitude formation. This can be explained by the fact that that the physicians' beliefs about consequence play a central role when evaluating benefit-risk of any treatment prescribed in a clinical setting. For example, Janakiraman et al. (2008) claim that only non-persistent physicians are sensitive to detailing.

Learning can account for most attitudes (Doob, 1947), and unlike personality, attitude is expected to change with experience (Tesser and Shaffer, 1990). Dissonance-reduction theory holds that components of an attitude may be adjusted to match the other in order to reduce dissonance (Festinger, 1957). The purpose of perception is to guide action (Confer et al., 2010, Gaulin and McBurney, 2004 pp. 81-101). Furthermore, Bandura (1989) p. 1178, states that "Any factor that influences choice behaviour can profoundly affect the direction of personal development because the social influences operating in the environments that are selected continue to promote certain competencies, values, and interests long after the decisional determinant has rendered its inaugurating effect. Thus, seemingly inconsequential determinants can initiate selective associations that produce major and enduring personal changes". Thus, experiences early in a physician's career may be determinant of later choice behaviour.

Both experience and treatment effects are found to be important elements in how physicians construct quality of health care delivery, and are linked to learning in a Decision Theory context. Learning from experience holds that the role of awareness of the task factors that can influence outcomes influence learning through positive outcome feed-back (Einhorn and Hogarth, 1981 p. 79). Thus, experience facilitates learning, but the self-fulfilling treatment effects of taking action per se can combine to produce reinforcement through positive outcome feedback. Thus, one can receive positive feedback in spite of, rather than because of, one's judgmental ability (Einhorn and Hogarth, 1981 p. 79). It is therefore possible for a physician to learn inappropriate decision rules (heuristics). In fact, physicians do make mistakes, and Klein (2005) has identified heuristic pitfalls and made suggestions on how to avoid them.

4.6.6.3 Theory of Planned Behaviour

Ten key constructs from this study are related to Decision Theory; see Table 4-5 Key constructs by quality elements and relation to theory, for details.

The Theory of Planned Behaviour at its simplest, predicts behaviour on the basis of intent (Ajzen, 1991). The theory holds that attitude toward behaviour, subjective norms, and perceived behaviour frame behavioural intention. In this study, the key constructs may be categorized into three separate groups, according to quality elements as defined by (Peabody et al., 2006 p. 1294): structure, process and outcome. First, constructs representing structure, referring to stable, material characteristics and the resources of the organizations that provide care and the financing of care. Constructs in this category include resources (resource availability, resource utilization and time), experience and effect of therapy. Second, constructs representing process, referring to the interaction between physicians and patients during which structural inputs from the health care system are transformed into health outcomes. These constructs include communication, correct interpretation of information, continuity and responsibility of care provision, and cooperation. Finally, constructs representing outcomes, which may be measured in terms of health status, deaths, or disability-adjusted life year. Only one construct, early diagnosis and treatment, is found in this category. In Table 4-5, key constructs are summarised per category, indicating the theoretical construct associated with theory and suggested literature reference.

Table 4-5 Key constructs by quality elements and relation to theory

Quality element	Construct	Theory	Theoretical construct	Reference example
Process	Communication	TPB	Attitude	Ajzen 1991, p. 198
		Agency	Risk: monitoring and negotiation	Conlon & Parks 1990, p. 607
	Correct interpretation of information	TPB	Control belief	Ajzen 1991, p. 204
		Decision	Causal vs diagnostic interpretation	Einhorn & Hogarth 1981, p. 65
	Continuity	TPB	Control belief	Ajzen 1991, p. 199
	Responsibility for provision of care	TPB	Control belief & Social norm	Ajzen 1991, p. 199
Structure	Resource availability	TPB	Control belief	Ajzen 1991, p. 188
	Resource utilization	TPB	Control belief	Ajzen 1991, p. 188
	Time	TPB	Control belief	Ajzen 1991, p. 188
		Agency	Moral hazard & adverse selection	Conlon & Parks 1990, p. 619; Eisenhart 1989, p. 70
	Cooperation	TPB	Control belief	Ajzen 1991, p. 188
		Agency	Moral hazard & adverse selection	Eisenhart 1989, p. 72
	Experience	TPB	Control belief	Ajzen 1991, p. 203
		Agency	Adverse selection	Eisenhart 1989, p. 61
		Decision	Habit persistence	Ajzen 1989, p. 203
Outcome	Early diagnosis and treatment	TPB	Control belief	Ajzen 1991, p. 204
		Agency	Risk: random market effect	Conlon & Parks 1990, p. 610
	Effect of therapy	TPB	Control belief	Ajzen 1991, p. 204
		Decision	Reinforcement: positive outcome feedback	Einhorn & Hogarth 1981, p. 79

The constructs providing information about process are felt to be the most important, as this is where the interaction between patient and health care service providers takes place (moment of truth). Four key constructs are included in this category; communication, continuity of care, responsibility and correct interpretation of information.

First, communication is related to attitude. Evidence from research suggests that persuasive messages that attacks beliefs about an object may produce changes in attitudes toward the object (Petty et al., 1983). According to Ajzen (1991) p. 198, “it is highly likely that persuasive communications directed at particular normative or control beliefs will influence subjective norms and perceived behavioural control”. Communication may therefore influence attitude, subjective norm and perceived behavioural control. However, of special interest is the construct related to transfer; this highlights the fact that communication is not just verbal. Other factors of communication may also influence attitude, as exemplified by the quote below.

> "*Everyone knows this patient. She has been in and out of institutions her whole life. When I became responsible for her care I thought I could make a difference. It is very difficult to deal with the patient that eats needles and razor blades when you have spent so much time and effort trying to help. I felt so angry and disappointed" (ID# 1)*

Second, continuity of care is related to how many physicians or other health care workers are involved in the care. However, continuity is also strongly linked to responsibility and may even partly be driven by responsibility. The moral obligation to perform or not to perform certain behaviours is expected to influence behavioural intent (Ajzen, 1991 p. 199). When many physicians are involved in the provision of care, information may be lost during numerous exchanges. Furthermore, feeling of responsibility may also be affected.

Lack of continuity is connected to another key construct, early diagnosis and therapy. These constructs are interlinked as the time from symptom to diagnosis, and hence therapy may be influenced by lack of continuity of care.

Third, full responsibility of care denotes the fact that one physician is in charge of the care of the patient. This is often not the case, as a patient may see many physicians during one hospital visit.

There are a number of reasons why a patient will encounter many physicians during a stay in the hospital. First, modern medicine is complex and multidisciplinary, involving many sub-specialties. For example, upon entry to the emergency room (ER), a patient with pneumonia will first meet the attending ER physician. Depending on the condition, x-rays may well be required, and the patient will then be in contact with the radiologist. After the diagnostic work-up is complete, the patient will most likely be sent to a ward for treatment and followed up by physicians in training during the remainder of the stay. However, the senior physician in charge of the ward will also likely be in contact with the patient. Upon discharge, the patient may be required to come back for a control, thus seeing the physician attending to policlinic patients that day.

Finally, correct interpretation of information is central to the process of diagnosing and deciding on the appropriate therapy. Processing of available information mediates the effects of clinical contexts on behaviour. Past experience with behaviour is the most important source of information about behavioural control (Bandura, 1986). It thus stands to reason that perceived behavioural control can play an important role in mediating the effect of past on later behaviour.

Evidence suggests that early experience of using a new medicine seems to strongly influence future prescribing (Jones et al., 2001, Jones et al., 2001). Bandura (1989) p. 1178, states that "Any factor that influences choice behaviour can profoundly affect the direction of personal development because the social influences operating in the environments that are selected continue to promote certain competencies, values, and interests long after the decisional determinant has rendered its inaugurating effect. Thus, seemingly inconsequential determinants can initiate selective associations that produce major and enduring personal changes". As such, experiences early in a physician's career may be determinant of later choice behaviour.

> *"The patient came to the ER complaining of a tight chest. It was early in my career as a physician and I was inexperienced. I figured it must be a myocardial infarction and did not involve the consultant. I gave the prescribed treatment for myocardial infarction, but the patient got worse. Finally, I called the consultant and pneumonia was diagnosed and treated." (ID# 20)*

From a TPB perspective, it is therefore clear that most of the key constructs framing physicians' perceptions of quality of health care delivery are related to control beliefs. Ajzen (1991) p. 184, makes a distinction between actual and perceived behavioural control. Actual behavioural control relates to the availability of resources and the opportunity to perform the desired behaviour; thus, actual behavioural control is observable. Perceived behavioural control, on the other hand, relates to perception and its impact on intention and action; and is unobservable. If the accuracy of perceived behavioural control is high, then it may substitute for actual behavioural control. Information asymmetry and uncertainty may influence the accuracy of behavioural prediction (Ajzen, 1991 p. 185). However, if the perception is realistic, it may be used to predict the probability of behaviour (Ajzen, 1985). In a meta-analytic review of efficacy of the Theory of Planned Behaviour, Armitage and Conner (2001) p. 471, conclude that "the perceived behavioural control (PBC) construct accounted for significant amounts of variance in intention and behaviour, independent of theory of reasoned action variables." Furthermore, Eccles et al. (2006) p. 9, concluded that intention is a valid proxy measure for behaviour among clinicians.

4.6.6.4 Theory Summarized

From a theoretical perspective, the findings of this study are mainly related to behavioural control in a context of risk modulated by information asymmetry. Thus, the probability of predicting behavioural action and consequent outcome is dependent on unobservable factors. Influencing quality of health care will

therefore depend on the ability to manage factors influencing perceived behavioural control of physicians, information asymmetry and uncertainty. Furthermore, it is possible that physician behaviour may be categorized as habitual, as it is typically performed in a stable context (Godin et al., 2008). This notion stems from the observations made by Verplanken and Wood (2006), who demonstrated that habitual behaviour performed in a stable context is more difficult to change. In conclusion, physician effort is largely unobservable and takes place in a stable context; thus, improving quality of health care delivery by influencing physician behaviour may be difficult. It is therefore important that any intervention be designed so that the constructs of quality perceived by physicians are taken into due consideration.

In conclusion, it is evident that the constructs of health care delivery quality are strongly influenced by perceived behavioural control. Thus, the Theory of Planned Behaviour has the strongest predictive power of how quality is constructed when viewed through the physician lens.

4.6.7 Proposed Conceptual Framework

In this section, a conceptual framework for quality in health care delivery is proposed, based on how physicians construct quality of health care delivery. The framework takes into account the findings from this study, elements of quality and the three theoretical domains identified in Project One, see Figure 4-5 Conceptual framework.

Structure is comprised of resource availability, resource utilization, time, cooperation and experience. All five constructs are grounded in the Theory of Planned Behaviour and related to control beliefs and perceived behavioural control. Three of the constructs are also grounded in Agency Theory; experience, cooperation and time. Information asymmetry and risk are defining constructs of influence in the Agency Theory context. Finally, experience is grounded in Decision Theory and related to habit persistence.

Process is comprised of communication, correct interpretation of information, continuity of care and responsibility of care. All constructs are grounded in Theory of Planned Behaviour and related to control beliefs and perceived behavioural control. Communication is also grounded in Agency Theory and related to risk through monitoring and negotiation. Correct interpretation is grounded in Decision Theory and linked to causal and diagnostic interpretation of information.

Outcome is comprised of early diagnosis and treatment, and effect of therapy. Early diagnosis and treatment are grounded in Theory of Planned Behaviour and Agency Theory. The link to theory is through control beliefs and perceived behavioural control, and information asymmetry and risk, respectively. Effect of therapy is grounded in Theory of Planned Behaviour and Decision Theory. From a Theory of Planned Behaviour perspective, effect of therapy is associated with control beliefs and perceived behavioural control. From an agency perspective, effect of therapy is linked with reinforcement through positive outcome feedback.

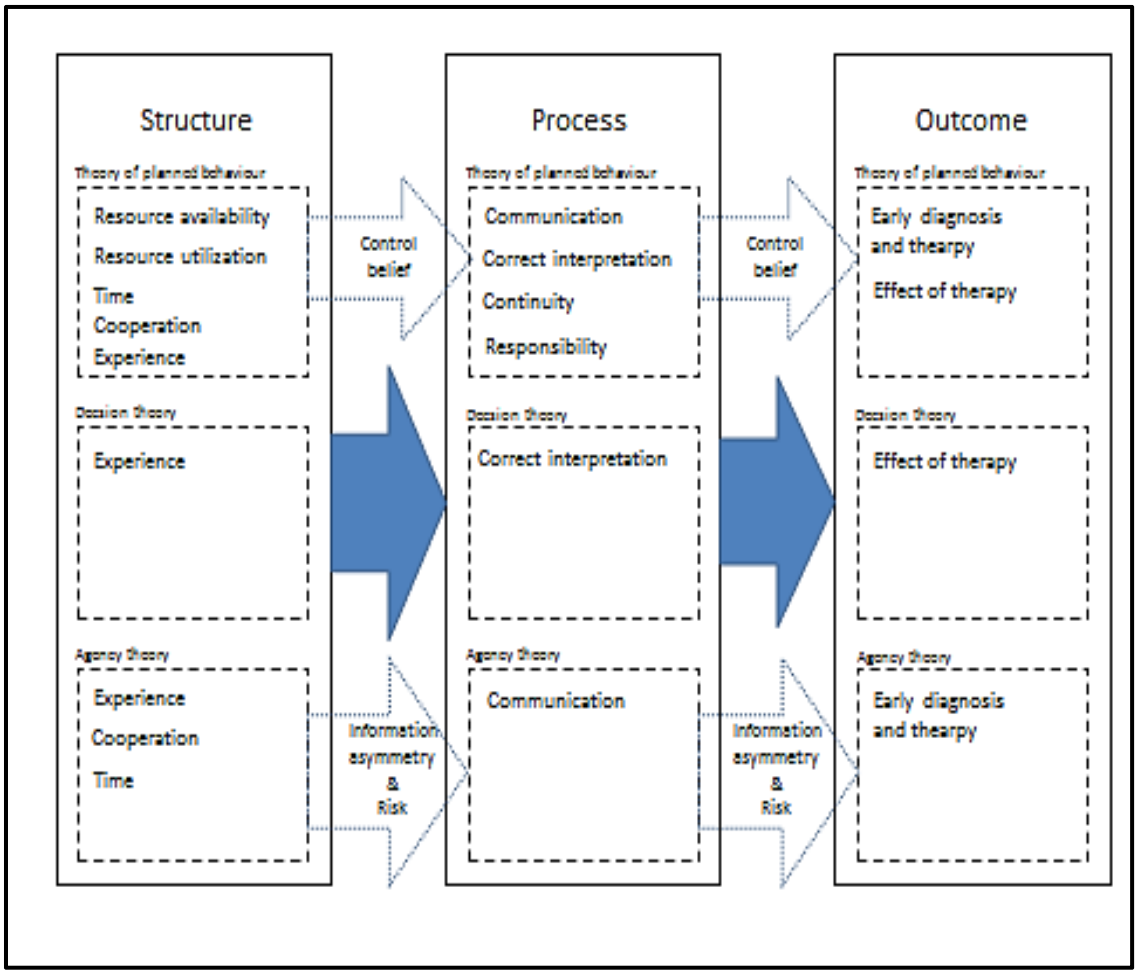

Figure 4-5 Conceptual framework

4.7 Summary & Conclusions

In this section the key findings, contributions, limitations and personal reflections are summarised.

4.7.1 Key Findings

The moment of truth in medicines is complex for five main reasons. First, physicians are the decision makers on behalf of patients, payers, providers and producers. Second, decisions are made in the context of information asymmetry and uncertainty; and no unified theory of medical decision exists. Thus, deciding how to decide is important. Third, quality is non-contractible and physician effort is unobservable. Models abstracting the complexity of medical decisions into a single measurable item give the impression that treatment decisions are more easily monitored and controlled than they really are (McGuire, 2001 p. 527). Physicians are experience goods; patients must experience the physician and make an inference about quality. Fourth, physicians may set levels of quality to influence demand, and may do so motivated by self-interest. Finally, a unified definition of quality of health care does not exist, and there are more techniques to measure it than definitions.

It has been widely recognized that access to medical interventions necessitates physician initiative and concurrence (McGuire, 2001). Furthermore, it is widely recognized that because medical decisions have an impact on patients' health, they should be of high quality (Klein, 2005). Thus, the physician supplies into the production of health care for the patient (McGuire, 2001). The effort supplied by physicians may also be understood as quality and is not contractible (Ma and McGuire, 1997). Therefore, focusing on CMS process management implies that the very effort producing quality is ignored. Herein lays the challenge provided by this study; i.e. the process element of quality is dependent on physician effort, and ignoring this fact is counterproductive.

Thus, the findings of this study challenge the simplicity by which surrogates of quality are being used to measure quality. The complexity of clinical medicine, in a context where the physician is the decision maker on behalf of the stakeholders, and the effort is non-retradable and often unobservable, and cannot be measured using simple econometric models and managed through a unilateral focus on process management.

4.7.2 Contributions

In this section, the contributions made by this study, implications for stakeholders in health care, limitations, suggestions for future research and personal reflections are all highlighted.

4.7.2.1 What has been Added

This study explicates some aspects of quality of health care delivery that go beyond prior related studies. The researcher advances theory in this area by exploring how physicians construct quality of health care delivery in a hospital setting. The model presented integrates the study findings with elements of theory from different academic areas, such as medicine, economics, management and psychology.

More specifically, the study explicates three main aspects of health care quality. First, this study provides evidence on how physicians construct quality of health care delivery, and therefore represents a window into the hitherto unobservable effort (quality) input by physicians. Second, the theoretical link to the Theory of Planned Behaviour and, specifically, control belief and consequent perceived behavioural control is strong. This may indicate a conflict between process management on one hand and physician effort to produce quality health care services on the other. Finally, the results from this study are homogenous in that theoretical saturation was achieved early, indicating that there is a high degree of agreement within the physician community as to the construct of quality. The most probable explanation for this last finding is that the "institution" of medicine is strong, indicating socialization and common perceptions of quality.

4.7.2.2 Implications for Stakeholders in Health Care

In this section, implications for stakeholders in the health care value chain are discussed, who are: payers, providers and producers. Payers refers to policymakers, regulators and payers. Providers refers to hospital management and practitioners (physicians). Producers refers to the pharmaceutical and

technological industry. In addition, institutions are added as there may be implications for medical education and research. Finally, implications for patients are provided.

4.7.2.2.1 Implications for Payers

Payers in this context refers to payers in the health care value chain as defined by Burns et al. (2002). However, in addition to payers and financial intermediaries, policy makers and regulators are considered in this section. The reason for the inclusion of policymakers and regulators is that they influence and regulate the fiscal platform supporting the health care value chain.

The findings of this study may be of interest to payers for three main reasons. First, payers by way of simple monitoring and incentives leave a great deal of authority about diagnosis and treatment with the physician (McGuire, 2001 p. 527). Second, reliance on medical sub-specialization and physician experience may have a paradoxical effect on quality of health care delivered (Choudhry et al., 2005). Finally, there is a lack of evidence supporting the hypothesis that more is better when it comes to cost of health care (Wennberg et al., 2002).

It has been widely recognized that access to medical interventions necessitates physician initiative and concurrence (McGuire, 2001). Furthermore, simple monitoring and incentives leave a great deal of authority about diagnosis and treatment with the physician (McGuire, 2001 p. 527). Thus, the physician is the decision maker on behalf of the patients and stakeholders in the health care value chain. The findings of this study imply that physicians place great emphasis on early diagnosis and treatment as an influencer of quality health care. Payers should therefore pay more attention to the process of clinical medicine and how monitoring and incentives influence the time from symptom to start of therapy.

In a systematic review of the literature, Choudhry et al. (2005) p. 260, found that "physicians who have been in practice for longer may be at risk of providing lower quality of care". In this study, the findings suggest that physician perception is contradicting evidence in the literature. There are several possible explanations for this contradiction, but only three merit further mentions in this context. First, it has been suggested that the physician's "tool-kit" is developed during training and not updated on a regular basis (Choudhry et al., 2005, Carthy et al., 2000). Second, older physicians have a higher threshold for adopting new standards of care (Young et al., 1987). Finally, the adaptation of new technologies may be affected by habit formation (Greer, 1988).

4.7.2.2.2 Implications for Providers

The findings in this study should be of particular interest to physicians in clinical medicine. It is evident that physician perspective and weighted importance of experience is at odds with evidence in the literature. Thus, physicians should be cognisant of the potential paradoxical effect of experience on patient outcome. Experience in clinical decision making may have two main effects: it may inform on a conscious level or on an unconscious level. Unfortunately, one of the strongest influencers of physician choice behaviour is habit persistence. Habit does not involve conscious thought, so decisions based on habit may therefore represent a pitfall in decisions related to diagnosis and treatment (Klein, 2005).

> *"When I was a young physician I wanted to be consulted. Being asked by other colleagues is a nice experience. Now, I am being consulted and it feels good."* (ID# 17)

Physician perspectives on quality health care are a reflection of the "institute" of medicine. Since asymmetry of information and uncertainty are strong influencers of physician choice behaviour, it is reasonable to assume that the perspectives identified in this study represent key areas of potential conflict between hospital management and physicians. It may therefore be advisable to build change and key performance metrics grounded in the physician perspectives, as this will give legitimacy and ease implementation.

The findings of this study suggest that experience is positively correlated with quality of health care delivery. However, a systematic review of evidence linking experience with quality of health care has shown paradoxical effects (Wu et al., 2012, Choudhry et al., 2005) or no effect (Pieske et al., 2010). There are several possible explanations for this divergence, but habit persistence may be the strongest predictor. This should concern managers of health care institutions. Physicians with more experience will in most cases be more senior due to the length of time it takes from entering medical school until a physician is a certified specialist and respected by peers. Thus, the most experienced physicians are more likely to be in positions of influence with respect to the provision of health care.

4.7.2.2.3 Implications for Producers

It can be argued that the two sides of the health care value chain are driven by different logics in the contest for flow of products, money and information.
Payers are focused on welfare, and producers on profit maximisation. In the middle sits the provider, acting out of self-interest. Mechanisms to regulate the flow of information, money and products are therefore central to the future of health care, where prescription medicines will continue to play an important role. The model successfully utilized by the pharmaceutical industry for more than a century is at odds with the future needs of patients, payers and providers. This is highlighted by the recent McKinsey report (Q4 2011) addressing the pharmaceutical industry, where it is evident that change must come swiftly if competitive advantage is to be maintained. Loss of exclusivity of block buster medicines and generic competition combined with a lean pipeline of new and promising products have led the industry down the path of extensive cost cutting (Hunt et al., 2011). However, cost cutting alone will not sustain investor relations in the long term. Thus, a new model must be successfully implemented. The main ingredients are innovative partnerships and technology.

4.7.2.2.4 Implications for Institutions

Communication is central to gathering and sharing information in a clinical setting, and thus central in diagnosing and treating patients. The literature on communication is abundant, and it is widely stated that good quality communication between patient and physician is key to quality of care (Jensen et al., 2011). In a randomized controlled trial, it has been shown that a 20 hour course in clinical communication can improve the quality of care, and that these

changes are measurable three years after the course (Jensen et al., 2011). Focus on clinical communication should therefore be a part of the core curriculum in medical schools. Furthermore, it is evident that short courses can improve quality of care in a clinical setting. As such, continuous focus on communication needs to be on any health care manager's agenda.

Lai (2002), has defined competency as the ability to meet today's and tomorrow's challenges; in other words, to have knowledge, skills, abilities and attitudes suited to accomplish tasks and challenges. Being competent is not a state, but a condition related to a given situation. Therefore, in clinical medicine, it is imperative that competent health care workers are matched to the situational requirement of patients. Since the course of a disease is dynamic, competency requirements may change over time, and this mandates adaptation in the competency mix providing care. Clinical competencies in medicine take a long time to develop; from the time a hopeful student enters medical school till the same person is a fully fledged sub-specialist within a field of medicine, two decades will have passed. Making sure that this investment is not wasted necessitates further investment in tweaking and maintaining the competencies of the individual. However, this needs to be put into a larger strategic context where hospital management plans for the future requirements of the population base being served.

It is argued that although uncertainty can be reduced, it can never be completely eliminated from decision-making. Therefore, most decision-making performed in medicine contains an irreducible intuitive element, and is thus vulnerable to these biases and heuristics. Given that few medical curricula overtly address the process of medical decision-making, both medical students and physicians remain vulnerable to these effects on their own (and their patients') decision-making. Insight via education appears to be the major means through which to avoid distorting decision-making processes.

4.7.3 Limitations

The study was designed to capture how physicians frame quality of health care delivery in a hospital setting. A repertory technique was employed, yielding data from 27 physicians (respondents) based on 162 actual patient cases (elements) provided by the respondents. Theoretical saturation, as measured by employing a modified Lorenz curve, was reached at 17 respondents. Thus, the sample size is deemed to be adequate.

The methodology in this study closely followed that described in the literature. Repertory grid technique has been used in health care settings; however, it has not been used to investigate how physicians construct quality of health care delivery. The focus was on identifying the important constructs across the sample, and this was accomplished by using an additional technique devised by Honey (1979) to retain the meaning of the individual across the sample. However, it has not been possible to differentiate answers based on nominal responder data against the overall importance rating in accordance with Honey (1979).

Three main limitations to repertory grid technique are of interest in this study. First, RGT is a method that is time consuming, which makes it difficult to generate large amounts of data and so produce general knowledge. Second, RGT may be of limited use if the respondents find it difficult to understand the technique or if the constructs elicited are not handled in a sensitive manner (Cassell and Walsh, 2004). Finally, interpretation of the data may be problematic and due to the fact that interviews are subject to researcher bias (Goffin, 2002).

4.7.4 Suggestions for Future Research

This study has identified how physicians frame quality of health care delivery, and may serve as a framework for further studies into the field of quality in health care delivery. The study does not, however, inform on facilitators or barriers to quality of health care delivery. In order to design and implement interventions to improve the quality of health care delivery, it is important to understand the facilitators and barriers. It is therefore proposed that a further study should be undertaken to provide additional evidence on the topic. The following research question is thus posed for Project Three:

> RQ: What are the barriers and facilitators of quality of health care delivery in a hospital setting?

CHAPTER FIVE: PROJECT THREE

Chapter Four set out the research question for this study. The research strategy and method are detailed in Appendix C, and this chapter uses them to explore the gap identified in the second project of the Executive Doctorate Programme. The academic and business context of the project forms the introduction of the chapter. Following this introduction, the detail of the research question for Project Three and the research strategy and methods used during Project Two are discussed. The chapter further describes the pilot study that was conducted, which is followed by the description of how the main study was carried out. The findings and the results of Project Three are then discussed in detail. The chapter concludes by identifying the limitations of the study and offering suggestions for further research

5.1 Introduction and Background

Physicians are primarily dedicated to the process of diagnosing and treating patients; during this process, decisions are being made. Physician decision making during the process of diagnosing and treating patients has direct and indirect influences on patient health. It is therefore important that these decisions are of high quality. Any factors affecting the decision may also influence patient health, so it is of interest to understand what factors influence physician decisions, by what mechanism these factors assert influence and under which contexts.

In order to understand what factors influence physician decision behaviour, a systematic literature review was undertaken. This review (Project One) took prescribing behaviour as a proxy. The review identified two sets of categories of key influencers of physician decisions: interventions and contexts. Interventions refer to proactive techniques, processes or actions introduced to create change in physician decisions. Contexts are the set of circumstances surrounding decision events. Furthermore, the review found that existing evidence was limited in providing an understanding on how the influencers on physician decisions affect the quality of health care delivered.

The effort undertaken to enhance medical decision making is difficult to observe, as it occurs in the physician's mind. Therefore, in order to gain an understanding of how factors affect quality of health care delivery by influencing physician decisions while performing their duties, it is necessary to understand how physicians construct quality. Thus, Project Two was focused on identifying how physicians construct the perception of quality in health care delivery. Repertory grid interviews with 27 physicians were performed. The analysis of data followed established and well-documented practice in the literature and yielded eleven key constructs, identified based on their frequency of mention and variability. These key constructs are communication, continuity of care, cooperation, correct interpretation of information, early diagnosis and treatment, effect of therapy, experience, responsibility for care provision, resource availability, and resource utilisation and time. From this project, it emerged that how physicians construct quality of health care delivery provides a static picture of physicians' quality

conception. Thus, a third DBA project was undertaken to gain a fuller understanding of the dynamics of quality in health care by exploring enablers and barriers from the physician perspective.

The focus of the current project (Project Three) is to gain an in-depth understanding of what facilitates and what prevents physicians from delivering quality health care services. The study is driven by the following research question:

> RQ: What are the enablers and barriers physicians perceive in their role of providing health care?

Each patient-physician encounter is different and forges a set of temporal experiences unique to each physician. In order to explore and identify enablers and barriers for high quality health care service delivery, a semi-structured interview technique was adopted to address the research question.

5.2 Theoretical Positioning

The theoretical positioning has been covered in Project One and Two, and will therefore not be examined in detail in this document. However, the reader is provided with the main tenets of the theoretical domains initially identified in Project One. A reference to definitions of quality is also presented in this section.

5.2.1 Main Tenets of Theory

In the preceding systematic literature review, three theoretical domains of physician decision behaviour were identified; see Figure 5-1 Theoretical Domains. The theoretical domains have been presented in-depth in Project Two; please see Section 4.2 Theoretical positioning on page 169 for further details. A brief description of the main tenets follows.

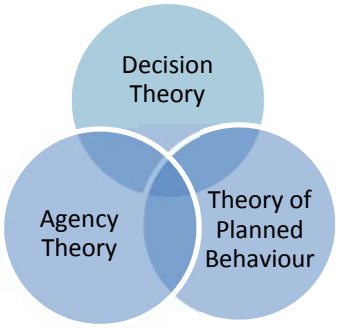

Figure 5-1 Theoretical Domains

5.2.1.1 Agency Theory

The basis for agency is that one party (principal) delegates work to another (agent); and Agency Theory is concerned with two problems occurring in agency relationships (Eisenhardt, 1989). The first problem relates to conflict of interest (moral hazard) and the second to risk sharing (adverse selection). Moral hazard and adverse selection lie at the core of Agency Theory, and both presume a conflict of interest between agent and principal (Mitnick 1994). Moral hazard occurs when a person is insulated from risk and behaves differently than if

exposed to the risk (Arrow 1963). Adverse selection refers to a situation when undesired results occur on the bases of the principal and agent having different information (asymmetry of information) (Arrow 1963). It has been argued that physicians operate in an environment characterised by both information asymmetry and uncertainty. Uncertainty has been stated to be a powerful influencer of physician behaviour (Arrow, 1963).

5.2.1.2 Theory of Reasoned Action and Theory of Planned Behaviour

Theory of reasoned action (TRA) is concerned with what determines intention. Intention to perform a certain action is a function of two factors: attitude and subjective norm (perception of importance). Determinants of attitude have been identified as: evaluation of belief and strength of belief (O'Keefe, 2002 pp. 103-109). Perceived lack of ability may have a negative impact on intention to perform an action. In 1991, Ajzen revised the theory, and in so doing added a third factor, perceived behavioural control, leading to the Theory of Planned Behaviour (TPB) (Ajzen, 1991). Persuasive efforts from a TRA perspective may take three forms: changing the attitudinal component, changing the normative component or changing the relative difference.

Physicians' behaviours can be explained by considering the physician's role as an expert in health care. The expert role is significant due to information asymmetry. Being the most knowledgeable in the agency relationship, attitude and social norm play a lesser role than does perceived behavioural control. Thus, physicians' behavioural control and its influencers are significant.

5.2.1.3 Decision Theory

Several factors influence decision making, and understanding these factors helps understand the decision making process and potential outcomes in the context of HCOs. Because medical decisions have an impact on patients' health, they should be of high quality (Klein 2005). However, medical practice is complex and time is often limited, leading to the use of heuristics, a substitute for the logical, scientifically based, peer-reviewed approach to decision making. Unfortunately, the use of heuristics also brings with it some pitfalls (Klein 2005). Despite being highly trained in the practice of medicine, physicians are prone to making mistakes (Bornstein and Emler 2001). Cognitive biases may detract them from the use of logical and statistically-based decisions (Hershberger et al. 1994).

Decision theories are developed to explain decisions under three main conditions of consequence of choice: certainty, risk and uncertainty. Decision under certainty applies when all decisions will lead to only one consequence. Decision under risk applies when a choice will have one of several possible consequences and the probabilities of the consequences are known (Heylighen 2010). Contrary to decision under risk, decision under uncertainty applies when a choice will have one of several possible consequences, but the probabilities of the consequences are not known.

5.2.2 Definition of Quality in Health Care Delivery

Before discussing the findings of the study, it is important to define quality in health care. Several authors and institutions have made attempts at defining

quality in health care; see Section 1.3 starting on page 3. The definition employed in this research is covered in the next section (Methodology) of this chapter.

It is clear that a global or unified definition of quality in health care does not exist. Human health is dynamic and represented by individuals carrying unique expectations. Thus, global objective measures of health quality may be impossible. However, Donabedian (1978) has defined three elements of quality (see Section, 1.3 for full details) - structure, process and outcomes.

At the core of clinical medicine is the decision making process, leading to diagnosis and treatment for individual patients and populations. The American College of Medical Quality has defined the medical decision process as:

> "The medical decision-making process used in medical quality management reflects a consensus of opinion of clinical judgment that is supported by published peer reviewed scientific literature." (American College of Medical Quality, 2010)

The definition of the decision-making process makes it reasonable to assume that the process is as dynamic as is medical quality. Each physician-patient encounter is a unique experience for both the patient and the physician. Aggregation of experiences over time may therefore form constructs defining future outcome expectations. The variation created by different encounters may thus create a unique set of perceptions of quality for both the patient and the physician. However, since concordance between patient and physician in general is low (Stevenson et al., 2004), the physician is the main decision maker. As such, physician perception represents a window into the "moment of truth" (Sokol, 2010), that is the encounter between the physician and the patient in health care delivery.

5.3 Methodology

The preceding two DBA projects pointed at the opportunity to investigate what enablers and barriers for quality in health care delivery exist, and how the physicians' influence is exerted. Thus, the RQ formulated for this study is:

> RQ: What are the enablers and barriers physicians perceive in their role of providing health care?

5.3.1 Definition of Quality Employed in the Research

In this section, quality is defined for use in this research, and a systems approach is adopted for its definition. The definition employed is similar to Donabedian's three element model, but it differs on two main points. First, Donabedian's definition of structure excludes patient or population level bio-medical contexts. Project One revealed that patient level bio-medical context is an influencer on physician decision making when prescribing. The bio-medical context defines the spectrum of possible clinical outcomes given current medical knowledge and technology. Second, Donabedian (1988), p. 1745, defines outcome as "the effect of care on the health status of patients and populations". However, this definition is problematic for two main reasons. The first reason is that clinical outcomes are

dependent on patient level bio-medical contexts, and may therefore be independent of process; for example, penetrating wounds to the chest have been reported to have a mortality rate of 0.8 – 18.1 %, with wounds not involving the heart having a greater chance of survival (Mandal and Oparah, 1989). Thus, patient level bio-medical contexts define the spectrum of possible clinical outcomes. The second reason is that normally perceived poor clinical outcome, such as death, does not alone define quality of healthcare delivery; in other words, meeting contextualized expectations, irrespective of clinical outcome, provides grounds for positive quality perceptions. Therefore, in addition to effects on health status of patients and populations, outcome is about the provision of a correct and timely diagnosis and institution of appropriate treatment for patients and populations, on both a system and individual level. As such, the adopted definition of quality consists of three elements: context, process and outcome; see Table 5-1 Definition of quality adopted.

Table 5-1 Definition of quality adopted

Quality in healthcare defined	
Elements	**Definition**
Context	A set of circumstances or facts surrounding a particular event or situation, such as resource attributes (material, human, organizational) and bio-medical status
Process	All activities involved in providing care
Outcome	Antecedents to clinical and experiential effects: diagnosis and therapy, clinical effects on health status and experiential effects

5.3.2 Extending Physicians' Conception of Quality

In this section, the differences between Project Two and Three are explained, along with the reasons why quality is re-examined in this research; see also Table 5-2 Differences between Project Two and Three.

Project Two explored the physicians' conception of quality. The study employed repertory grid technique to explore in-depth how physicians construct quality of health care while providing care for patients, resulting in eleven key constructs representing a static map of physicians' conception of quality. Project Three sets out to further extend the understanding of quality by exploring enablers and barriers, thus adopting a dynamic approach. Since Project Two is the first study exploring physicians' conception of quality, Project Three sets out to validate and extend the granularity of the constructs identified. By employing a different method (semi-structured interview technique), triangulation is possible, so validating the results from Project Two. Furthermore, the semi-structured interview technique provides an opportunity for laddering, which may provide further granularity. In Project Two, no information about physician perception of enablers and barriers (influencers) of quality, or mechanism of influence emerged. Therefore, in addition to validation and extending granularity to the findings of Project Two, this project sets out to explore enablers and barriers of quality of health care from a physician's perspective, and to identify the mechanism by which influence is exerted.

Table 5-2 Differences between Project Two and Three

	Project Two	Project Three
Aims	Explore physicians' conception of quality	Validate and extend constructs from Project Two Explore physicians' perception of enablers and barriers to quality Identify mechanism by which influence is exerted
Method	Repertory Grid Technique	Semi-structured Interview Technique

5.3.3 Description of the Method

In this project, the topic of interest is quality of health care service delivery. However, the effort supplied by physicians in contributing to quality is unobservable (Ma and McGuire, 1997, McGuire, 2001).

In order to gain insight into the unobservable, it is necessary to include physicians, as the main decision makers in health care provision, in this study. In order to obtain insights regarding physicians' perceptions of enablers and barriers to quality in health care, a semi structured interview technique was employed, as this was deemed suitable for the purpose of this project. Kvale and Brinkmann (2009) p. 1, express that "the qualitative research interview attempts to understand the world from the subjects' point of view, to unfold the meaning of their experiences, to uncover their lived experiences prior to scientific investigation".

The interview guide (see Appendix C.1.13 Interview Guide) includes an outline of topics to be covered during the interview and suggested approaches outlined by Kvale and Brinkmann (2009) p. 130. In the protocol, the terms enablers and barriers are used. However, the phenomenon of interest is influencers, which can be defined as something that has the capacity to produce effects on physicians' actions, behaviours, opinions, etc. Using enablers and barriers in the research makes it easier to tease out the deeper meaning of influence.

5.3.4 Content Analysis

In this study, interviews generated copious and rich amounts of data in the form of text. Krippendorff (2013) p. 24, defined content analysis as "a research technique for making replicable and valid inferences from texts to the contexts of their use". Thus, content analysis was deemed to be an appropriate methodological approach for analysis of textual data generated in this study. Content analysis technique was employed to gather insights from the informants about the subject of the study.

According to (Krippendorff, 2013 p. 41), at least three types of inferences can be distinguished:

- "Deductive inferences are implied in their premises. They proceed from generalization to the particular."
- "Inductive inferences are generalizations to similar kinds. They proceed from particulars to generalizations."

- “Abductive inferences proceed across logically distinct domains, from particulars of one kind to particulars of another kind.”

An additional type of inference is retroductive. According to (Sayer, 1992 p. 107), retroduction is a "mode of inference in which events are explained by postulating (and identifying) mechanisms which are capable of producing them".

The phenomenon of interest in this study is the quality in health care delivery, which is a highly inaccessible phenomenon. The reason for this is that the effort involved in producing health care is in part unobservable, so quality is non-contractible (Ma and McGuire, 1997, McGuire, 2001). An underlying assumption in this study is that the research question can be addressed by abductively inferring insights from the analysis of bodies of text. Furthermore, substantiation of inference is possible by comparing inferences with previous DBA projects: the systematic review of the literature (Project One) and the first empirical project (Project Two). Thus, the criteria according to Krippendorff (2013) p. 38, for content analysis are satisfied; see Table 5-3 Krippendorff’s criteria for further details.

Table 5-3 Krippendorff’s criteria

Krippendorff’s criteria	Criteria satisfied
They are believed to be answerable by examining a body of text.	Yes
They delineate a set of possible answers among which analysts may select	Yes
They concern currently inaccessible phenomena	Yes
They allow for (in)validation by acknowledging another way to observe or substantiate the occurrence of the inferred phenomena.	Yes

An open coding approach was initially adopted for this project, as it is well suited for understanding phenomena (Kvale and Brinkmann, 2009). The coding process went as follows: transcript of the first interview was studied in detail and concepts identified line by line; the concepts were given rudimentary codes in the margin of the written transcript; these codes were compared to new codes from the next transcript, continuously going back and forth comparing the data; and the process was repeated until all transcripts were analysed.

During the process, concepts were merged into new concepts, grouped into categories, and finally labelled as tentative categories. Using the tentative categories as a guide, transcripts and interview notes were revisited, establishing the final categorical coding, reflecting a cognitive map of how physicians perceive the enablers and barriers to quality health care service delivery.

The categories were then probed for properties and dimensions by using a process called constant comparison, in which each item is checked or compared with the rest of the data to establish analytical categories (Pope et al., 2000). This was achieved by going back and forth comparing data from transcripts, interview notes and re-listening to the recordings for additional data granularity. The resulting coding structure consists of four levels that are referred to as: category, sub-category, property and dimension. The coding was captured in NVIVO 10 for further analysis.

Finally, the resulting categories were evaluated and grouped according to the definition of the elements of quality as defined by (Donabedian (1978), Peabody et al., 2006); structure, process and outcome. This process yielded a further dimension of the categories: quality element. Furthermore, once all the codes were derived, analysis of frequency distribution was considered, and this is reported below. This complements the qualitative analysis since "a construct's frequency count is a good indication of its importance" (Lemke et al., 2003 p. 15). A worked example (NVIVO screen shot) is provided in the appendix, please see Table C-3 NVIVO screen shot.

5.3.5 Triangulation

(Easterby-Smith et al., 2008) address how research can withstand external scrutiny and distinguish between internal and external validity. Internal validity is concerned with systematic factors of bias. External validity is concerned with generalizability across different contexts. A technique to mitigate questions regarding validity is called triangulation. Triangulation has been suggested to be accomplished in social research by using multiple and different sources, methods, investigators or theories (Denzin, 1988) p. 290. In this research, the semi-structured interview technique has been used on the same respondents and patient cases to gain a deeper understanding of the constructs representing a map of physicians' conception of quality of health care, which was revealed in Project Two employing repertory grid technique. Other sources used in triangulation are theories and literature.

5.4 Results of the Empirical Work

In this section, the results from this empirical research are detailed. First, the results from the pilot study are presented. Next, the sample included in the study is provided before the data collection is described. Finally, the results from the data analysis are presented.

5.4.1 Pilot Study

The interview guide was piloted and amended before being employed in the main data collection. The pilot study was performed using the interview guide from the protocol. A total of three, 90-minute interviews were performed, recorded and transcribed in Norwegian. During a meeting between the researcher and three academics (study panel) on July 4th 2012, the interview guide was discussed.

Two main areas of concern were surfaced. First, was the time sufficient to allow for all the questions and laddering of questions to take place? The experience from the pilot study indicated that there would not be sufficient time to allow for all the questions to be sufficiently explored. One question was therefore removed from the interview guide in order to allow more time for the remaining questions; the question removed was: "Please tell me, how you would describe Quality of Health Care provision", resulting in the final interview guide used in this study, see Appendix 5.7.4C.1.13 Interview Guide on page 377. Second, elicitation of mechanisms from physicians did not extract information in line with the CIMO (context, intervention, method and outcome) methodology proposed by Pawson

(2006); therefore, CIMO was abandoned as a methodology, but data was collected in line with the original interview guide as it was felt it would provide valuable data informing the phenomenon of interest. The DBA panel (see Table C-1 Study panel for Project Three) agreed to the final interview protocol as presented in this document.

5.4.2 Sample

The aim of the study was to include 30 physicians across different specialties in a university hospital, i.e. non-randomized selection. Department leaders in four clinical divisions (medicine, surgery, paediatrics and psychiatry) were requested to provide names of potential participants in the study. In total, 70 physicians were invited to participate in the study, and 43 accepted the invitation. Due to the demand for physicians' services in the clinic, it was difficult to coordinate the attendance of physicians with the researcher's schedule during the study period (September 2012 to October 2012). Several physicians required rescheduled appointments on a number of occasions, and only about 40 % (27) of the appointments scheduled by the researcher were finally used for data collection.

Respondents covered a spread of gender, age and medical specialties, ensuring extensive experience with patient care in a hospital setting; please see Table 5-4 Respondents nominal data. All the respondents were native Norwegian speakers. Respondents were invited to participate through a structured invitation in Microsoft Outlook including a copy of the consent form (see page 377). The written and signed consent forms will be stored for 5 years in accordance with hospital and university regulations.

Table 5-4 Respondents nominal data

ID #	Date	Time	Gender	Age (years)	Specialty
1	12/09/12	14:30	Female	55	Psychiatry
2	13/09/12	11:30	Male	53	Anaesthesiology
3	14/09/12	13:00	Male	55	Surgery (ENT)
4	18/09/12	14:30	Female	46	Infectious diseases
5	18/09/12	16:00	Male	58	Geriatrics
6	02/10/12	10:30	Male	43	Oncology
7	02/10/12	13:00	Male	60	Cardiology
8	02/10/12	15:00	Male	52	Pulmonology
9	04/10/12	10:00	Female	36	Intern (general medicine)
10	05/10/12	10:30	Male	58	Cardiology
11	17/10/12	09:30	Male	50	Infectious diseases
12	17/10/12	12:00	Female	33	Intern (general medicine)
13	22/10/12	12:30	Male	53	Neurology
14	22/10/12	14:00	Male	66	Gastroenterology
15	23/10/12	14:30	Male	70	Infectious diseases
16	24/10/12	08:00	Male	60	Pulmonology
17	25/10/12	09:30	Male	63	Haematology
18	25/10/12	11:00	Male	65	Cardiology
19	26/10/12	09:00	Male	37	Intern (general medicine)
20	26/10/12	10:30	Male	54	Paediatrics
21	26/10/12	13:30	Male	53	Psychiatry
22	29/10/12	11:00	Male	51	Anaesthesiology
23	29/10/12	12:30	Male	47	Anaesthesiology
24	29/10/12	14:00	Male	34	Intern (general Medicine)
25	01/11/12	09:30	Male	32	Intern (general Medicine)
26	02/11/12	11:30	Female	60	Cardiology
27	02/11/12	14:00	Female	46	Neurology

5.4.3 Data Collection

Twenty-seven physicians were interviewed in the months of September and October 2012, using a semi-structured interview technique. The interviews were recorded using an Olympus DM-550 digital voice recorder. Notes were also taken by the interviewer during the interviews in order to aid in follow-up questions and laddering, as suggested by Kvale and Brinkmann (2009) p. 179. The interview recordings were transcribed and translated for meaning by the interviewer (native Norwegian speaker), resulting in a data set comprised of approximately 130 pages and 54,000 words. On average, interviews lasted for 30 minutes. Microsoft Word 2013 was used for word processing, and each interview was stored in a separate file with an individual file name: Interview 1 – 27. The interview file names correspond to the respondent ID # in Table 5-4 Respondents nominal data.

5.4.4 Data Analysis

Text data resulting from the transcribed and translated interviews were imported into NVIVO 10 for coding and data analysis. An open coding approach was chosen, as described in Section 5.3.4. The resulting coding structure consists of four levels comprised of: category, sub-category, property and dimension; see Table 5-5 Coding structure generated from data for further details. Evolution of the coding process was automatically tracked in NVIVO 10 (user event log), resulting in a detailed coding log. Word frequencies for the 100 most commonly occurring words were calculated using NVIVO 10; please see Table C-4 Word frequency of the 100 most common words for further details. In order to illustrate the word frequency, a word cloud was generated using NVIVO 10; please see Table C-5 Word Cloud.

Furthermore, a word frequency tree map was created employing NVIVO 10, and the result can be seen in Table C-6 Word frequency tree map. The word frequency counts and corresponding word tree map were employed as aids in the coding process. The constructs were grouped into categories employing “bootstrapping” (Holsti, 1968) as a methodology for content analysis coding.

The coding process yielded a coding structure that is presented in Table 5-5 Coding structure generated from data, with distribution frequency by interviewees in Table C-7 Distribution of nodes (categories) and references by interview respondent.

Table 5-5 Coding structure generated from data

Category	Sub-category	Property	Dimension
Evaluation	Feedback	Level of feedback and ability to change based on feedback received	High - Low
	Measures	Being able to objectively measure	High - Low
Intervention	Diagnosis	Ability to make a correct diagnosis without delay	High - Low
	Treatment	Ability to give appropriate treatment without delay or undue risk to patients	High - Low
	Procedure	Ability to perform procedure correctly	High -Low
	Communication	Quality of communication	High - Low
Mechanism	Time	Availability of time to do what is necessary	High - Low
	Communication	Ability to communicate, get and give necessary information in a tailored manner	High - Low
	Diagnostics	Ability to correctly diagnose patients without delay	High - Low
	Treatment	Ability to correctly treat patients without delay	High - Low
	Resources	Availability of necessary technical, building and human resources	High - Low
	Competency	Availability of necessary competency (knowledge, experience and skill)	High - Low
	Physician attitude	Ability to show and real interest and level of curiosity	High - Low
	Patient	Willingness to cooperate and adhere to medical advice given	High - Low
Barriers	Availability of time	Having enough time to do what is necessary	High – Low
	Resource availability	Adequate resources available	High – Low
	Competency	Level of competency available on the personal level	High – Low
	Organization	Organization of work that support delivery of health care	High – Low
Enablers	Evaluation	Ability to evaluate	High – Low
	Time	Availability of time to do what is necessary	High – Low
	Competency	Availability of necessary competency (knowledge, experience and skill)	High – Low
	Communication	Ability to communicate, get and give necessary information in a tailored manner	High – Low
	Organization	Organization of work that support delivery of health care	High – Low
	Physician	Physician attitude	High – Low
	Patient	Willingness to cooperate and adhere to medical advice given	High – Low
	Diagnostics	Ability to correctly diagnose patients without delay	High – Low
	Treatment	Ability to correctly treat patients without delay	High – Low
Quality	Communication	Ability to communicate, get and give necessary information in a tailored manner	High – Low
	Resources	Adequate resources available	High – Low
	Competency	Availability of necessary competency (knowledge, experience and skill)	High – Low
	Diagnostics	Ability to correctly diagnose patients without delay	High – Low
	Treatment	Ability to correctly treat patients without delay	High – Low
	Patient	Willingness to cooperate and adhere to medical advice given	High – Low
	Physician	Physician attitude	High – Low
	Organization	Organization of work that support delivery of health care	High – Low
	Evaluation	Ability to evaluate and learn	High – Low
	Continuity	Level of continuity of care	High – Low
	Patient satisfaction	Level of experiential quality	High – Low

5.5 Findings

In this section, the findings of this research are presented. Overall, the findings may be summarized in three points. First, the findings validate and extend the quality constructs revealed in Project Two. Second, physicians' constructs of quality and perception of enablers and barriers were found to be closely related; in fact almost identical. Project Two explored physicians' conception of quality in health care, and identified eleven key constructs; a static picture of quality as perceived by physicians. Project Three aimed to extend this understanding by exploring enablers and barriers, hence taking on a dynamic perspective. The project found that enablers and barriers were polar opposites of factors influencing quality; thus, enablers and barriers are polarized limits of influencers. Influencers are defined here as something that has the capacity to produce effects on physician actions, behaviour, opinions, etc. Finally, the mechanism of influence is found to be physicians' perceived behavioural control.

Frequency of mention may impart information about relevance (Goffin et al., 2006, Lemke et al., 2003). Thus, references to word frequencies are provided in this section. Two forms of frequency presentation were chosen to be used, tabular and visual (word cloud), as a means to provide information about relevancy.

This study revealed that constructs and influencers are identical. Having adopted a systems definition of quality, the presentation of findings is structured by quality element, as in Table 5-6 Project three findings. Table 5-6 shows element, construct, activity, mechanism and impact. The "Element" column is related to the definition of quality used in this research (see Section 1.3 on page 3), and represents the model proposed by Donabedian (1979). In the next column, "Constructs", the empirically derived constructs representing physicians' conception of quality, is grouped by the researcher according to the best fit with the definitions provided by Donabedian (1979). The "Activities column" represents empirically identified activities associated with the derived constructs. In the "Mechanism" column is the mechanism by which influence is exerted. The last column, "Impact" reflects the effect the activity associated with the construct has on the quality construct.

The Findings section is structured as follows. First, findings related to the quality elements of context, process and outcome are presented, followed by enablers and barriers. Then, the findings related to mechanism of influence are detailed. Finally, a summary of the key findings of this study is offered. Quotes are attributed using the ID# found in Table 5-4 Respondents nominal data.

Table 5-6 Project three findings

Element	Construct	Activities	Mechanisms	Impact
Context	**Resources availability**	Available resource for patient care	Boundaries of choice	Resource utilization
	Competency	Formal training, on the job training, own experience, feedback from patients and colleagues	Reduction of physician uncertainty	Physician effort
	Time	Time spent with patients	Reduction of physician uncertainty	Physician effort
	Standards of care	Setting expectations	Social norm	Standardized physician supply of effort
	Organization	Allocate resources to match expectations	Perceived behavioural control	Resource allocation Level of co-operation
	Co-operation	Identifying necessary resources outside control of individual physician	Perceived behavioural control	Coordinated effort
	Evaluation	Feedback from patients and peers	Social norm Learning	Changed perception of expectation Experience
Process	**Patient**	Recognizes symptoms	Level of concern reaches action threshold	Seeks medical help
	Physician attitude	Patient physician interaction	Transfer of feelings from patient Physician perception of patient expectation	Physician effort
	Communication	Information exchange	Reduction of physician uncertainty Social norm	Physician effort
	Continuity	Number of physicians involved in care of a patient	Information lost when information is exchanged	Information integrity
	Diagnostics	Gathering and interpretation of information	Synthesis of information	Diagnosis
	Therapy	Deciding on appropriate medical intervention	Bio-medical influence	Change in health status
Outcome	**Diagnosis**	Not applicable	Not applicable	Diagnosis
	Therapy	Not applicable	Not applicable	Appropriate therapy initiated
	Clinical outcomes	Not applicable	Not applicable	Change in health status
	Experiential outcomes	Not applicable	Not applicable	Patient satisfaction

5.5.1 Context

Overall, context is found to set the boundaries for what is possible, real or perceived. Resources, in a broad sense, including time and competency, are about what is available to do the job at hand. Standards of care set the expectations for the job, and organization concerns how best to allocate resources, in a broad sense, to best achieve the expectation. Level of HCP co-

operation is a result of expectations and resource structure, which is the base for resource utilization. Evaluation refers to third party feedback and formal measures. Feedback is claimed to supplement own experience in learning, and shapes the experience component of competency. Thus, evaluation alters the context, and may therefore be argued to constitute learning.

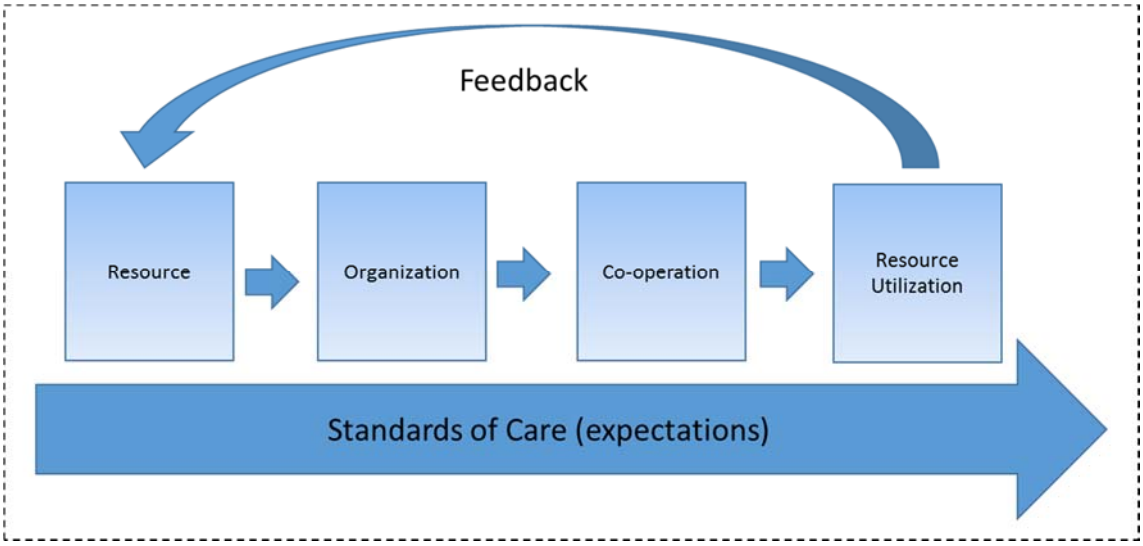

Figure 5-2 Internal dynamics of context

In this section, the findings that map to the context element of quality in health care are detailed. The presentation of findings explains the empirical basis for Figure 5-2, and is structured as follows. First, findings related to resources in a broad sense are presented, followed by findings on standards of care, before data on organization and cooperation are provided. Then, findings on resource utilization are presented, and finally, data on evaluation of quality in health care.

5.5.1.1 Resources

In this section, findings related to resources are detailed, starting with findings about resource availability, then findings about standards of care and findings related to resource utilization, before data about organization are presented. Then, findings on cooperation are offered, and finally, findings related to evaluation. A short summary is included at the end of sub-sections when relevant.

5.5.1.1.1 Availability of Resources

In this study, resource availability has been found to be an important aspect of quality of health care provision. Insights about resources fell into two main categories: resource availability and resource utilization. Resources, whether human, technical equipment, building facilities, etc., were all deemed necessary for the provision of health care.

> "…by resources I mean people, technical equipment building facilities and things like that. It is necessary to have enough people, nurses and physicians especially with the right competency. Nurses and physicians must have access to enough technical equipment, diagnostic modalities, medicines, hospital beds to do their job." (ID #: 26)

Resource availability is seen as critical for quality of health care service provision by physicians in this study.

> "I think in order to be able to do what I have already talked about, it is necessary to have adequate resources." (ID #: 26)

> "…well, it may be worthwhile mentioning resource access, well, actually that's also very important, one of the patients we have discussed earlier was definitely an example of lack of resources, as he did not get access to a respirator, was placed in the hallway of a hospital and died." (ID #: 8)

> "Lack of diagnostic modalities, especially MRI, which causes patients to have to wait for days, resulting in not being able to diagnose the patient while the patient is admitted and forcing us to discharge the patient without a clear diagnosis." (ID #: 13)

5.5.1.1.2 Staff Competency Level

In this study, the data suggest that other than the traditional knowledge, experience and skills, competency is about understanding what concerns the patient has and what the physician can do to develop professionally. Furthermore, the data suggest that availability of the right competencies at the right time is important to how physicians define quality.

> "…should have a basic education, enough resources so that people develop academically while working, especially physicians in training." (ID #: 9)

> "…quality is predictable, founded on knowledge and skills, it should be neutral in the way that we can agree that it is quality, it should be verifiable, we should be able to measure it and at the same time it should be something that the patient can experience." (ID #: 6)

Competency in this study is found to be highly relevant when considering quality in health care. In addition to the elements of competency (knowledge, skills, experience), competency is about the appropriate application of knowledge and skills gained through experience. In this study, competency is seen as a barrier when there is a lack of competency necessary for the delivery of health care service.

> "My own knowledge level is always a limiting factor." (ID #: 5)

> "…lack of knowledge and skills, lack of competency. I will have to define competency. The problem is we need to sort of often walk through the door. We can sit down and read. But the lack of competency in general, is a barrier." (ID #: 17)

5.5.1.1.3 Availability of Time

Respondents in this study indicate that time is an influencer of quality in health care service delivery. The focus is on the availability of time.

> “I had a lot of patients waiting in a waiting room and felt stressed due to lack of time; I didn’t spend enough time to evaluate the patient properly and missed the diagnosis.” (ID #: 26)

The focus on availability of time from a physician perspective indicates that “time” is about the physicians’ perception of availability of physicians as a human resource. In this research, time is seen as a barrier when there is an imbalance between available time and necessary work relating to the delivery of health care service.

> “…often I feel it’s about not having enough time which could be caused by a combination of factors, one being that we have a lot of patients and therefore more patients per physician, both admitted and outpatients.” (ID #: 12)

> “…if there is too much to do at the same time. I managed to keep track of individual patients but not of the group of patients that I’m in charge of.” (ID #: 9)

Lack of time may lead to shortcuts being taken and also result in stress, and is consequently regarded as a barrier.

> “…that a good example of what can happen in medicine when people take shortcuts.” (ID #: 4)

> “…stress and many different expectations can produce a situation where there is too much to do.” (ID #: 27)

5.5.1.1.3.1 Time Spent Directly on Patient Care

In order to deliver quality health care, the informants revealed that time spent directly on patient care is related to the time available for interaction with patient and physician or other health care workers. This is related to the communication between patient and physician and to diagnostic or therapeutic procedures. Available time is important in order to do what is necessary; thus, time available is often determined by patients/physicians per time unit.

> "The patient was left in the ER for 12 hours without care. There were simply too many patients to take care of and some had to wait a really long time. Longer than what is acceptable." (ID #: 11)

> “I must be given enough time to do the job within my professional limits.” (ID #: 26)

Data suggest that the sub-category “time” is also related to time to diagnosis and treatment. Time to diagnosis is defined as time to primary diagnosis, ensuring that a diagnosis is established early.

> “…quality is defined by establishing an early primary diagnosis….” (ID #: 13)

5.5.1.1.3.2 Time Spent Indirectly on Patient Care

Time spent indirectly on patient care is also evident from the sample. This use of time is spent on maintaining or improving clinical or academic competencies; and reflection and evaluation of information, especially when dealing with complicated cases.

> "We do not have enough time to supervise our interns. In the hospital where I worked before, we had control of what our interns knew and did. Here, we do not have the time for appropriate supervision. What type of cardiologists are we getting? I honestly can't tell you...." (ID #: 26)

The findings in this study suggest that availability of time is either used directly or indirectly on patient care. However, time is linked with physicians' perception of availability, thus indicating that availability of time may in fact be a resource. Since time is a non-tangible asset or resource, it may make more sense to consider time in this context as a temporal measure of physician availability. Time will for this reason be considered a resource.

5.5.1.2 Standards of Care

With the advent of evidence based medicine, standards have become an increasingly important part of clinical medicine and are often referred to as guidelines, as is found to be the case in this study. Guidelines represent "best practice" and form the basis for expectations.

> "…a basis for quality is an academic standard of practice that we adhere to national and international guidelines, and what is accepted within the medical community in Norway. " (ID #: 16)

Standards are also a way of ensuring quality control, as quality is defined by how close to the standard clinical medicine is being practiced.

> "…the standard is set and we measure to what degree you manage to apply or follow the standard." (ID #: 18)

> "…quality is then defined as how well you managed to live up to the standard defined by the medical community. Decisions take place continuously and it is about how close to the standard you manage to practice." (ID #: 12)

Standardized operating procedures are found to be an aspect of quality in this research. Procedures define the standard of care and may be a useful tool for quality control and improvement.

> "…it is also necessary to have procedures, for example the work we are doing now is focused on standardizing diagnostic procedures as I am focused on improving the quality and precision of the diagnosis that we give to patients." (ID #: 21)

Standards of care set the prescribed expectation of how resources are to be used, which further guides how health care services are organized. Organization is covered in the next section.

5.5.1.3 Organization of Health Care Services

The results of this study indicate that how the delivery of health care is organized is an element in how physicians define quality. Organization is comprised of several factors: equal access, cooperation, standardized procedures and working environment. Each of the factors is now briefly presented.

5.5.1.3.1 Equal Access

Interviewees indicated that the delivery of health care services should be organized in such a way that patients are ensured equal access. This finding is in line with the definition of quality found in the literature; see Section 1.3 Definition of Quality in Health Care Delivery.

> "Access to health care should be equal, by that I mean we should not differentiate depending on age, sex or race. The patient should be met and offered an opportunity to get clarity around the cause other symptoms and what we have to offer to help them." (ID #: 15)

5.5.1.3.2 Organization

Organization is mentioned in the context of barriers to quality health care service delivery by the respondents. Organization is indicated as a barrier and is related to management, inadequate logistics and bureaucracy.

Management is related to poor management; focus on production and reorganization processes.

> "Poor bosses and things like that drain energy and can also affect quality negatively." (ID #: 1)

> "It could be a barrier that there is a higher focus on production…" (ID #: 27)

> "A state of continuous reorganization, new people with new thoughts, we are always changing to adapt to a new system. This is a situation creates problems. I want to do the best I can, but when I meet the same obstacles again and again I lose my motivation. Continuous change where I feel that I cannot control any aspect, what is important is that the people treating the patients can influence the structure and resource utilization." (ID #: 25)

It is important that the delivery of health care is efficient. Modern health care service delivery is a logistics challenge which may impact quality of health care.

> "…organizational issues could have an impact, if for example several physicians were involved creating a breach of continuity in the treatment. We have to admit that breach of continuity in treatment is the norm in the Norwegian health care system rather than the exception." (ID #: 15)

Bureaucracy and formalities create barriers for health care service delivery. The bureaucratic burden is seen to be driven by system and model needs rather than the needs of patients.

> "The demand for reporting and documentation of what we do, the need for control from government agencies and politicians, which is largely designed to cover the needs for covering their own back side than the needs of physicians. This is in conflict with what aids patient care and ultimately outcome." (ID #: 2)

> "The economic model increases the demands for reporting to satisfy the bureaucracy. This detracts from good quality health care services. " (ID #: 6)

5.5.1.3.3 Working Environment

Finally, working environment for physicians is also found to be an organization-related factor when considering quality in a health care service delivery context.

> "I must have access to equipment, building facilities and support services. I must be free from administrative burdens. I must be given enough time to do the job within my professional limits. I must be encouraged to develop professionally. I need a good work environment and a work-life balance." (ID #: 26)

5.5.1.3.4 Summary of Organization

The findings of this study suggest that organization of health care influences resource allocation in anticipation of expected health care needs. One of the defining factors of how resources are organized is claimed to be standard of care. Health care service delivery should be organized so that patients have equal access, ensure efficient and appropriate cooperation between different health care professionals providing health care according to standardised protocols, and ensure a supportive work environment.

5.5.1.4 Cooperation

The delivery of health care is complex and takes place under uncertainty. This complex task of caring for patients is seldom a "one man show"; a team effort is often necessary, as patients often suffer ailments from different organ systems. The continuous specialization of medicines narrows the scope of specialized physicians, thus driving the need for a cooperative effort. Indeed, the informants claim that cooperation among physicians and health care workers is necessary for a team approach and synergies of effect.

> "Cooperation with other colleagues and other departments is very important and that cooperation is smooth. That I have personal contact with other colleagues and a low threshold for helping each other quickly, and that there is no waiting time for necessary diagnostic procedures such as blood tests, gastroscopy, colonoscopy and so forth." (ID #: 8)

Also, cooperation means that the team around the patient is coordinated and capable of communicating a common message. However, cooperation between different levels of care is an element of quality in health care as well.

> "Quality is also dependent on cooperation with primary care physicians, cooperation between different departments internally, personally I think

> our hospital is too big, the hospital work came from was smaller so it was easier to get things to work smoothly." (ID #: 25)

This cooperative effort is driven by expectations, often derived from explicitly stated standards of care.

> "…a basis for quality is an academic standard of practice that we adhere to national and international guidelines..." (ID# 16)

5.5.1.5 Resource Utilization

The data in this research suggest that quality of health care is not only dependent on resources being available, but respondents claim that quality is also dependent on how the resources are used..

> "…necessary competency, aggressive with regards to diagnostics, aggressive with regards to deciding on the correct treatment and also on the level of treatment necessary, thus deciding on resource utilisation for that patient. It is also important that available resources are harmonised with regards to workload." (ID #: 22)

How resources are to be used is driven by explicit (prescribed) and implicit expectations. One such explicit expectation is the standard of care, often referred to as guidelines.

5.5.1.6 Evaluation

Evaluation is an important element in any quality system. However, the findings in this study suggest that physicians do not formally evaluate the quality of their own practice, but rely on feedback from patients and colleagues. Being able to evaluate health care delivery is found to be an element of quality in this study. In this data set, evaluation can be categorized into three categories: measures, feedback, documentation and control.

Measurements are an element that the data in this research suggest may influence quality of health care provision. Measure may be anything that is measurable, such as outcomes, readmission rates, hospital infection rates, etc.

> "…it should be verifiable, we should be able to measure it and at the same time it should be something that the patient can experience." (ID #: 1)

Feedback is suggested to influence quality of health care provision by the respondents in this study. The feedback may be own experience, feedback from patients and next of kin, and outcome.

> "Well, I think it is often based on feedback from patients and next of kin, and my own experience and observations." (ID #: 8)

Documentation and control is suggested to influence quality of health care provision by the respondents in this study.

> "Documentation, journal updates should be done on a regular basis. All this is designed to generate quality but it's not necessarily a measurement

> of quality. Well, actually maybe it is a measurement of quality after all“. (ID #: 6)

Evaluation is found to be relevant in relation to quality in health care. Measurements and evaluation of different aspects of health care may contribute to continuous improvement both on an individual as well as on a system level.

5.5.1.6.1 Feedback

Feedback from patients and peers is an important part of learning, as clinical medicine relies heavily on experience. In this data set, feedback from patients, next of kin, colleagues and system is found to be an important source of information when evaluating quality of health care service delivery.

> “It’s largely based on direct feedback from patients, with this satisfied or not satisfied. No matter what happened, if there are satisfied I feel that I have done some good.” (ID #: 12)

5.5.1.6.1.1 Own Experience

Own experience is found to be a source of information when physicians evaluate quality of health care service delivery.

> “…evaluation of quality is subjective, based on how I experience patient satisfaction compared against objective treatment outcomes” (ID #: 10)

5.5.1.6.1.2 Patients and Next of Kin

Direct and indirect feedback from patients and next of kin is an important source of information when physicians evaluate quality.

> “…it’s largely based on direct feedback from patients, with this satisfied or not satisfied.” (ID #: 12)

Feedback from patients can be informal or formal. Informal feedback can be positive or negative; in contrast, formal feedback is most often negative.

Informal feedback from patients takes the form of direct feedback and may be solicited or unsolicited. In its simplest form, physicians may ask about patient satisfaction during consultations.

> “…I may ask the patient if they are satisfied or not. Ask if there is something they would like to complain about or something that they would have liked to have different.” (ID #: 4)

On a more formal level, questionnaires may be used to solicit information about patient satisfaction.

> “We may also use questionnaires to ask patients about their experience. Patients cannot evaluate the quality of technical medicine, but they can save do are satisfied or not.” (ID #: 19)

Unsolicited formal feedback is often complaints. Even though formal complaints procedures are in place, complaints as a source of information for quality evaluation may not be a “good” indicator of quality.

> "Even though we can get some information out of formal complaints, adverse event monitoring et cetera, I think overall our tools for measuring quality are poor." (ID #: 15)

Even though complaints may not necessarily be viewed as a good indicator of quality, they still represent an opportunity for individual and collective learning in the medical community.

> "With a formal complaint it is important to share the outcome with staff that has been involved in the case which formed the basis for the complaint. Sometimes it's also a good idea to talk with a colleague one on one if negative information needs to be shared. Not everyone needs to hear it. However, I think it is important that we collectively learn from our mistakes." (ID #: 14)

5.5.1.6.1.3 Colleagues

Feedback from colleagues is a source of information for evaluating quality of health care service delivery. Colleague feedback may be formal or informal. Formal feedback is often used in appraisals; for example, the General Medical Council (GMC) in the UK has developed validated formal colleague appraisal questionnaires (Campbell et al., 2012). However, such formal appraisals have not been developed for Norway. Feedback from colleagues in this data set therefore reflects informal feedback.

> "…it should be a reflection of all factors, how well has the physician performed, how satisfied are the hospitals staff with their own work." (ID #: 23)

Furthermore, feedback in a teaching environment may be a useful tool for learning and quality improvement.

> "Discussions in the context of medical training, discussions on medical cases and so on are definitely a sign of quality, and help us become better." (ID #: 12)

5.5.1.6.1.4 Outcomes

Outcomes of health care service delivery are indicated as a source of information for evaluation by the respondents in this study.

> "…it can be measured by looking at the treatment outcome, for example, I had a tumour and it was surgically removed." (ID #: 20)

5.5.1.6.2 Measures

This study provides data on measures of quality of health care service delivery. Quality measures can be divided into two main categories: patient and system level.

5.5.1.6.2.1 Patient Level

Patient level measures include function and satisfaction. Function is often measured as a change in activity after treatment (Stratford et al., 1995).

> "...I would measure patient function after treatment." (ID #: 23)

Patient satisfaction is measured by simply asking the patient directly or using validated tools such as questionnaires.

> "I may ask the patient if they are satisfied or not. Ask if there is something they would like to complain about or something that they would have liked to have different." (ID #: 4)

> "…We may also use questionnaires to ask patients about their experience." (ID #: 19)

5.5.1.6.2.2 System Level

Publication rates are a measure of academic production and may be linked to quality. In the university hospital where this research was undertaken, publication rates are measured and points given in order to guide strategic investment in high yield research groups. Respondents in this study indicated that this is the case.

> "…we can measure publication rates." (ID #: 12)

Readmission rates are another measure that may provide information about quality. However, the use of all cause readmission rates has recently come under scrutiny (Monette, 2012). In a recent meta-analysis, the authors conclude that "Less than one in four readmissions were deemed avoidable. Health system planners need to use caution in interpreting all cause readmission statistics as they are only partially influenced by quality of care" (van Walraven et al., 2012 p. 1211).

> "In today's setting it would have been of interest to see readmission rates as a measurable factor of quality. It would say something about whether treatment before discharge represents an adequate solution to the problem leading to the initial admission." (ID #: 23)

Complications are also indicated to be a measure in this study. All the respondents indicating complications as a measure make reference to event rates.

> "If you have a system where you monitor and catch mistakes you may simply count the rate of unwanted events." (ID #: 19)

Also, complaints are suggested to be a measure. Complaints, in this context, from patients - other than spontaneous criticism - are processed employing formalized complaints procedures.

> "I think quality can be measured by looking at formal complaints," (ID #: 14)

During a lecture held by the patient ombudsman for the municipality of Akershus in Norway in September 2012, he spoke on the topic of general statistics of complaints from patients. Informally, he had contacted his colleagues around the country and could conclude that about 80% of complaints are due to communication and the remaining 20% due to medical errors (Thorne, 2012).

Based on these findings, it can be concluded that the majority of formal complaints are based on experiential quality.

Time to diagnosis is an important factor determining quality of health care services. It is also important to consider time to treatment, but treatment appears to be viewed as a consequence of diagnosis. Thus, time to diagnosis is a key factor when it comes to quality of health care service delivery.

> "…and when they are in a hospital they should be diagnosed quickly resulting in a correct diagnosis, and they should receive treatment. Treatment is more schematic in the way that once the diagnosis is established then the treatment is given." (ID #: 8)

Implementing a systematic approach to the implementation of and compliance with guidelines can help reduce variation in core processes of organizations (Flynn et al., 1994), and at the same time increase the quality of health care provided (Leape, 1994). Guideline adherence was found in the dataset, but not given much credit as a source of information when evaluating or measuring quality of health care service delivery.

> "…there are many ways to measure quality, back in the old days with the all chief of quality, we were forced to measure adherence to guidelines with respect to use of statins, aspirin and beta-blockers after a myocardial infarction. When he left we stop measuring, because the measures showed an adherence rate of about 92%, and there was always a good reason why the last 8% did not use the medication according to guidelines, for example the patient might have an ulcer disease contraindicating the use of aspirin." (ID #: 18)

5.5.1.6.3 Summary of How Physicians Evaluate Quality

Evaluation is found to be a category of quality in health care delivery. The category has two subcategories: feedback and measures. From a simple frequency count perspective, measures seem to be given more relevance than feedback in this data set; see Table 5-7 Evaluation by frequency for details. The data indicate that physicians do not formally evaluate or measure quality when performing their duties. However, the data indicate that physicians rely on own experience and feedback from patients and peers. Literature on feedback is extensive, and a recent Cochrane Review concluded that feedback generally leads to small but potentially important improvements of quality in health care (Ivers et al., 2012).

Furthermore, the data suggest that quality is measured on two levels: patient and system. Patient satisfaction is important, and may also be related to direct feedback from patients. Thus, patient level measures may be considered measures of experiential quality. The data indicate that system level measures are measures of clinical quality.

Table 5-7 Evaluation by frequency

Evaluation					
Sub-category	**Property**	**Dimension**	**Number of respondents**	**Number of references**	**Ratio (Ref/Res)**
Feedback	Level of feedback and ability to change based on feedback received	High - Low	13	21	1,62
Measures	Being able to objectively measure	High - Low	21	50	2,38

5.5.2 Process

Process sets out what takes place during delivery of healthcare. Patients and physicians interact in an agency context where communication is the central mechanism of information exchange. The information resulting from the interaction is central to the process of health care delivery for two main reasons. First, patients and physicians do not exchange all available information; thus, information asymmetry exists. Second, the resulting information asymmetry creates a context of uncertainty where both patients and physicians must make choices. Continuity of care ensures information integrity, which is vital for correct interpretation of information in a given context. Furthermore, information integrity reduces uncertainty for both patients and physicians.

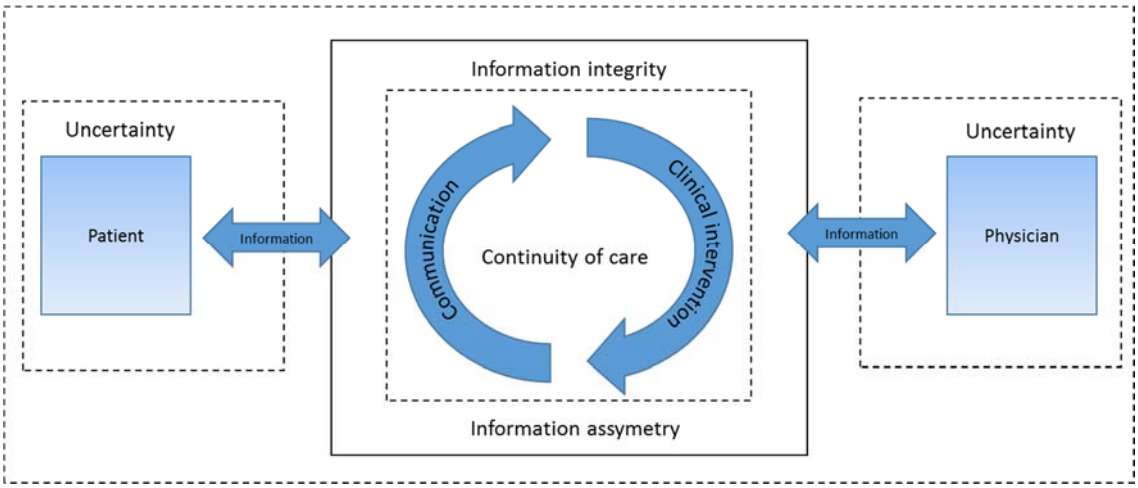

Figure 5-3 Internal dynamics of process

In this section, the findings that map to the process element of quality in health care are presented. The presentation of findings explains the empirical basis for Figure 5-3, and is structured as follows. First, findings related to patients are covered, followed by findings on physician, before data on continuity of care are detailed. Finally, findings on clinical intervention are presented, including diagnostics and therapy.

5.5.2.1 Patient Participation

Patient participation is important, as it is a cooperative process. From an agency perspective, the physician (agent) acts on behalf of the patient (principal). Thus, quality is dependent on the patient agreeing to participate in the process.

> "It means that the patient agrees to participate in the process, that it is a cooperative process with the patient and a common understanding with the patient." (ID #: 17)

5.5.2.1.1 Patient Attitude

In this study, patient attitude comes across as a factor that may affect quality of care. The explanation for this phenomenon is transfer of positive or negative feelings from the patient to the physician. This transfer of feelings may influence how a physician treats the patient, and consequently may affect quality of the health care provided.

> "Well I must be honest, you get extra motivated when you have a pleasant patient to deal with, the good relation with the patient helps, if you have a good relation with the patient then you unconsciously do a better job. I think we should be more open about this issue and talk to our colleagues about it. For example, maybe this patient should be seen by someone else." (ID #: 8)

5.5.2.1.2 Patient Engagement in Medical Care Summary

Patients are central to quality in health care, in that they are the principals in the agency relationship. Thus, patients delegate work to the physicians who supply effort into the production of health care. The patients' engagement in this process of health care production as the subject of intervention is therefore a potential influencer of quality in health care. In this research, the evidence suggests that patients may manipulate the system to gain greater benefit, and as such, represent a mechanism.

> "...this patient had detailed information about how to use the system to get what she wanted. She got more resources than she should have." (ID #: 1)

Furthermore, the data suggest that patient compliance is a mechanism for quality of health care.

> "…good compliance at the patient level, she complied and took medicines." (ID #: 10)

5.5.2.2 Physician

The results of this study indicate that physician is a sub-category of enablers. It is found that physicians who are professionally curious, respectful and interested in the patient may enable quality health care service delivery.

> "…respect the patient and the patient's experience of his problem." (ID #: 2)

> …"believe that people are equal." (ID #: 27)

> "Being professionally curious and interested is important, the moment you stop being curious and believe you know everything you have lost." (ID #: 25)

"…first that I am personally engaged and motivation" (ID #: 10)

Furthermore, it is found that attention to detail is important, and honesty and compromise may be physician factors enabling quality.

> "What I'm satisfied with is the attention to detail and attitude making me able to catch the fact that the GP felt that this was something different than the regular issue with enlarged tonsils." (ID #: 3)

> "I am very honest when giving my advice, no compromise." (ID #: 7)

Finally, the results of this study indicate that the physician's mood may enable quality, and that mood may be influenced by energy.

> "I deliver better quality the days I'm in a good mood; we are affected by mood, even though you work on it and are conscious of its effect you are still affected by your mood." (ID #: 18)

> "…if you feel that you have extra energy which is enough for the work that you have to do it will be easier to be in a good mood than if you don't have." (ID #: 18)

5.5.2.2.1 Physician Attitude

The results of this research indicate that physician attitude may be an important element of quality. Physician attitude can broadly be categorized into three categories: respect, humbleness and interest.

Respect is suggested to be an element of physician attitude that may influence quality of health care provision.

> "…that you have time to speak with a patient, show empathy and sympathy for the patient's condition, problems and concerns." (ID #: 19)

Being humble is suggested to be another element of physician attitude that may influence quality of health care provision by physicians.

> "It means to be open, humble and willing to admit having made a mistake. Try to solve problems and issues that arise with patients and next of kin using the way of least resistance or lowest level of conflict in order to prevent escalation." (ID #: 14)

Showing interest in the patient and expressing empathy is another element that is suggested to influence quality of health care provision from a physician perspective.

> "…being present in the meeting with the patient. By that I mean being attentive, interested and awake. Have the ability to be present in the meeting would patients. I think this is very important for the real quality and also for the experience quality from the patient perspective. Also, to be able to convey regret and apologise for misunderstandings and when things did not work out that according to plan. Never be afraid of saying, I

> did not understand you I was mistaken. I am sorry. The ability to be honest, truly honest." (ID #: 27)

Physician attitude in this context is an expression of favour or disfavour toward a patient or circumstance associated with the patient. In this study, the results may indicate that attitude may influence quality of health care service delivery.

> "…attitude towards people, attitude toward how things should be done and what standard is acceptable" (ID #: 3)

Respect is suggested to influence quality of health care provisions. It is important for the physician to treat patients as "equals" and it is imperative that this is rooted in a genuine feeling of equality.

> "First, you need to respect the patient and the patient's experience of his problem. Second, you need to respect the patient as an equal with respect to yourself. You need to believe that people are equal. This belief needs to be rooted deep in your soul. However, sometimes it may be very difficult". (ID #. 2)

Physicians are human and thus influenced by the trifles of everyday life in the same manner as everyone else. For example, having had a good night's sleep and being well rested gives energy and may affect mood.

> "...if you feel that you have extra energy which is enough for the work that you have to do it will be easier to be in a good mood than if you don't have." (ID #: 18)

The findings here suggest that physician mood may influence quality. Even though physicians are cognizant of mood and its effects, it may still influence quality of health care provision.

> "I deliver better quality the days I'm in a good mood; we are affected by mood, even though you work on it and are conscious of its effect you are still affected by your mood." (ID #: 18)

Interest in the patient and attention to detail are suggested to be important parts of the physician attitude related to quality of health care service delivery. Solving complicated medical problems involves being interested on a professional and on a personal level.

> "Being professionally curious and interested is important, the moment you stop being curious and believe you know everything you have lost." (ID #: 25)

> "Also, I think that I had an interest in this field of medicine and cared for the patient enough to go the extra mile." (ID #: 26)

Furthermore, the data suggest that physicians who enjoy their work deliver better quality.

> "I think as long as you enjoy your work you will also provide good quality. The moment you start to dislike your job you will likely start providing inferior quality work". (ID #: 18)

> "…the most important thing for me is that I love medicine, I love what I do, and I enjoy working with people from all walks of life". (ID #: 25)

Finally, social context is also suggested to influence quality of health care service delivery. In order to focus on the work at hand, it may be important for physicians not to have to deal with social problems.

> "…that I feel good and that I don't have problems socially, I think that is important." (ID #: 14)

5.5.2.3 Communication

Analysis of the data revealed physicians' emphasis on patient communication. In this research, communication is found to be about ability to establish a relationship with the patient in providing the basis for a mutual dialogue.

> "…quality is something that we should be able to discuss and be the basis of a dialogue, I don't have a good way to formulate that but it should be; quality is patient focus." (ID #: 1)

Good communication is found to be tailored to address patient needs, and therefore involves a decision based on subjectivity. Thus, the physician perception of patient needs becomes an important factor of communication quality.

> "By good communication I mean that we inform about the findings that we have made in a manner that the patient is able to fully understand its implications, communication must therefore be tailored to the individual. Some patients are capable of absorbing all information, and need the full information, whereas others do not have this capability. Consequently, communication and the way to proceed with communication becomes a subjective decision." (ID #: 10)

Communication may also being defined by what the patient experiences.

> "…the patient should experience that there are treated with respect, at the physician has communicated well the intention for what is planned, and that the patient is satisfied with the result." (ID #: 2)

In this study, communication with patients is found to be relevant. Good communication entails a good match between the physician's perception of the patients' needs, thus generating a positive experience for the patient. Communication is indicated to be an activity of conveying information through the exchange of thoughts, messages, or information, as by speech, visuals, signals, writing, or behaviour.

> "I took a good case history, I didn't buy the initial story, something didn't fit and I spending time on getting information from the case history I was able to make a correct diagnosis." (ID #: 4)

Communication is referred to by interviewees as an enabler of quality in this study. Communication is a tool for exchange of information, and as such, dependent on messages being sent, received and understood in the manner intended. Being able to ask good questions to elicit necessary information and communicating in an open and honest manner is also suggested to facilitate quality.

> "Communication must be good, which includes language. I must be clearly and the patient must understand what is being communicated. When this takes place by way of a translator information exchange may be insufficient. If we cannot have a good quality dialogue between physician and patient we have a problem." (ID #: 15)

> "…it's mostly about me listening and I am able to pose good questions, and that I am very honest when giving my advice, no compromise." (ID #: 7)

Communication also necessitates an understanding on the patient level; thus, being able to communicate so that patients understand what is being communicated is suggested to enable quality.

> "I must communicate clearly and the patient must understand what is being communicated." (ID #: 15)

Communication is indicated by the interviewees to be an important part of both diagnostics and treatment.

> "I think that the fact that they have been very explicit in what they need has made it easy to be their physician and give them the support that they needed." (ID #: 7)

> "The information was a very important part of the treatment. I informed the patient about her role and her responsibility, and ensured that she was willing to cooperate. Those were important things." (ID #: 21)

In this research, the data suggest that availability of information is critical when providing health care to patients. Consequently, lack of information may affect the outcome and hence quality of health care service delivery.

> "In the end the patient died. What irritates me with this type of case is that I did not have all the necessary information to explain his condition." (ID #: 16)

5.5.2.4 Continuity of Care

Continuity is related to how many physicians or other health care workers are involved in the care. When many physicians are involved in the provision of care, information may be lost during numerous exchanges. In this study, context was

found to be related to the number of exchanges of information during the delivery of health care.

> "It means that as few people as possible should participate in the treatment, exchange of information should be kept at a minimum." (ID #: 20)

As mentioned above, when many physicians are involved in the provision of care, information may be lost during numerous exchanges.

> "This patient had been to several of my colleagues with stomach pain for months. A few tests had been done and the patient repeatedly sent home without further to do. When he came to me I ordered a computer tomography of the abdomen and it showed liver cancer with widespread metastasis. He died two weeks later and …." (ID #: 19)

In this sample, it seems that there is evidence to suggest that continuity may be an area for improvement.

> "…if for example several physicians were involved creating a breach of continuity in the treatment. We have to admit that breach in continuity of treatment is the norm in the Norwegian health care system rather than the exception." (ID #: 15)

5.5.2.5 Clinical Intervention

Intervention may be considered the trigger for change (Pawson, 2006 p. 27). In this context, clinical interventions aim to change health status. From the data collected, interventions may be categorized into four main categories: diagnostics, treatment, procedures and communication.

Table 5-8 Clinical intervention

Clinical intervention			
Sub-category	**Property**	**Dimension**	**Sample quote**
Diagnostics	Ability to make a correct diagnosis without delay	High - Low	"…in this case there were Max points and everything, working systematically, recognising the symptoms. This feels very good, we found something wrong, there was a consequence effect, everything fit and it was easy to treat."
Treatment	Ability to give appropriate treatment without delay and undue risk to patients	High - Low	"I was the technician that solved the problem there and then by identifying the problem, deciding on treatment, putting the pacemaker in place."
Procedure	Ability to perform procedure correctly	High -Low	"I examined him with echocardiography, talked with him, evaluated that he needed a pacemaker, and gave him information about the pacemaker…"
Communication	Quality of communication	High - Low	"I took a good case history, I didn't buy the initial story, something didn't fit and I spending time on getting information from the case history I was able to make a correct diagnosis."

Diagnostics is central to uncovering a causal relationship between a symptom and pathology causing the symptom. Treatment is the process of correcting pathology and improving health. For both diagnostics and treatment, procedures

are necessary and involve some form of purposeful action intended to achieve a result. Communication (see Section 5.5.2.3) governs the flow of information necessary for diagnostics, treatment and procedures.

5.5.2.5.1 Diagnostics

Diagnostics is an essential part of health care service delivery and may be regarded as a classification process. During the process, patient conditions are classified into distinct categories. The resulting categories are the basis for medical decision making pertaining to treatment and prognosis.

> "…in this case there were Max points and everything, working systematically, recognising the symptoms. This feels very good, we found something wrong, there was a consequence effect, everything fit and it was easy to treat." (ID #: 5)

5.5.2.5.2 Treatment

Treatment is the process of remediation of a health problem following a diagnosis. In this data set, treatment is not so much about the process; the physicians are focused on deciding on treatment.

> "I was the technician that solved the problem there and then by identifying the problem, deciding on treatment, putting the pacemaker in place." (ID #: 18)

> "I decided to use the resources and take the risk, as interferon treatment could drive the patient into a depression and ultimately suicidal behaviour." (ID #: 11)

5.5.2.5.3 Procedures

Procedures are a course of action intended to achieve a result in the care of persons with health problems. In this case, this may involve diagnostic procedures like echocardiography.

> "I examined him with echocardiography, talked with him, evaluated that he needed a pacemaker, gave him information about the pacemaker,"

Procedures may also involve providing treatment in the form of prescriptions, or more technical procedures like injections or the placement of a pacemaker.

> "…yes, a prescription of controlled substances." (ID #: 2)

> "…firstly I took the patient seriously, and provided injection therapy is that cured his pain condition." (ID #: 2)

> "…we gave a temporary pacemaker and he's given a permanent pacemaker a few days later." (ID #: 19)

With diagnostic and therapeutic procedures, it is important to think of the logistics so that the process is efficient and important aspects are not missed.

> "I evaluated the whole patient, making sure that everything fit, that the diagnostic workup was logical, that the patient had received enough

information, and that the logistics and practical aspects worked out okay." (ID #: 9)

5.5.2.5.4 Diagnostics

In this research, the respondents indicate that diagnostics is an element of quality in health care. Diagnostics is an important part of clinical medicine as practiced by physicians, and is in most cases the precursor (decision base) for therapy.

> "Due to very aggressive diagnostics, we discovered that this patient has a cancer with metastasis." (ID #: 22)

5.5.2.5.5 Therapy

Respondents also indicate therapy as an element of quality. Focus is on timely and appropriate therapy suited to address the patients' needs.

> "I didn't diagnose the patient correctly and started inappropriate treatment which may have masked the symptoms. When I realised the patient was getting worse I contacted a more senior physician, a cardiologist, and he could make the correct diagnosis and start appropriate treatment but it was too late." (ID #: 23)

5.5.3 Outcome

In this study, outcome is found to be comprised of the following two constructs: diagnosis & treatment and effects (clinical and experiential outcomes). Therefore, correct and timely diagnosis coupled with institution of appropriate and timely therapy constitutes the outcome. Quality in health care is therefore defined as the ability, on both a system and individual level, to provide a correct and timely diagnosis and institute appropriate treatment for individual patients and patient populations.

In this section, the findings that map to the outcome element of quality in health care are covered. The presentation of findings explains the empirical basis for Figure 5-4, and is structured as follows. Firstly, findings related to antecedent to clinical outcomes, diagnosis and therapy are detailed, followed by findings on clinical outcomes, and finally, data related to experiential outcomes are presented.

5.5.3.1 Timeliness and Correctness of Diagnostics

Early diagnosis and treatment is frequently mentioned, indicating strong relevance. In this study, it is clear that this plays an important role in quality of health care delivery. Furthermore, it is important that the diagnosis is correct and that the process is logical and efficient.

Establishing a diagnosis quickly can in some cases be a matter of life and death. It is therefore not surprising that "early diagnosis" is an important element in how physicians define quality.

> "Due to delay in diagnosis this patient did not receive the therapy needed to save his life." (ID #: 26)

> "For example, if you have a patient with an acute coronary syndrome my standard says that you should be able to make a diagnosis as quickly as possible, and inform the patient, and treat according to available guidelines within the time limits defined in our internal procedures." (ID #: 18)

In addition to establishing a diagnosis quickly, it is also important that the diagnosis is correct. Treatment is often dictated by the diagnosis, and if the diagnosis is wrong, the prescribed treatment may not help or may even make the situation worse.

> "…when they are in a hospital they should be diagnosed quickly resulting in a correct diagnosis, and they should receive treatment. Treatment is more schematic in the way that once the diagnosis is established then the treatment is given. The patient should receive the treatment that is deemed to be the correct treatment based on the diagnosis." (ID #: 8)

Informants suggest that in order to ensure early and correct diagnosis, the diagnostic process should be rational and efficient.

> "…rational and efficient diagnostic workup. It is often the case that making a diagnosis is like going through different phases. When patients are admitted acutely, the focus is more on what needs to be done now, taking care of vital functions so that life and function is not lost. Then, it becomes more important to be more exact with regards to the diagnosis and deciding on treatment. For example, is the patient bleeding or not, in the next instance it might be a question about whether the patient has a Leiden mutation or not. The latter case is an example of a situation where more time can be spent on entering the question, also it does not have to happen while the patient is admitted, and it can be deferred to an outpatient setting." (ID #: 13)

Focus of medical research is on early diagnosis and treatment for different disease states. For example, the vast amount of research conducted on cancer in recent years has made it possible to detect, diagnose and treat cancer conditions that a few decades ago would lead to death in most patients. It has been shown that for 20 tumour types, the 5-year survival rates have increased from 1950 to 1995 (Welch et al., 2000). The main reason for this is attributed to screening, better diagnostic procedures, and resources.

> "This is a case I am uncomfortable talking about. Due to a clear focus on only part of the problem the diagnosis was missed and the patient died after about two months. I can also say that this may have been attributable to the competency of the physician doing the diagnostic procedure." (ID #: 6)

Thus, early diagnosis and effective and timely treatment reduce morbidity and prevent premature death from disease. Early diagnosis and consequent treatment depends on the patient and the physician's ability to interpret information correctly and is related to competency; see Section 5.5.1.1.2 Staff Level Competency.

5.5.3.2 Therapy

The effect of therapy can be more or less effective in solving the presenting problem. Differentiation is made between curative effect and symptomatic effect. In some cases, the symptomatic effect may be just as important dependent on the availability of curative therapies; for example, palliation for terminal cancer patients.

> "...intensive care is about two things: cure and palliation. Sometimes a cure is not available and then it is important to set therapy targets in line with what is the patient's interest." (ID #: 22)

> "Availability of effective therapy is definitely important for quality. In oncology we have quite a few patients that will have a good chance of survival in a few years, but today medicines that are effective are not available." (ID #: 6)

In this study, treatment has emerged as an element of quality of health care service delivery. The results suggest that correct treatment should be given at the right time; it should be effective and tailored to suit the patients' needs.

> "…that we give the best possible treatment within available resources limits" (ID #: 10)

> "…means that we deliver the best treatment available from a medical point of view with available resources." (ID #: 2)

> "…that we can provide treatment tailored to suit the individual patient" (ID #: 11)

Physicians strongly associate effective therapy with quality of care. The main premise identified in the data is that there is a correlation between the availability of effective therapy and quality of care, suggesting that effective therapy is necessary for positive outcomes related to the presenting problem. Overall, the results suggest that treatment should be given early; therapy should be correct, effective and tailored to suit the patients' needs.

5.5.3.3 Clinical Outcomes

5.5.3.3.1.1 Improvement

Some patients improve and live fulfilling lives as a result of the health care service provided.

> "We provided them with small backpacks with oxygen, this gave them a better life quality and they lived 15 years longer than what is normally expected with this condition." (ID #: 25)

This was a case where a special interest and curiosity led to experimental treatment for two children with downs syndrome.

> "It was a combination of being professionally interested and curiosity that made me solve the problem, and in addition it was enjoyable." (ID #: 25)

5.5.3.3.1.2 No Change

Some patients show no improvement even though resources and efforts are being made. Sometimes, parts of the health care delivery are below par, and quality may suffer as a result. As the proverb goes, 'the chain is never stronger than the weakest link'.

> "The patient is readmitted to the ICU after a while on a normal ward due to a plugged tracheal cannula. This is caused by inappropriate care of the cannula. The patient has a white lung, and in order to put it right we need to do a bronchoscopy, and in order to do a bronchoscopy we must put the patient back on a respirator. Then we are back to square one, where we were nine weeks ago." (ID #: 22)

5.5.3.3.1.3 Worse

Some patients get worse as a result of the health care service provided. For example, in interview 8, a previously healthy 65 year old Danish bricklayer suffered from complications due to premature discharge, which resulted in fibro thorax, and he can no longer work.

> "…in my opinion he was discharged way too early the first time he was admitted. He should have received longer course of intravenous antibiotics, the drain should have been kept longer and fibro lytic medication should have been instituted". (ID #: 16)

The reason for the premature discharge may have been due to an imbalance in the number of patients needing hospital admission and the available resources.

> "I think it was discharged early because there was a lot of pressure to discharge patients due to the sheer volume of patients coming into the hospital during this period, spring 2010". (ID #: 8)

5.5.3.3.1.4 Death

The outcome in several of the patient cases provided is death. Death is the end of life and is not an optimal outcome by any means, but it is not synonymous with poor quality health care service delivery. In this study, death was the outcome in 9 out of 54 patient cases provided by the subjects being interviewed. However, 2 of the 9 cases represented situations where the interview subject was very satisfied with the quality of health care service delivery. One such case (interview 20) involved a 3-year old boy with an aggressive form of leukaemia; everything in this case was done correctly and the patient still died.

> "The outcome was sad, in the end he died, because he had a very aggressive form of acute myelogenic leukaemia. The reason why I am satisfied with this case is because we came to a diagnosis very quickly and given the correct treatment very quickly." (ID #: 20)

This could indicate that physicians accept death as an inevitable and sometimes unavoidable consequence of disease.

5.5.3.4 Experiential Outcomes

In this study, experiential outcome is found to be related to patient satisfaction; and patient satisfaction is found to be a patient's expression of the experience and that he/she feels well taken care of.

> "…we have several patients with varying degrees of disease and symptoms and it's not so much about the technical quality, in other words the results of the treatment, but more about how the patient experiences the result." (ID #: 3)

> "…it is the patient's expression of his or her experience, at least the patient must feel that we haven't done what is possible." (ID #: 5)

Patient satisfaction is related to experiential quality. In this data set, patient satisfaction refers to patients being able to present relevant problems, receive answers to the questions they wish answered, made aware of the plans that the health care service is making for them, and helping them understand what is going to happen and why. In other words, it is about a feeling of being respected and well taken care of.

> "Quality is that the patient is seen, respected and treated as a whole person." (ID #: 24)

5.5.3.5 Patient Satisfaction

In this research, patient satisfaction is a sub-category of how physicians frame quality of health care delivery.

> "I see a lot of patients every day, and I think that the patient should be the focus for our efforts, the patient should be satisfied, and the patient should have a correct diagnosis and good treatment." (ID #: 12)

The results of the study indicate that patient satisfaction is related to the patients' experience with the health care service delivery.

> "Experiential quality often includes an element of feeling safe and that expectations are managed, and that the patient and next of kin has the same understanding and feeling of being well cared for". (ID #: 15)

The data here indicate that quality is something that the patient can experience, and is directly or indirectly related to the health care service provided.

5.5.3.6 Clinical Outcome

In this study, two categories of outcome are identified: clinical and experiential. Technical outcomes are related to the medical condition, and were found to lie along a continuum ranging from cure to death; please see Figure 5-4 Clinical outcome continuum. Experiential outcome is related to patient satisfaction and the dimension is high – low.

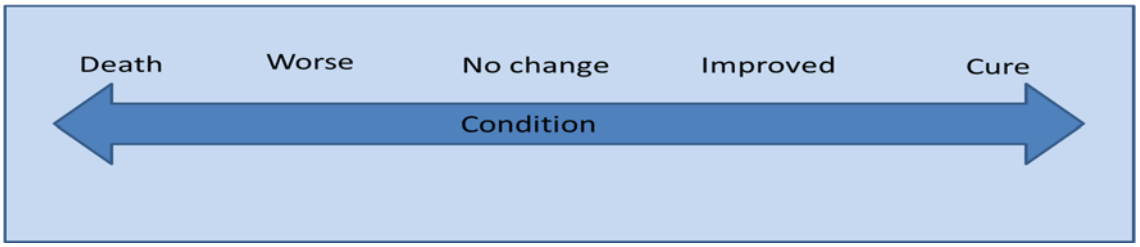

Figure 5-4 Clinical outcome continuum

5.5.3.6.1 Clinical Outcome

The frequency distribution of outcomes is of interest, as it shows that the physician perception of quality is likely to be higher with better outcomes (cured and improved), and lower if the outcome is worse or death. However, there are exceptions, as high quality was perceived in two cases where death was the outcome, and conversely, low quality was perceived in two cases where the outcome was cure; see Table 5-9 Frequency distribution of clinical outcomes for further details on distribution of outcomes. In the following sections, each of the outcomes will be described briefly and sample quotes provided; please also see Table 5-10 Clinical outcomes.

Table 5-9 Frequency distribution of clinical outcomes

	Cure	Improved	No change	Worse	Death
High quality	15	9	1	1	2
Low quality	2	2	2	8	12
Total	17	11	3	9	14

Table 5-10 Clinical outcomes

Outcomes		
Sub-category	**Property**	**Sample quote**
Cure	Condition and/or function is full restored as a result of medical intervention and/or context	"I took the patient seriously, and provided injection therapy that cured his chronic pain condition."
Improve	Condition and/or function improve as a result of medical intervention and/or context	"We provided them with small backpacks with oxygen, this gave them a better life quality and they lived 15 years longer than what is normally expected with this condition."
No change	No change in patients condition or function as a result of medical intervention and/or context	"The patient is readmitted to the ICU after a while on a normal ward due to a plugged tracheal cannula. This is caused by inappropriate care of the cannula. The patient has a white lung, and in order to put it right we need to do a bronchoscopy, and in order to do a bronchoscopy we must put the patient back on a respirator. Then we are back to square one, where we were nine weeks ago."
Worse	No change in patients condition or function as a result of medical intervention and/or context	"…in my opinion he was discharged way too early the first time he was admitted. He should have received longer course of intravenous antibiotics, the drain should have been kept longer and fibro lytic medication should have been instituted".
Death	Death as a result of medical intervention and/or context	"the outcome was sad, in the end he died, because he had a very aggressive form of acute myelogenic leukaemia. The reason why I am satisfied with this case is because we came to a diagnosis very quickly and given the correct treatment very quickly."

5.5.3.6.1.1 Cure

Some patients are fortunate and become cured or have their function (physical and/or mental) restored.

> "I took the patient seriously, and provided injection therapy that cured his chronic pain condition." (ID #: 2)

A cure is often considered the best outcome; however, it is not necessarily synonymous with quality health care service delivery. Consider the four following situations in the context of a medical outcome defined as a cure. First, a situation where good medical quality is delivered, but the experience from the patient perspective is not good. Second, a situation where medical quality is poor and experiential quality is good. Third, a situation where medical quality and experiential quality are both rated as poor. Finally, a situation where medical quality and experiential quality are both rated as good. Thus, outcome is but a piece of a complex jig-saw puzzle making up quality health care service delivery.

> "…in the end we did not manage to make a diagnosis, the patient improved slowly over time, diagnostic workup did not work well. Everyone was dissatisfied." (ID #: 15)

In this section, the findings are presented from the 54 patient cases used to query the respondents about what influences quality in health care, under what circumstances and by what mechanisms. Two categories of patients were chosen. The first category, 27 patients, was chosen on the basis that the physician indicated that he/she was very satisfied with the quality of health care in these cases. The second category, also 27 patients, was chosen on the basis that the physician indicated that he/she was dissatisfied with the quality of health care in these cases.

5.5.3.7 Classification of Medical Conditions

Context was found to be related to the patients' medical condition. In this research, medical condition was found to have two sub-categories: physical or mental disease. Each of the sub-categories was found to have several further layers defining the context at a more granular level, including acuteness, symptom and severity. The coding structure of medical condition is shown in Table 5-11 Classification of medical conditions. The table also provides frequency reporting as an indication of relevance in the # columns.

Table 5-11 Classification of medical conditions

Classification of medical conditions							
Disease type	**#**	**Acuteness**	**#**	**Symptom**	**#**	**Severity**	**#**
Physical	51	Acute	38	Clear	31	Life threatening	24
						Non- life threatening	7
				Diffuse	7	Life threatening	2
						Non- life threatening	5
		Chronic	13	Clear	10	Life threatening	3
						Non- life threatening	7
				Diffuse	3	Life threatening	1
						Non- life threatening	2
Mental	3	Acute	2	Clear	2	Life threatening	1
						Non- life threatening	1
				Diffuse	0	Life threatening	0
						Non- life threatening	0
		Chronic	1	Clear	1	Life threatening	1
						Non- life threatening	0
				Diffuse	0	Life threatening	0
						Non- life threatening	0

5.5.4 Enablers and Barriers

Two important findings emerged from the data. First, data in this study indicate that barriers and enablers are interconnected in the way that they are viewed as opposites of a spectrum. For example, availability of time may be considered an enabler and lack of time a barrier. Thus, availability of time takes on the dimension high (enabler) and low (barrier). Respondents report that enablers may be considered as absence of barriers.

> "….well, mostly the opposite of what we have already talked about. I don't know if I can find something else to say. Now, I don't think so." (ID #: 15)

Availability of time may therefore be considered an influencer. Second, constructs of quality and influencers are found to be identical.

5.5.5 Mechanism of Influence

A part of the interviews focused on asking respondents about what they would do differently if the mentioned barriers did not exist; the majority of physicians responded that they would do more of what they were already doing.

> "I would spend more time on diagnostics, making sure that we follow national and international standards for establishing diagnosis, more time on treatment and evaluation of effect and follow up, I would spend more time talking to the patients and next of kin ensuring better and more complete information. I would spend more time developing professionally and discussing cases with colleagues." (ID #: 26)

The consequence, as indicated in this data set by the projections, would be an improvement in health care service delivery in general.

> "I would probably make fewer mistakes, fewer complaints, patients would be more satisfied, expenses would probably go down, things would go smoother, we would use less time and may be able to treat more patients. It would be more fun to work, less complaints from colleagues, time to develop as a physician." (ID #: 15)

This was an unexpected finding, but quite intriguing. If physicians would simply do more of what they were already doing if the barriers did not exist, then barriers influence volition or at least the perception of perceived behavioural control at some level. This topic will be discussed in detail in the discussion section of this chapter.

5.5.6 Summary of Findings

In this section the findings in this study are summarised. A tabulated summary of the sub-categories suggested to be associated with quality in health care, influencers of health care and patient case validation, is presented in Table 5-12 Summary of findings. It is worth noting that physicians' conception of quality and influencers of quality are the same. This is relevant because medical care belongs to the category of commodities for which the product and the activity of production are identical (Arrow, 1963 p. 949).

The column labelled “Quality” in the table indicates the sub-categories associated with how physicians conceptually frame quality in health care. The column labelled “Influencers of quality” indicates the sub-categories associated with influencers (barriers and enablers) of quality in health care. The column labelled “Patient case validation” indicates which sub-categories have been validated from data in the 54 patient cases included in the data set. There are four sub-categories where the patient cases in the data set do not provide validation: evaluation, patient satisfaction, standards of care and time. Time may be considered a subset of resource, as it is associated with the temporal availability of the physician as a resource in the production of health care. Thus, evaluation, standards of care and patient satisfaction are not validated sub-categories

Table 5-12 Summary of findings

Sub-category	Property	Dimension	Quality	Influencers of quality	Patient case validation	Element
Competency	Availability of necessary competency (knowledge, experience and skill)	High - Low	X	X	X	Context
Communication	Ability to communicate, get and give necessary information in a tailored manner	High - Low	X	X	X	Process
Continuity	Level of continuity of care	High – Low	X		X	Context
Diagnostics	Ability to correctly diagnose patients without delay	High - Low	X	X	X	Process
Evaluation	Ability to evaluate and learn	High – Low	X			Process
Organization	Organization of work that support delivery of health care	High – Low	X	X	X	Context
Patient	Willingness to cooperate and adhere to medical advice given	High - Low	X	X	X	Process
Patient satisfaction	Level of experiential quality	High - Low	X			Outcome
Physician attitude	Ability to show and real interest and level of curiosity	High - Low	X	X	X	Process
Resources	Availability of necessary technical, building and human resources	High - Low	X	X	X	Context
Standards of care	Availability and adherence to guidelines	High Low	X			Context Process
Therapy	Ability to correctly treat patients without delay	High - Low	X	X	X	Process
Time	Availability of time to do what is necessary	High - Low	X	X	X	Context

Furthermore, the data suggest that influencers of quality in health care exert influence by modulating the perceived behavioural control of physicians while supplying effort into the production of health care.

Continuity of care is not considered to be an influencer. The reason for this finding may be due to the fact that continuity of care is related to organization. It is noted that discontinuity is the rule rather than the exception in the dataset.

> "Theoretically, one could imagine that organisational issues could have an impact, if for example several physicians were involved creating a breach of continuity in the treatment. We have to admit that breach of continuity in treatment is the norm in the Norwegian health care system rather than the exception." (ID #: 15)

Evaluation is not considered to be an influencer and is not validated by patient cases. This may indicate that evaluation is necessary for developing quality in health care, but does not influence quality directly. However, logically, feedback should provide real time learning and be a basis for experience. This researcher's personal experience is that feedback is received on an infrequent basis, and may therefore be missed during sampling. The same arguments can be made for patient satisfaction, another subcategory not considered to be an influencer; and not validated by patient cases.

Also, standards of care (guidelines) were indicated not to be an influencer. This finding may be due to the fact that the link between standards of care and quality is by way of adherence.

> "Quality is then defined as how well you managed to live up to the standard defined by the medical community. Decisions take place continuously and it is about how close to the standard you manage to practice." (ID #: 13)

In order to gauge adherence, it is necessary to evaluate or measure. The data in this study indicate that physicians do not formally measure quality. Thus, it may be argued that physicians do not measure guideline adherence. The results for standards of care, therefore, follow those of evaluation.

In this study, the findings suggest that bio-medical context is a differentiating factor of quality constructs. The most notable differentiating contextual factors are acuteness and severity of medical condition. However, these differentiating contextual factors may in themselves be influencers of quality.

> "If for example a patient comes in with chest pain, it is important that the physician can differentiate whether this is just due to pain and the muscles or if it is an acute myocardial infarction which potentially could kill the patient." (ID #: 24)

Bio-medical factors are therefore found to contextualize medical decision making, and thus supply of effort by physicians in the delivery of care for patients.

5.6 Discussion

The discussion is structured around the identified key findings representing physician perception of quality health care delivery, compared and contrasted with evidence from the literature. This starts by considering what has been added before discussing what has been confirmed. Next, a discussion of what has been

challenged is provided. Then, the author discusses theoretical implications. Finally, a conceptual framework for quality in health care delivery is proposed.

5.6.1 What has been Added

Quality in healthcare is dependent on the interaction between physicians and patients. These interactions are complex for five main reasons. First, physicians are the decision makers on behalf of patients, payers, providers and producers. Second, decisions are made in the context of information asymmetry and uncertainty; and no unified theory of medical decision exists. Thus, deciding how to decide is important. Third, quality is non-contractible and physician effort is unobservable. Models abstracting the complexity of medical decisions into a single measurable item give the impression that treatment decisions are more easily monitored and controlled than they really are (McGuire, 2001 p. 527). The physician is an "experience good"; patients must experience the physician and make an inference about quality. Fourth, physicians may set levels of quality to influence demand, and may do so motivated by self-interest. Physicians may therefore influence quality by adjusting effort in a situation where demand is not under physician influence. Finally, a unified definition of quality in health care does not exist and there are more techniques to measure it than definitions.

This study adds the physician perspective of this complex and cloaked process of decision making, employing content analysis of textual data collected using a semi-structured interview technique. In so doing, this study makes six contributions by extending or adding to current knowledge. First, Donabedian's system model of quality is extended. Second, bio-medical contexts are found to define the spectrum of possible clinical outcomes. Third, antecedents to clinical outcomes are found to be more stable indicators of clinical quality than health outcomes. Fourth, quality constructs are identified as influencers; in other words, physicians define quality by what defines their spectrum of choice. Fifth, the predominant mechanism by which influence is exerted on supply of effort is revealed to be perceived behavioural control. Finally, the semi-structured interview technique provides a richer data set than the repertory grid.

5.6.1.1 Extending Donabedian's Quality Model

The study adds two extensions to Donabedian's (1979) elements of quality. First, it is proposed that structure is a sub-set of context. Patient level bio-medical contexts define the spectrum of possible clinical outcomes given current available medical knowledge and technology. Project One identified patient-level biomedical contexts as an important influencer of physician decision making. Project Three identified and classified bio-medical contexts perceived by physicians to influence quality of health care. Donabedian's definition of structure, which is focused on resources (material and human) and organization, omits bio-medical aspects altogether. Thus, structure is a subset of context. The elements of quality in health care are therefore: context, process and outcome. Second, it is proposed that diagnosis and choice of therapy are valid measures of clinical quality. Clinical outcomes which are perceived to influence quality have been identified and classified in this project. Furthermore, the respondents claim that poor clinical outcomes do not translate to poor quality of healthcare (see Section 5.5.3.3.1.4 on page 262). This finding may at first seem contradictory, but

is linked to biology and the physician's understanding and expectation of bio-medical consequences of clinical outcomes. Thus, change in health status on its own is not a valid measure of quality in healthcare. It is proposed that the antecedents to clinical outcome are a better measure of clinical quality; for example, if the correct diagnosis is made without delay and results in institution of appropriate therapy without delay, then the clinical outcome is dependent on the medical condition. Clinical outcomes can therefore not be evaluated without considering the bio-medical context. However, diagnosis and choice of therapy can be measured temporally and with respect to correctness. Thus, it is suggested that diagnosis and therapy are valid measures of clinical quality.

5.6.1.2 Bio-Medical Contexts and Antecedents to Clinical Outcomes

Empirically, the study revealed that bio-medical factors such as severity, acuteness and clarity of symptoms, contextualize medical decision-making. Severity of condition refers to the degree of organ abnormalities or decompensating of normal bodily functions. Severity is therefore an important determinant of when to institute medical intervention; for example, acute airway obstruction requires a resolution within a few minutes. Clarity of symptoms refers to the fit between symptom and diagnosis; for example, an uncharacteristic headache may indicate anything from stress to severe intracranial abnormalities. Acuteness refers to a rapid onset of symptoms and/or short course. It is easy to confuse acute with severe, but it is possible for a disease to be acute but not severe; for example, the common cold is considered an acute disease, but generally mild. On the other hand, acute myocardial infarction is both acute and severe in nature.

Severity of condition is found to mandate a temporal course of action, and as such, influences supply of physician effort. In addition, clarity of symptoms and acuteness are found to modulate the effect of severity. For example, the respondents claim that chronic patients with diffuse symptoms transfer negative energy to the physician, influencing the supply of effort. Physicians may make decisions on choice of therapy based on either symptoms or diagnosis alone, or in combination. It has been shown that the use of both symptoms and diagnosis result in the lowest error rate with regard to choice of therapy (Adelhard et al., 1996).

It is proposed that maximum supply of effort occurs under conditions characterized by high degree of severity, clarity of symptoms and acute onset. However, the perception of these constructs during the course of disease is likely to vary from day to day and from physician to physician, thus making the supply of effort unpredictable.

5.6.1.3 Quality Constructs and Influencers

This study adds granularity to the quality constructs identified in Project Two. The second project of this DBA identified and classified constructs of physicians' quality conception while providing care for patients. This project validated the findings from Project Two and provides information about the activities related to the constructs, the mechanisms and the impact. Thus, Project Three provides a

road map for stakeholders in health care, which provides valuable information when designing and implementing interventions.

Project Three was designed to address the question of enablers and barriers in health care. Enablers and barriers were found to be identical to the quality constructs. Project Two set out to explore physicians' conception of quality. The study resulted in eleven key constructs, representing a static map of how physicians construct quality. Project Three, on the other hand, set out to extend the understanding of quality by exploring enablers and barriers. The study revealed a set of quality constructs similar to that found in Project Two, but also found that enablers and barriers were represented polar opposites of a dimension of the identified quality constructs. Physicians supply effort into the delivery of health care, and this effort is considered equal to quality (Ma and McGuire, 1997, McGuire, 2001). Since the perspective of the phenomenon of interest is that of the physician, it is natural for the physician to consider influencers of physician effort as quality.

5.6.1.4 Mechanism of Influence

Project One revealed two sets of factors influencing physician decision making; however, the link to quality was missing. From a quality perspective, Project One provides information related to context and interventions influencing the process of health care delivery. Furthermore, the findings of Project One indicate that perceived behavioural control at the physician level is an important mechanism by which influence is exerted. However, a link to outcomes were found to be missing in extant literature. Project Two revealed eleven key constructs representing physicians' conception of quality, and this project further informs the phenomenon of interest by exploring enablers and barriers of quality. The findings of this study reveal that physicians view the absence or presence of the constructs as enablers or barriers, thus adding a dimension to the construct. Also, this indicates that physicians' perception of quality is shaped by the spectrum of choice available to them while making clinical decisions. In fact, when asked what they would do differently if the barriers did not exist, the respondents claim "more of the same". Thus, this project provides empirical evidence to support the findings from Project One, that perceived behavioural control is the predominant mechanism of influence of supply of physician effort in the delivery of health care.

5.6.1.5 Point of Influence

The constructs mapping to the context element of quality are claimed to be influencers of quality by the respondents in this study, as covered in Section 5.5.1 from page 239. Furthermore, context is found to define the spectrum of choice. The prevailing mechanism of influence is the perceived behavioural control, and context is found to influence quality by defining the spectrum of choice. Thus, it is proposed that the point of influence is context.

5.6.1.6 Semi-Structured Interview

Several scholars, for example Goffin (2002) and Lemke et al. (2011), claim that repertory grid technique is better suited to revealing granular data of complex phenomena. However, the finding of this study is that using a semi-structured interview technique provides a richer data set. Therefore, in the context of health

care quality, the semi-structured interview technique may be better suited to examining complex phenomena than repertory grid technique.

5.6.2 What has been Confirmed

In this section, the findings of the study are discussed where agreement with evidence presented in previous DBA projects and literature is high. First, there is evidence to support Donabedian's systems approach to defining and assessing quality in health care. Second, there is evidence to support the use of the Theory of Planned Behaviour in a health care context. Third, there is evidence to support the use of Agency Theory in a health care context. Fourth, the semi-structured interview technique is found to be a valid method for investigating complex phenomena related to quality in health care. Fifth, bio-medical contexts are confirmed to be important factors in determining the spectrum of possible clinical outcomes and they influence physicians' decisions. Finally, quality constructs identified in Project Two have been validated using triangulation of methods.

Table 5-13 Comparison of constructs between Project Two and Three

Element	Construct	P2	P3	Theory	Theoretical concept	Reference example
Process	Communication	X	X	TPB	Attitude	Ajzen 1991, p. 198
				Agency	Risk: monitoring and negotiation	Conlon & Parks 1990, p. 607
	Correct interpretation of information	X		TPB	Control belief	Ajzen 1991, p. 204
				Decision	Causal vs. diagnostic interpretation	Einhorn & Hogarth 1981, p. 65
	Continuity	X	X	TPB	Control belief	Ajzen 1991, p. 199
	Physician attitude, including responsibility for provision of care	X	X	TPB	Control belief & Social norm	Ajzen 1991, p. 199
	Patient		X	Agency	Moral hazard & adverse selection	Eisenhart 1989, p. 72
Context	Resource availability	X	X	TPB	Control belief	Ajzen 1991, p. 188
	Resource utilization	X		TPB	Control belief	Ajzen 1991, p. 188
	Time	X	X	TPB	Control belief	Ajzen 1991, p. 188
				Agency	Moral hazard & adverse selection	Conlon & Parks 1990, p. 619; Eisenhart 1989, p. 70
	Cooperation and organization	X	X	TPB	Control belief	Ajzen 1991, p. 188
				Agency	Moral hazard & adverse selection	Eisenhart 1989, p. 72
	Competency (including experience)	X	X	TPB	Control belief	Ajzen 1991, p. 203
				Agency	Adverse selection	Eisenhart 1989, p. 61
				Decision	Habit persistence	Ajzen 1989, p. 203
	Standards of care		X	Decision	Causal vs. diagnostic interpretation	Einhorn & Hogarth 1981, p. 65
	Evaluation		X	Decision	Reinforcement: positive outcome feedback	Einhorn & Hogarth 1981, p. 79
Outcome	Early diagnosis and treatment	X	X	TPB	Control belief	Ajzen 1991, p. 204
				Agency	Risk: random market effect	Conlon & Parks 1990, p. 610
	Effect of therapy, outcomes (clinical and experiential)	X	X	TPB	Control belief	Ajzen 1991, p. 204
				Decision	Reinforcement: positive outcome feedback	Einhorn & Hogarth 1981, p. 79

Physicians frame quality in health care delivery in both Project Two and Project Three, as in Table 5-13 Comparison of constructs between Project Two and

Three similarities and differences. Since patient cases were used in both studies, physician conception of quality is linked with actual clinical practice, and the findings in Project Two and Three are homogenous.

5.6.3 What has been Challenged

This study provides two main challenges to currently accepted knowledge, and in addition, questions the traditional organization of health care service. First, evidence presented in this study indicates that Agency Theory and TPB alone are insufficient in predicting behaviour, and thus effort and quality, with respect to quality in health care. Second, the current approach to ensuring quality in health care is counterproductive because it discounts the influencers of effort supplied into its production and hence quality. Finally, the findings in the study challenge the current thinking and organization of health care services.

The first challenge concerns the application of Agency Theory and TPB in the context of a patient-physician dyad. The evidence provided in this study suggests that both theories need to be combined in order to be able to predict effort. On one hand, Agency Theory, or more specifically, physician agency states that effort is not observable and hence quality non-contractible (Ma and McGuire, 1997). However, TPB holds that behavioural intent is an immediate precursor to behaviour and has been shown in studies to have predictive power (Godin et al., 2008). In this context, effort and behaviour are considered to be synonymous. Thus, TPB claims to predict what Agency Theory cannot. The evidence presented in this study indicates that information asymmetry and perceived behavioural control may be linked, and that a combined use of Agency Theory and TPB is necessary in order to overcome the challenge posed by the patient-physician dyad.

The second challenge provided by this study is related to process management of quality in health care. Chandrasekaran et al. (2012) investigated the effect of Centres for Medicare and Medicaid Services (CMS) process management on quality. CMS developed a set of core measures for common and serious health conditions. The authors found a positive effect on technical quality and a negative effect on experiential quality. CMS process management aims to reduce variation, and thus experiential quality suffers as the variability necessary for meeting patient expectations is reduced (Pettersen et al., 2004).

The results of this study suggest that if barriers to quality in health care service delivery did not exist, they would do more of what they were already doing. This finding suggests that perceived behavioural control is influenced by the barriers. The CMS process discounts the underlying mechanisms for influence of physician effort supplied into the production of health care, and focuses purely on measuring effort proxies retrospectively.

The consequence of the traditional organization of medical services is that the patient first meets the most inexperienced physician. This research finds that physicians claim experience to be central to making a correct and timely diagnosis with the appropriate therapy. However, senior physicians are likely to

be found far from the ER. The consequence is that the patients must wait for decisions to be made, thus delaying diagnosis and appropriate therapy.

5.6.4 Theoretical Implications

In this section, the findings of the study will be discussed employing Agency Theory, TPB and realist synthesis (context, intervention, mechanism and outcome). First, a brief overview of the main tenets relevant to this discussion is provided. Next, the evidence presented in this study employing agency and TPB perspectives is examined.

5.6.4.1 Agency Theory and TPB

From a theoretical perspective, evidence presented in this study is of particular interest because it provides empirical evidence of a link between two theoretical frameworks (agency and TPB) when applied to the patient-physician dyad.

In clinical medicine, the patient has a medical need and delegates work to the physician, who in turn supplies effort into the production of health care. How is effort to be understood in this context? Effort is defined as the physician's input into the production of health care for the patient, and can also be understood as quality; and is simply non-observable and hence non-contractible (McGuire, 2001 p. 466). If the input is non-observable, information asymmetry must exist. This is a natural consequence of the expert role the physician has when providing health care. In the context of the patient-physician dyad, Agency Theory posits that the physician supplies effort into the production of health care, information asymmetry exists and that effort is unobservable as a consequence.

Control of volition is an underlying assumption of TPB (Ajzen, 1991). Evidence in this study strongly suggests that perceived behavioural control is the central mechanism by which enablers and barriers exert influence (see Enablers and Barriers)

Two important findings emerged from the data. First, data in this study indicate that barriers and enablers are interconnected in the way that they are viewed as opposites of a spectrum. For example, availability of time takes on the dimension high (enabler) and low (barrier). Respondents report that enablers may be considered as absence of barriers.

"…well, mostly the opposite of what we have already talked about. I don't know if I can find something else to say. No, I don't think so." (ID #:15)

Availability of time may therefore be considered an influencer. Second, quality constructs and influencers are found to be identical.

5.6.4.2 Mechanism of influence

In an ideal world where barriers do not exist, physicians will not do anything different other than more of what they are already doing. Thus, the evidence indicates that physicians will not change what they are doing, but effort supplied by physicians may be influenced. It can therefore be argued that "the will to act" (behavioural intent) is present in a clinical setting and may be considered a

constant. It is therefore possible for the TPB constituents, attitude and social norm, to be considered constant in a clinical setting.

From a practitioner perspective and the researcher's personal experience, this makes sense, as the drive to help others may be considered strong in the medical profession because there is a concern for medical ethics (Arrow, 1963). Thus, the combination of both intent and perceived behavioural control may be used to predict actual behaviour, as asserted by Ajzen (1991) p. 184. Keeping behavioural intent constant, the probability of actual behaviour becomes dependent on perceived behavioural control, which in TPB is assumed to be dependent on prerequisite opportunity and resource. The availability of requisite opportunities and resources (e.g., time, money, skills, cooperation of others) collectively represents physicians' actual control over behaviour related to health care service delivery (Ajzen, 1985, Ajzen, 1991 p. 182).

5.6.4.3 Linking Agency Theory and TPB

Linking effort from Agency Theory and behavioural intent from TPB will be the focus of the rest of this discussion. The argument has already been made that the physician supplies effort into the production of health care, information asymmetry exists and that effort is unobservable as a consequence. Furthermore, it has been argued that evidence provided in this study suggests that perceived behavioural control may be a variable factor when predicting actual behaviour in the context of the patient-physician dyad. How are these arguments to be understood together?

The limit of information asymmetry may be described by considering a situation where the physician has full information; knows everything that is relevant to know in the situational context, i.e. has superior information. From the argument made above, the consequence would be that resulting physician effort would be non-observable. However, if information asymmetry did not exist, then both patient and physician would have full information, and effort would be observable. The underlying assumption of value in the patient-physician dyad is that the physician is the expert and has more information; hence, a natural situation of information asymmetry. Thus, information asymmetry may regulate level of physician effort available for observation.

Information asymmetry in the context of patient-physician dyad is dependent on the physician having superior information. Thus, it may be argued that the more "expert" the physician is, the greater the information asymmetry. However, when a physician engages in decision making on behalf of the patient, uncertainty is reduced by having superior information. Uncertainty has been claimed to be a strong influencer of physician behaviour (Arrow, 1963).

Having "superior" information touches on two findings, as evident in this study. First, communication is an important tool for exchanging information, and may both increase and reduce information asymmetry. Second, competency is related to how "expert" the physician is, and is central to information asymmetry in clinical practice. Thus, communication and competency may influence the level of information asymmetry in the patient-physician dyad. In this context, competency is of special interest, as it may be argued that with increased physician

competency, uncertainty is reduced and information asymmetry increased. Lai (2002) has defined competency as the ability to meet today's and tomorrow's challenges; in other words, to have knowledge, skills, abilities and attitudes suited to accomplish tasks and challenges. Thus, the more competent the physician is, the more likely it is that effort will be supplied, but the effort is also more likely to be non-observable. The implication is that with increasing specialisation of medical practice, effort supplied into its production becomes increasingly clouded. Thus, having insights into this issue is of importance.

It has been argued in this study that information asymmetry may influence physician effort by modulating uncertainty. From a TPB perspective, it may therefore be argued that perceived behavioural control is in part influenced by information asymmetry. Perceived behavioural control is assumed to be dependent on prerequisite opportunity and resource, and the evidence provided in this study confirms this assumption; organization and resource are found to be influencers of quality.

The study provides empirical evidence to support perceived behavioural control as the mechanism by which enablers and barriers exert influence on physician effort supplied in the production of health care. From an agency perspective, the patient-physician interaction is associated with information asymmetry, which may influence physicians' uncertainty when making decisions on behalf of patients. Thus, information asymmetry may be considered a modulator of physician perceived behavioural control in clinical practice. Evidence provided in this study suggests that information asymmetry is influenced by communication and competency. From a TPB perspective, perceived behavioural control is influenced by organization and resource. Thus, the study provides evidence to support the need for both Agency Theory and TPB when considering quality in health care.

5.6.5 Proposed Conceptual Framework

In this section, a conceptual framework for quality in health care is proposed, based on how physicians conceptually frame quality of health care delivery. The framework takes into account the findings from this study, elements of quality and the three theoretical domains identified in Project One.

5.6.5.1 Extension of Quality Elements

The evidence in this study signals that context may be an element of quality; see Section 5.5.1 from page 239. Therefore, an extension is proposed to the three elements of quality originally suggested by Donabedian (1978): structure, process and outcome. The proposed extension is context, and it is defined by the acuteness of medical condition, clarity of symptoms and severity.

When considering effort and elements of quality, it is logical that effort is part of the process, and that it may be influenced by elements including and preceding process; see Figure 5-5 Extended elements of quality. Thus, factors that are categorized within each of the elements of quality may influence the effort supplied by the physician.

Figure 5-5 Extended elements of quality

Structure is comprised of resource availability, resource utilization, time, cooperation and experience. All five constructs are grounded in the Theory of Planned Behaviour and related to control beliefs and perceived behavioural control. Three of the constructs are also grounded in Agency Theory; experience, cooperation and time. Information asymmetry and risk are defining constructs of influence in the Agency Theory context. Finally, experience is grounded in Decision Theory and related to habit persistence.

Process is comprised of communication, correct interpretation of information, continuity of care and responsibility of care. All constructs are grounded in Theory of Planned Behaviour and related to control beliefs and perceived behavioural control. Communication is also grounded in Agency Theory and related to risk through monitoring and negotiation. Correct interpretation is grounded in Decision Theory and linked to causal and diagnostic interpretation of information.

Outcome is comprised of early diagnosis and treatment, and effect of therapy. Early diagnosis and treatment are grounded in Theory of Planned Behaviour and Agency Theory. The link to theory is through control beliefs and perceived behavioural control, and information asymmetry and risk, respectively. Effect of therapy is grounded in Theory of Planned Behaviour and Decision Theory. From a Theory of Planned Behaviour perspective, effect of therapy is associated with control beliefs and perceived behavioural control. From an agency perspective, effect of therapy is linked with reinforcement through positive outcome feedback.

5.6.5.2 Proposing and Explaining the Conceptual Framework

The discussion in this section follows the flow in the proposed framework visually represented in Figure 5-6 Proposed conceptual framework.

The moment of truth in medicine takes place when patient and physician interact, and the primary reason for this interaction is that the patient has an unresolved medical need. Patient-physician interaction in an agency context that mandates patient engagement in the process of work delegation, as is evident from the findings of this study. When presented with a patient's medical need, it is widely stated that it is the physician's perception of this need (patient expectation) that is the main influencer (Mangione-Smith et al., 1999, von Ferber et al., 2002, Hyde et al., 2005, Lado et al., 2008). In the agency context, the patient (principal) delegates work to the physician (agent). The physician supplies effort into the production of health care, but the effort cannot be observed and can therefore not be predicted in advance.

Why can effort not be predicted in advance? The patient interaction takes place in the context of information asymmetry and uncertainty. Since the physician is the "expert", he/she holds more information than the patient, and this creates a

situation of information asymmetry. However, the physician is not “all knowing”, and thus makes decisions under conditions of uncertainty. Since it is not possible to know what the physician knows when deciding to supply the effort, it is also not possible to predict the effort in advance, but it can be observed in retrospect. Evidence presented in this study suggests that contextual, structural and procedural influencers may determine the effort supplied by the physician in the production of health care.

Since, according to Agency Theory, it is not possible to predict the behaviour of a physician in advance, the question of interest is: what influences physician behaviour (effort)? There are several theoretical frameworks to describe behaviour, but TPB is the one that is most widely studied and recognized to predict behaviour in a health care context (Godin et al., 2008).

What is effort in this context? Physicians supply health care by diagnosing and treating patients when performing their duties; i.e., the physician does something that results in a diagnosis and treatment. Thus, effort in the context of health care may be considered behaviour associated with diagnosing and treating patients.

TPB holds that attitude, social norm and perceived behavioural control influence behavioural intent, the antecedent to actual behaviour (Ajzen, 1991). The findings of this study suggest that perceived behavioural control is an influencer of physician behaviour while delivering health care. Perceived behavioural control is about the freedom to act. Consider the following excerpt from ID #11:

> “I: what facilitates you in delivering good quality health care services?
> R: freedom to act.”
> I: what you mean by freedom to act?
> R: that I have time, resources and a team to do the job. This is in line with new public management, where I believe that the most benefit will be achieved by giving me the freedom to act.”

What influences the freedom to act? TPB is based on the assumption of volitional control, and holds that there are two levels of perceived behavioural controls: external and internal (Ajzen, 2002). The external level is related to external structural elements; for example, ‘I cannot perform the surgery because I do not have a knife’. The internal level is more abstract and relies on whether one believes that one can succeed when the external level is satisfied; for example, ‘I have the knife, but I am not sure I am competent to perform the surgery’.

Finally, the effort supplied into the production of health care results in an outcome at the patient level. However, the outcome does not influence the perceived behavioural control. Past behaviour, experience in this context, is important because perceived behavioural control may mediate past on later behaviour (Ajzen, 1991 p. 204). Thus, outcome may influence later behaviour.

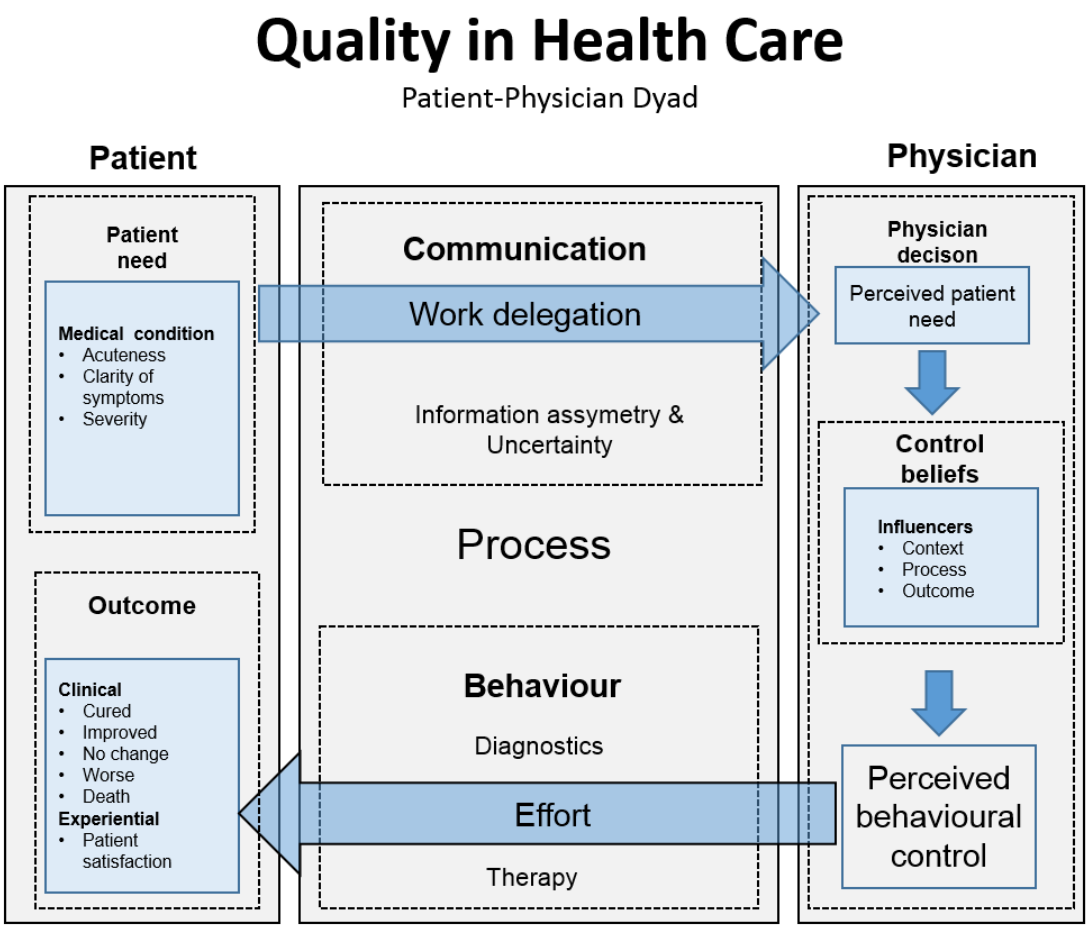

Figure 5-6 Proposed conceptual framework

5.7 Summary and Conclusions

In this section, a summary and conclusions are provided, starting with a summary of contributions, followed by the implications for policy and practice, the strengths and limitations of the study, and finally, suggestions for further research.

5.7.1 Summary of Contributions

The objective of this study was to gain a fuller understanding of quality in health care by exploring enablers and barriers from a physician's perspective. This exploratory research has enabled making a contribution to the understanding of quality in health care:

1. Findings in the study validate the systems approach to quality in health care. Furthermore, the quality model proposed by (Donabedian, 1979) is extended.
2. The study integrates three hitherto separate theoretical domains, providing a lens to better understand the complexities of health care quality.
3. The study validates the appropriateness of using semi-structured interview techniques when investigating complex individual, organisational and/or

managerial phenomena in health care; in fact, the semi-structured interview technique is found to provide data with valuable additional insights to the ones provided by the repertory-grid technique.
4. Constructs identified in Project Two are validated.
5. Enablers and barriers are found to represent polar opposites of a quality construct dimensions.
6. The predominant mechanism of influence is revealed to be perceived behavioural control.
7. Bio-medical contexts are found to define the spectrum of outcomes; thus, the direct antecedents to clinical outcomes are found to be a more stable base for quality assurance.
8. Context is identified as the point of influence of physicians' supply of effort when providing health care.
9. A conceptual framework is proposed. The model presented integrates the study findings with elements of theory from different academic areas, such as medicine, economics, management and psychology.

5.7.2 Implications for Policy and Practice

In this section, implications for stakeholders in the health care value chain are discussed: payers, providers and producers. Payers refers to policymakers, regulators and payers. Providers refers to hospital management and practitioners (physicians). Producers refers to the pharmaceutical and technological industry. In addition, institutions are added, as there may be implications for medical education and research. Finally, implications for patients are provided.

Deriving guidelines for policy making and practice from research is in itself a complex phenomenon. Realist synthesis and evaluation (Pawson et al., 2004) emerged as an approach to synthesise 'what works, for whom, in which circumstances…' The realist synthesis methodology suggested by Pawson et al. (2004) is where the focus is on gaining insights from the respondent perspective about the relationship between context, intervention, mechanism and outcomes (CIMO). Pawson (2006) states that "the generative model calls for a more complex and systemic understanding of connectivity. It says that to infer a causal outcome (O) between two events (X and Y) one needs to understand the underlying generative mechanism (M) that connects them and the context (C) in which the relationship occurs". Thus, intervention may be considered the trigger for change (Pawson, 2006 p. 27). In this context, interventions aim to change health status. Mechanisms describe what it is about the intervention that triggers change to occur. Pawson (2006) p. 23, defines mechanisms "as engines of explanation in realist synthesis", as "we rely on mechanisms to tell us why interconnections should occur". Employing the CIMO logic to the results in this study is of value, as it helps derive clear implications for policy and practice.

The context in which this study has been conducted is that of prepaid health care. When health care is prepaid, fees for service do not regulate demand (Friedman and Gould, 2007). The consequence for the physician in this context is that the physician does not have mechanisms at his disposal to regulate demand (McGuire, 2001). Thus, if demand increases and resource is fixed, the effort per patient may decrease as a result. Evidence from this study suggests that

physicians adjust effort into the production of health care in line with demand. Physicians therefore seem to accept variability in effort as a consequence of variability in demand. However, data suggest that the physicians' view on this is that the result is lower quality.

It is also possible for an employer to take advantage of a physician's ethical constraints and organize health care delivery in such a way that the physician is forced to supply more effort to ensure the patient attains an acceptable outcome (McGuire, 2001 p. 61); this case would be an example of how the health care service delivery is organized and resourced.

Intervention in the CIMO context is to be understood as physician effort supplied into the production of health care, and consequently, quality in health care. The underlying generative mechanism is the physicians' perception of behavioural control. Outcome is considered as quality in health care. Therefore, in a context of prepaid health care, physician effort supplied into the production of health care is dependent on the physicians' perception of behavioural control of that effort.

5.7.2.1 Implications for Providers

The findings in this study should be of particular interest to physicians in clinical medicine. This study indicates that physicians' perceived behavioural control is tightly linked with quality in health care service delivery, and physicians need to be cognisant of this fact when performing their duties. The paradox is created by the coexistence of two opposing operational modes: systematic control on one side, and improvisation on the other. To resolve or reconcile this apparent paradox requires empowerment of physicians to make decisions on behalf of the stakeholders in the health care value chain. However, strategies to prevent moral hazard and adverse selection should be implemented at the physician level.

In order to enhance quality of health care provided, physicians may need to consider

- Patient communication
- Organization and resourcing when contributing to define health management processes
- Medical education and postgraduate training to ensure appropriate staff level competencies

5.7.2.2 Implications for Health care Organizations

This study provides important information for institutions for three main reasons. First, the supply of physician effort is linked to quality in health care delivery. Thus, factors influencing physician effort may be of interest for institutions from an organizational and research perspective. Second, how institutions are organized and resourced is claimed to influence quality in health care. Thirdly, physician competency is an influencer of supplied physician effort, and hence quality in health care. Thus, medical training at all levels should be a key focus. Finally, antecedents to clinical outcomes are found to be a more stable measure of outcome than change in health status. This finding could provide grounds for a validated tool to measure effect of change on quality.

Health care organisations may need to consider the findings of this study when

- Structuring medical departments
- Deciding on resourcing
- When controlling physician
- When planning physicians' careers with respect to current and future competency needs

5.7.3 Strengths and Limitations

The study was designed to capture how physicians frame quality of health care delivery in a hospital setting. The interview subjects in this study provide real patient cases where the patient outcome was death, either indirectly or directly caused by the physician interviewed. This is a testimony to the first two criteria suggest by (Gottschalk et al., 1945); see Table 5-14 Checklist of criteria suggested by Gottschalk et al (1945, p. 35).

With respect to the third criteria, the author has been as diligent as possible to provide example quotes to substantiate every inference made from the data in this study. The use of low inference descriptors, such as quotes, is described as a strategy for improving quality of qualitative research (Johnson, 1997 p. 283). Finally, both the DBA Project Two and literature have been used to corroborate the evidence presented.

Table 5-14 Checklist of criteria suggested by Gottschalk et al (1945, p. 35)

#	Description	Checked
1	Was the ultimate source of the detail (the primary witness) able to tell the truth?	Yes
2	Was the primary witness willing to tell the truth?	Yes
3	Is the primary witness accurately reported with regard to detail under examination?	Yes
4	Is there any external corroboration of the detail under examination?	Yes

Though qualitative research does not seek statistical generalizability, but generalizability to theory, there are elements that help establish the quality of the study. First, low inference descriptors (quotes) have been widely used. Second, theory triangulation has been employed; Agency Theory, TPB and Decision Theory have been used. Finally, discussions with peers and implementation of findings in practice have yielded accepted changes in the way emergency medical care is organized on a national level. This topic is now being keenly debated by the Prime Minister and Minister of Health as a run up to this autumn's election.

One weakness of the interview technique is that there may be a limited scope for the respondent to answer questions in sufficient detail or depth. In order to ensure sufficient detail and depth in the responses, a laddering technique was employed by asking follow-up questions.

Furthermore, during the interview, the researcher may influence the way a respondent answers various questions, thereby biasing the responses. The researcher followed the interview guide closely and made every effort possible

not to influence the answers provided. Open ended questions with laddering were employed.

The researcher (native Norwegian speaker) transcribed and translated all the transcripts. Both the transcription and translation process may be a potential weakness. Kvale and Brinkmann (2009) p.187, note that it is important to be mindful of the fact that “the publication of incoherent and repetitive verbatim interview transcripts may involve an unethical stigmatization of specific persons or groups of people”. Thus, the transcription and translation was performed for meaning - and not verbatim.

Well established approaches to minimize bias were employed when capturing, reporting and analysing data, thus minimizing the risk of bias and ensuring quality.

5.7.4 Suggestions for Future Research

This study has identified how physicians frame quality in health care delivery, identified influencers in quality health care service delivery, and may serve as a framework for further studies in this field. The model presented in this study would benefit from further mathematical development and prospective testing; thus, further studies validating the framework presented in this research are warranted.

Several scholars, for example Goffin (2002) and Lemke et al. (2011), claim that the repertory grid technique provides a deeper understanding of complex issues than exploratory investigations employing semi-structured interview techniques. This is not evidenced in this study, as Project Three provided greater granularity to the constructs of quality first identified in Project Two. Therefore, investigation of methodologies examining complex issues in health care is an opportunity for further research.

Diagnosis and treatment were found to be more stable measures of clinical outcome than change in health status. This finding warrants further investigation and is currently being reviewed by this researcher as a possible avenue to validate a measure of quality. The utility of such as tool is the ability to measure change in a complex organization after interventions either to context or process have been implemented.

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APPENDICES

Appendix A PROJECT ONE

This section contains appendices and tables for the systematic review (DBA project 1).

A.1 Protocol

A.1.1 Overview

The protocol outlines the focus, methodology and tools to conduct a systematic review on influencers of physician prescription behaviour. The purpose of the review is to study literature in order to gain an understanding of the above stated phenomenon of interest. Specifically the review will, identify and map factors under the influence of the pharmaceutical industry having a bearing on physician decision behaviour when prescribing.

This protocol provides a background to frame the review. It then summarizes a scoping study aimed at mapping relevant bodies of literature, and justifies the need for this review based on findings from the scoping study. Then detailed accounts of the review panel, objectives, search strategy, selection criteria, quality assessment and reporting are provided. Thus, the protocol will provide transparency and facilitate an audit trial of the methods and findings.

A.1.2 Background for the Review

It has been widely recognized that access to medical interventions necessitates physician initiative and concurrence (McGuire 2001). However, payer driven public policy is at odds with strategies employed by the pharmaceutical industry (Hurwitz and Caves 1988;Leffler 1981;McGuire 2001) within the context of a health care value chain (Stremersch 2008;Stremersch and van Dyck 2009). Furthermore, it is widely recognized that because medical decisions have an impact on patients' health, they should be of high quality (Klein 2005). Any influence on the medical decision may therefore have an untoward effect on patients' health. Factors influencing physician prescribing behaviour have been widely stated, but linkage between these factors and evidence of how and under which circumstances (contexts) influence is exerted is lacking (Bornstein and Emler 2001;Bradley 1992).

The profit maximising hypothesis central to Agency Theory predicts that physicians' act in a manner motivated by financial self-interest (Gaynor and Gertler 1995;McGuire 2001). Asymmetry of information may perpetuate self-interest behaviour in a manner not beneficial either side of the value chain and thus lead to poor decisions being made on behalf of the principal (Eisenhardt 1989;McGuire 2001). Loyalty issues having a bearing on patient health may arise as a consequence. The practice of medicine is further complicated by the context of ethical and legal constraints on decision choices (Ma and McGuire 1997;McGuire 2001).

There appears to be consensus that decision making in medicine is made under uncertainty (Bornstein & Emler 2001;Elstein 1999;Elstein and Schwarz 2002;Payne et al. 1993;Reyna and Rivers 2008;Spring 2008). However, no general theory of medical decision has been formulated, but the theory of reasoned action is the most studied theoretical framework informing on the topic of physician's decision behaviour (Reyna 2008). Given the complexities and no grand theoretical framework, deciding how to decide is central (Payne, Bettman, & Johnson 1993). Despite being highly trained doctors are prone to making mistakes and cognitive biases may detract from use of logical and statistical decision heuristics (Hershberger et al. 1994). In general there is a lack of contextually sensitive evidence informing medical decision processes.

The literature reviewed suggest that there is evidence that physician education and training, control and regulatory measures, peer effect, promotion and drug characteristics impact the quality and volume of prescribing in the short term (Hemminki 1975;Kremer et al. 2008;Manchanda and Honka 2005;Windmeijer et al. 2006). How these factors affect prescribing behaviour is largely unknown. However, source-, message-, receiver- and contextual factors have all been postulated to have persuasive effects (Cialdini 2007;O'Keefe 2002). There is evidence to support a positive persuasive effect of source factors, natural receiver factors, induced receiver factors, and contextual factors (O'Keefe 2002). There is inconclusive evidence to support such persuasive effects of message factors in general. However, there is evidence suggesting a positive effect of visual images(O'Keefe 2002).

This review aims to summarize "how" context impacts factors having a bearing on physician prescribing behaviour. The model used for this review is as outlined by (Fink 2010;Huff 2009;Tranfield et al. 2003).

A.1.3 The Scoping Study

A scoping study has been conducted in order to identify relevant areas and important factors having a bearing on prescription behaviour of physicians. The following areas were identified and subsequently investigated, see table A-1.

Table A-1 Results from scoping study

Areas included	Topics Included	Main Conclusions
Health care value chain	Opposing economic drivers operating within the value chain.	▪ The concept of the health care value chain is useful in identifying stakeholders, points of influence and decisions ▪ The health care value chain consists of two sides: payer and delivery. The two sides operate on opposing economic logics. Payers focus is on general well-being of individuals in need. Delivery side focus is on increasing profits.
Agency	Physician agency and loyalty conflicts	▪ Behaviour motivated by self-interest ▪ Loyalty conflict due to simultaneous principals ▪ Legal and ethical constraints of choice
Medical decision making	Theoretical backdrop of medical decision making including use of heuristics and pitfalls	▪ No grand theory of medical decision making exist ▪ Deciding how to decide is important ▪ Use of heuristics is widespread and may lead to mistakes ▪ Diversity of decisions exists
Factors affecting prescribing behaviour	Factors affecting prescribing behaviour	▪ There are numerous factors that affect physician prescribing behaviour: education, regulatory and control measures, price, peers, promotion, therapeutic area, attributes of medicines, ethical and legal constraints, patient expectations and physician characteristics
Persuasion	Theoretical framework and underpinnings of persuasion	▪ Four main factors have been postulated to have persuasive effects. There is evidence to support that source; receiver and contextual factors have persuasive effects. There is inconclusive evidence to support a persuasive effect of message factors.

A.1.4 Justification for the Review: Findings from the Scoping Study

Though a good amount of research exists on physician prescribing behaviour, this review is justified, among others for the following reasons:

Lack of grand medical Decision Theory

Medical decision making has been given due attention due to the fact that such decisions may have a profound impact on patients' health. Although there is wide agreement that medical decisions are made under uncertainty, as of yet, no grand theory of medical decision making exists (Reyna & Rivers 2008). Deciding how to decide is therefore important (Payne, Bettman, & Johnson 1993).

Lack of understanding how identified factors interact

Though evidence of factors having a bearing on physician prescribing behaviour have been identified (Hemminki 1975;Kremer, Bijmolt, Leflang, & Wieringa 2008;Venkataraman and Stremersch 2007;Windmeijer, de Laat, Douven, & Mot 2006). There is a general lack of evidence of interaction between these factors.

Overall lack of information regarding outcomes

Effect on patients' health of any intervention designed to affect physician prescription behaviour is sadly lacking (Bornstein & Emler 2001;Bradley 1991;Smith 1977).

The need for understanding how factors influence prescription behaviour

There is a wide body of evidence informing on the topic of influence and persuasion (O'Keefe 2002), but very little on effect in the context of physician prescribing behaviour (Lambert et al. 1997;O'Keefe 2002). Furthermore, there is a lack of contextual evidence and understanding of how factors affect physician prescribing behaviour.

A.1.5 Review Panel

The review panel will consist of the reviewer (Yngve Mikkelsen), his supervisor (Dr. Javier Marcos), a senior academic supervisor (Prof. Hugh Wilson) and senior academic supervisor (Prof. Simon Knox). In addition, other academics with whom the researchers have contact and are knowledgeable in the field may be consulted to discuss the approach and findings of the present review.

Table A-2 Systematic review panel

Person	Role / Title and organization
Dr. Javier Marcos	Supervisor. Senior Research Fellow Cranfield School of Management.
Prof Simon Knox	Senior supervisor. Cranfield School of management
Prof. Hugh Wilson	Senior supervisor. Cranfield School of management

A.1.6 Objectives

The purpose of the review is to study literature in order to gain an understanding of the factors that influence physician prescription behaviour.

Specifically the review will:

- Identify and map factors under the influence of the pharmaceutical industry having a bearing on physician decision behaviour when prescribing

A.2 Search Strategy

A.2.1 Sources of Information

Several sources will be searched to locate all potential relevant studies. Focus will be to maximize coverage and minimize bias. In particular, the following will be used to retrieve relevant studies:

- Citation databases
- Internet: Meta-search engines, search engines, subject gateways
- Grey literature (non-peer reviewed)
- References from selected studies, suggested by peers and

- Available bibliographies
- Manual searches of specific journals
- Theses

A.2.2 Information and Data Handling

The details (database collections, search strings, number of documents retrieved and number of documents initially selected) of the searches will be captured and documented in Microsoft Excel using two by two tables for each database including a unique identifier for further tracking. Internet searches will be documented using the same methodology highlighted above. EndNote X4 will be used for citation storage and management. Microsoft Excel 2010 and NVIVO 8 will be used for synthesis of data.

Search Terms

The search terms listed below will be used to locate relevant studies and documents. These search terms will be combined into search strings in the different databases to be combined as appropriate (see appendix 2 for details).

Table A-3 Systematic review search terms

Search terms		
Payer	Delivery	Provider
Producer		
Marketing	Promotion	Instruments
Price	Price sensitivity	Promotional Instruments
Interaction	Field force	Detailing
Promotional material	Gifts	Industry paid-meals
Conference travel	Honoraria	Research funding
Expenditures	Formulary requests	
Public Policy	Quality	Safety
Efficacy	Financing	Reimbursement
Access	Welfare	Optimality
Competition	Supplier induced demand	
Information	Knowledge	Knowledge management
Health Economics	Agency	Physician agency
Asymmetry of information	Physician	Physician behaviour
Medical	Decision	Decision-making
Shared decision	Theory	Heuristics
Intention	Attitude	Choice
Constraints	Legal	Ethical
Factors	Attributes	Therapeutic area
Education	Regulatory control	Regulatory measures
Demand	Colleagues	Peers
Influence	Persuasion	Source
Message	Receiver	Context

Physician	Prescribing	Behaviour
Change	Influence	

A.2.3 Selection Criteria

Table A-4 Scope of systematic review

Focus	The focus of the review is on direct-to-physician pharmaceutical promotion and its influence on physician prescription behaviour. Source: knowledge must be produced by organizations adhering to accepted academic methods of inquiry and be research based. Content: knowledge must be generated following academically accepted methodologies and aligned with appropriate epistemologies.
Time Frame	Searches will be conducted from 1980 onwards as this denotes the time from which modern regulation of promotion of medicines was instituted. Literature earlier than this will be included if cross referenced within the original search frame.
Language	English only (UK and US)
Discipline	The review will examine the management, marketing, health economics, psychology and medical literature. List is not exhaustive and flexibility will be key to extract available information.

Stage 1: Selection by Title and Abstract

Papers will be selected if:

- They address aspects:
  - Frameworks and theoretical underpinnings of physician decision behaviour having a bearing on prescription behaviour
  - Factors and interventions that influence physician decision behaviour

Stage 2: Selection by Full text

Documents selected at stage 1 will undergo a second selection stage with the following criteria:

- Conceptual overview: papers included will be those that address the key issues, framework and theoretical underpinnings of physician prescription behaviour.
- Review of factors influencing physician prescription behaviour: Papers exploring factors under the influence of the pharmaceutical industry having a bearing on physician decision behaviour when prescribing will be included at this step.

A.2.4 Quality Appraisal Criteria

Quality Appraisal criteria has been adapted from (Tranfield, Denyer, & Smart 2003).

Table A-5 Systematic review quality criteria

	High	Medium	Low	Not applicable
Theory	Well defined theory/framework	Fairly well defined theory/framework	Insufficient definition of theory/framework	Element not applicable to paper
Research Design	Methodology fully appropriate for research question asked	Methodology partially appropriate for research question asked	Methodology insufficiently appropriate for research question asked	Element not applicable to paper
Alignment of concepts and ideas	Concepts and ideas are fully aligned	Concepts and ideas are partially aligned	Not enough information to assess alignment	Element not applicable to paper
Data Collection and Analysis	Systematic, transparent and auditable collection, analysis and interpretation of data.	Systematic collection, analysis and interpretation of data. Gaps in auditability and transparency	Data collection, analysis and interpretation unclear.	Element not applicable to paper
Conclusions	Fully aligned to theme of paper. Clear link between theory/hypotheses. Strong empirical evidence and Limitations clearly stated.	Partially aligned to theme of paper. Lacking clarity in link between theory/hypotheses. Medium empirical evidence and limitations of evidence is clear	Conclusions not in alignment with theme of paper. Link to theory/hypothesis is unclear. Empirical evidence is insufficient.	Element not applicable to paper
Contribution to knowledge	Meaningful and significant contribution to the field.	Incremental and limited significant contribution to knowledge	Contribution to knowledge is unclear and not significant.	Element not applicable to paper.

Quality appraisal criteria will be applied to and documented for all literature selected for inclusion at stage 2. Only literature appraised as being of high and medium quality will be included in the review. Furthermore, non peer reviewed literature will be appraised by a second reviewer (Dr. Javier Marcos) and judgement on reputability of source will be made. Only non-peer reviewed literature from a reputable source, such as academic and government institutions, having passed the quality appraisal criteria by the second reviewer will be included in the review. The review panel will serve as the final decision authority for all literature to be included in the review.

A.2.5 Descriptive Analysis and data Extraction Form

The following data will extracted from the studies and input into EndNote X4 and subsequently into Microsoft Excel 2010 and NVIVO 8.

Table A-6 Data extraction form

Aspects	Fields
Citation information	1. Author 2. year 3. title of paper (book) 4. journal title 5. publisher 6. Volume 7. Issue 8. Page numbers 9. URL (if web pages) 10. Location of item – location of the electronic/hard copy
Purpose	11. A brief description of the aim and objectives of the study
Operationalization:	12. Measures used and operationalization of variables in the study.
Content of the study	13. Variables/Interventions 14. Primary and secondary endpoints 15. Outcomes
Study details	16. Academic/ practitioner/policy 17. Methods of data collection 18. Sample size and type of sample 19. Methods of data analysis 20. Theoretical frameworks mentioned
Study context	21. Country/Region 22. Regulatory conditions 23. Type of organization (payer, provider, delivery)
Key findings	24. Brief summary of the main conclusions reached and research gaps identified
Subfield of study	25. Indicate the sub-area of study of the paper.
Keywords	26. Relevant keywords and descriptors of the study

A.2.6 Synthesis and Analysis

After extracting the data for the descriptive analysis, the studies will be analysed in depth using the Wallace and Wray framework (Wallace and Wray 2006). Captured relevant information will be imported and coded in NVIVO 8. Emerging themes will be identified and grouped into dimensions following and inductive analysis approach.

The following table summarizes some principles of good synthesis methods and how the synthesis strategy of this systematic review will meet these principles.

Table A-7 Principles of good synthesis

Principles	Strategy: Approach and methods
Synthesis method appropriate to research	4. Explore and map the key issues, frameworks and theoretical underpinnings of physician decision behaviour having a bearing on prescription behaviour 5. Investigate factors that influence physician decision behaviour, 6. Investigate contexts under which these factors influence physician decision behaviour.
Cope with diffuse and heterogeneous data	Summaries of the studies following the Wallace and Wray framework will be import into NVIVO 8 facilitating handing of diffuse and heterogeneous data.
Transparency and detail of content allowing reader to adequately gauge quality of method, data and conclusion	Transparent and exhaustive referencing of material included in the review will allow the reader to interpret and validate the conclusions of the review.
Ensure audit trail	Studies included and excluded from the review will be reported. Comprehensive descriptive analysis tables and coding in NVIVO 8 will provide audit trials.

A.2.7 Dissemination of the Review and Further Research

The aim of this review is to fulfil the DBA requirements at the Cranfield School of Management. The review will be updated on an ongoing basis using an automatic alert from the British Library. Identified literature titles will be added once the final search is completed.

A.2.8 Project Plan

The review includes several stages and will be conducted during the period spanning from protocol approval (late 2010) to final submission in June 2011. Work will only commence obtaining necessary protocol and ethical approval. Consultation is planned at various points during the review period and will take the form of monthly progress reviews with Dr. Javier Marcos. A face-to-face meeting with the panel will be planned during the course week in February 2011. Further, face-to-face meeting will be planned as required. First draft will then be circulated among the panel members in May 2011, before final submission by June 20th 2011.

Table A-8 Systematic review project plan

Stage		Start	End
Stage 1	**Preparing the review**		27.09.2010
	Map the field		27.09.2010
	Review protocol		27.09.2010
Stage 2	**Identify and evaluate papers**		
	Systematic search	15.11.2010	15.12.2010
	Evaluate papers	01.12.2010	31.12.2010
Stage 3	**Data extraction/synthesis**		
	Data extraction	15.12.2010	31.01.2011
	Data synthesis	01.01.2011	30.04.2011
Stage 4	**Reporting**		
	Work in progress submission		17.01.2011
	Work in progress review	31.01.2011	03.02.2011
	Final Draft paper		01.05.2011
	Final paper		20.06.2011
Stage 5	**Utilizing the findings**		
	Informing the research	04.07.2011	07.07.2011
	Informing practice	04.07.2011	07.07.2011

Table A-9 Systematic review source details

Citation databases	▪ MEDLINE ▪ EMBASE ▪ PROQUEST ▪ EBSCO ▪ Web of Science ▪ Science Direct ▪ Emerald ▪ PsycINFO ▪ ERIC ▪ Cochrane Trials Database
Metasearch engines	▪ Complete Planet www.completeplanet.com. ▪ Dogpile: www.dogpile.com ▪ IxQuick http://ixquick.com ▪ Metacrawler. www.metacrawler.com ▪ Vivisimo. http://vivisimo.com.
Internet. Search engines	▪ Google. www.google.com ▪ Google Scholar. scholar.google.com ▪ Adobe pfd online http://searchpdf.adobe.com ▪ Scirus www.scirus.com ▪ Teoma: www.teoma.com.
Subject gateways	▪ Bized: www.bized.ac.uk ▪ SOSIG: www.sosig.ac.uk ▪ BUBL http://bubl.ac.uk ▪ Virtual LRC
Grey literature	▪ SIGLE: International System for Grey Literature.
References	▪ References suggested by the review panel and/or knowledgeable researchers and/or practitioners ▪ List of references from selected papers ▪ Personal library (850 books and articles)
Available bibliographies	A focused search to browse for bibliographies about influence on physician prescribing behaviour will be done and relevant bibliographies retrieved.
Manual searches of specific journals	▪ International Journal of Research in Marketing ▪ Journal of Marketing ▪ Journal of Law and Economics ▪ Social Science Medicine ▪ The Academy of Management Review ▪ Marketing Research ▪ Medical Decision Making ▪ Management Science ▪ Journal of Advertising Research ▪ JAMA ▪ BMJ
Thesis	▪ Index to thesis

Table A-10 Systematic review search strings

Search String	
1	Physician AND (decision OR behaviour OR) AND prescr*
2	Physician AND (price OR price sensitivity OR promotion OR detailing OR field force OR promotional material OR gifts OR honoraria OR meals OR travel OR conference)
3	Physician AND presc* AND (industry OR pharmaceutical OR pharmaceutical industry)
4	Physician AND presc* AND (therapeutic area OR promotional instrument OR education OR promotion OR peers OR colleagues OR ethics OR ethical OR legislation OR regulatory OR measures OR control OR attributes OR product)
5	Prescribing AND (public policy OR quality OR safety OR reimbursement OR finance OR payment OR efficacy OR welfare OR optimality OR competition OR demand)
6	Prescr* AND medicines AND physician AND (information OR information asymmetry OR persuasion OR knowledge OR know why OR know how OR research OR development OR knowledge management)
7	(Influence OR persuasion) AND (source OR message OR receiver OR context)
8	Prescr* AND (Medical decision OR medical decision making OR heuristics OR shared decision OR theory OR framework OR intention OR attitude or Choice)
9	(Changing OR influencing) AND (prescr* AND behavio*)

Table A-11 Journals included in the review

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Acad Emerg Med	1	.6	.6	.6
	Acta Psychiatr Scand	1	.6	.6	1.2
	Am J Ind Med	1	.6	.6	1.9
	Am J Manag Care	3	1.9	1.9	3.7
	Am J Med	2	1.2	1.2	5.0
	Am J Med Qual	1	.6	.6	5.6
	Am J Med Sci	1	.6	.6	6.2
	Am J Psychiatry	1	.6	.6	6.8
	American Journal of Hosital Pharmacy	1	.6	.6	7.5
	American Journal of Public Health	1	.6	.6	8.1
	Ann Emerg Med	1	.6	.6	8.7
	Ann Intern Med	1	.6	.6	9.3
	Ann Pharmacother	3	1.9	1.9	11.2
	Arch dermatological research	1	.6	.6	11.8
	Arch Intern Med	5	3.1	3.1	14.9
	Australian Journal of Rural health	1	.6	.6	15.5
	BMC Health Service Research	4	2.5	2.5	18.0
	BMC Public Health	1	.6	.6	18.6
	BMJ	7	4.3	4.3	23.0
	Br J Clin Pharmacol	2	1.2	1.2	24.2
	Br J Gen Pract	6	3.7	3.7	28.0
	Chochrane Database Syst Rev	2	1.2	1.2	29.2
	Clin Drug Investig	1	.6	.6	29.8
	Clin Microbiol Infect	1	.6	.6	30.4
	Clin Pharmacology & Therapeutics	1	.6	.6	31.1
	CMAJ	1	.6	.6	31.7
	Consult Pharm	1	.6	.6	32.3
	Diabetes Care	1	.6	.6	32.9
	Dis Manag	1	.6	.6	33.5
	Eur J Clin Pharmacol	2	1.2	1.2	34.8
	Euro Surveil	1	.6	.6	35.4
	European Journal of Clinical Pharmacology	1	.6	.6	36.0
	European Psychiatry	1	.6	.6	36.6
	European Respiratory Journal	1	.6	.6	37.3
	Fam Pract	4	2.5	2.5	39.8
	Fundamental and Clinical Pharmacology	1	.6	.6	40.4
	Health Economics	1	.6	.6	41.0
	Health Mark Q	2	1.2	1.2	42.2
	Health Policy	1	.6	.6	42.9
	Health care Policy	1	.6	.6	43.5
	Inflammatroy Bowl Disease	1	.6	.6	44.1
	Int J Med Inform	1	.6	.6	44.7

International Journal of Cardiology	1	.6	.6	45.3
International Journal of Clinical Pharmacy and Therapeutics	1	.6	.6	46.0
International Journal of Pharmaceutical and health Care Marketing	1	.6	.6	46.6
International Journal of Pharmaceutical Medicine	1	.6	.6	47.2
International Journal of Technology Assessement in Health Care	1	.6	.6	47.8
J Am Board Fam Pract	1	.6	.6	48.4
J Am Med Inform Assoc	2	1.2	1.2	49.7
J Antimicrob Chemother	2	1.2	1.2	50.9
J Cancer Educ	1	.6	.6	51.6
J Clin Epidemiol	1	.6	.6	52.2
J Clin Pharm Ther	2	1.2	1.2	53.4
J Eval Clin Pract	1	.6	.6	54.0
J Gen Intern Med	1	.6	.6	54.7
J Health Serv Rec Policy	1	.6	.6	55.3
J Manag Care Pharm	1	.6	.6	55.9
J Palliat Med	1	.6	.6	56.5
J Pharm Technol	1	.6	.6	57.1
J Scand Prim Health Care	1	.6	.6	57.8
JAMA	3	1.9	1.9	59.6
Jorunal of Clinical Epdiemiology	1	.6	.6	60.2
Journal of Advertising Research	1	.6	.6	60.9
Journal of Clinical Pharmacy and Therapeutics	1	.6	.6	61.5
Journal of Economics & Management Strategy	2	1.2	1.2	62.7
Journal of Evaluation in Clinical Practice	1	.6	.6	63.4
Journal of Evaluation of Clinical Practice	3	1.9	1.9	65.2
Journal of Health Economics	2	1.2	1.2	66.5
Journal of Law and Economics	1	.6	.6	67.1
Journal of Marketing	1	.6	.6	67.7
Journal of Marketing Research	1	.6	.6	68.3
Journal of Medical Education	1	.6	.6	68.9
Journal of Medical Marketing	1	.6	.6	69.6
Journal of Pharmaceutical Marketing & Management	3	1.9	1.9	71.4
Journal of the American Geriatrics Society	1	.6	.6	72.0
Journal of the Royal Society of Medicine	1	.6	.6	72.7
Management Science	3	1.9	1.9	74.5

Market Lett	1	.6	.6	75.2
Med Care	3	1.9	1.9	77.0
Med Decis Making	2	1.2	1.2	78.3
Medical Journal of Australia	1	.6	.6	78.9
Medinfo	1	.6	.6	79.5
NJEM	1	.6	.6	80.1
Osteoporosis Int	1	.6	.6	80.7
P&T	1	.6	.6	81.4
Pain	1	.6	.6	82.0
Pain Med	1	.6	.6	82.6
Pediatrics	2	1.2	1.2	83.9
Pharmacoeconomics	1	.6	.6	84.5
Pharmacoepidemiol Drug Saf	5	3.1	3.1	87.6
Pharmacy World & Science	1	.6	.6	88.2
PLoS Med	1	.6	.6	88.8
PLoS One	1	.6	.6	89.4
Preventive Medicine	1	.6	.6	90.1
Psychol Med	1	.6	.6	90.7
Qual Saf Health Care	2	1.2	1.2	91.9
Scand J Prim Health Care	1	.6	.6	92.5
Singapore Medical Journal	1	.6	.6	93.2
Soc Sci Med	1	.6	.6	93.8
Social Sci Med	2	1.2	1.2	95.0
South Med J	1	.6	.6	95.7
Stroke	1	.6	.6	96.3
The American Journal of Medicine	1	.6	.6	96.9
The European Journal of General Practice	1	.6	.6	97.5
The European Journal of Health Economics	1	.6	.6	98.1
The Eurpoean Journal of Public Health	1	.6	.6	98.8
The Journal of Indiustrial Economics	1	.6	.6	99.4
Wiener Klinische Wochenschrift	1	.6	.6	100.0
Total	160	100.0	100.0	

A.3 Systematic review data extraction results

The data extraction table is quite extensive more than 50 000 words and over 880 pages. For practical reasons I have therefore chosen to only include a facsimile of the table in this appendix, so that the reader can get a feeling with the way the data has been captured and recorded. The facsimile shows how data from each included study has been captured and organized according to the structure of the data capture table, please refer to Appendix F for details. The full table is available upon request in the following formats: doc, pdf and xls.

Table A-12 Systematic review data extraction results

Appendix B PROJECT TWO

This section contains the appendices for project two of the thesis.

B.1 Protocol

B.1.1 Background

It has been widely recognized that access to medical interventions necessitates physician initiative and concurrence (McGuire, 2001). Furthermore, it is widely recognized that because medical decisions have an impact on patients' health, they should be of high quality (Klein, 2005).

There appears to be consensus that decision making in medicine is made under uncertainty (Bornstein and Emler, 2001, Elstein, 1999, Elstein and Schwarz, 2002, Payne et al., 1993, Reyna and Rivers, 2008, Spring, 2008). A systematic review conducted prior to the present project revealed that no general theory of medical decision has been formulated, but the theory of reasoned action is the most studied theoretical framework informing on the topic of physician's decision behaviour (Reyna, 2008). Given the complexities of medical decision making and that no grand theoretical framework exists, deciding how to decide is central (Payne et al., 1993). Despite being highly trained, doctors are prone to making mistakes and cognitive biases may detract from the use of logical and statistical decision heuristics (Hershberger et al., 1994). In summary, there is a lack of contextually sensitive evidence informing medical decision processes.

A report from the Institute of Medicine has documented that close to one million people per year are injured and close to one hundred thousand people a year dies as a result of preventable medical errors (Kohn et al., 1999). As a consequence, standardization of the provision of care in hospitals has come into greater focus. Implementing approaches to implement more systematically compliance with guidelines can help reduce variation in core processes of organizations (Flynn et al., 1994) and the same increase the quality of health care provided (Leape, 1994).

The focus on quality of health care provision focuses on two main components. First, improvement of clinical quality where clinical quality refers to performance relative to process of care performance measures which are represented by clinical protocols of best practice to achieve high levels of patient safety (Chandrasekaran et al., 2012). Second, experiential quality is represented by the quality of care as experienced by the patient (Donabedian, 1988). It focuses on how care is provided and is distinct from the clinical quality as it is focused on what is provided.

Tension between the two paths may occur when hospital management try to balance the two; as focus on clinical quality can reduce variation and focus on experiential quality increase variation(Chandrasekaran et al., 2012). Clinical quality has been shown to be closely linked to experiential quality (Blackwell, 1973, Butler et al., 2002, Camron, 1996) and vice versa. Thus, it is argued that the quality of care is dependent on both clinical- and experiential quality.

B.1.2 Justification for the Study: Findings from Systematic Literature Review

Though a good amount of research exists on outcomes of medical care, this study is justified, among others for the following reasons:

Lack of grand medical Decision Theory

Medical decision making has been given due attention due to the fact that such decisions may have a profound impact on patients' health. Although there is wide agreement that medical decisions are made under uncertainty, as of yet, no grand theory of medical decision making exists (Reyna & Rivers 2008). Deciding how to decide is therefore important (Payne, Bettman, & Johnson 1993). This was a key finding of the systematic review preceding this study.

Overall lack of information regarding outcomes

It is widely recognized that because medical decisions have an impact on patients' health, they should be of high quality (Klein, 2005). Factors influencing physician prescribing behaviour have been widely stated, but the linkage between these factors and evidence of how and under which circumstances (contexts) influence is exerted remains unanswered (Bornstein and Emler, 2001, Bradley, 1991). Furthermore, effect on patients' health of any intervention designed to affect physician decisions is sadly lacking (Bornstein & Emler 2001;Bradley 1991;Smith 1977).

The need for understanding how factors influence decision behaviour

There is a wide body of evidence informing on the topic of influence and persuasion (O'Keefe 2002), but very little on effect in the context of physician prescribing behaviour (Lambert et al. 1997;O'Keefe 2002). Furthermore, there is a lack of contextual evidence and understanding of how factors affect physician decisions.

Overall, the above findings mean that factors influencing physician decision behaviour may impact quality of the health care provided. It is therefore important to understand how and what role the physician play in determining the quality of health care provision.

B.1.3 Study Panel

The study panel will consist of the primary investigator (Yngve Mikkelsen, MD), his lead supervisor (Dr. Javier Marcos), a senior academic supervisor (Professor Hugh Wilson) and senior academic supervisor (Professor Simon Knox). In addition, other academics with which the researchers have contact and are knowledgeable in the field may be consulted to discuss the approach and findings of the present study.

Table B-1 Study panel for project two

Person	Role / Title and organization
Yngve Mikkelsen MD	Researcher, doctoral student, Cranfield School of Management
Dr. Javier Marcos	Lead supervisor, Lecturer, Cranfield School of Management
Professor Simon Knox	Senior supervisor, Professor, Cranfield School of Management
Professor Hugh Wilson	Senior supervisor, Professor, Cranfield School of Management

B.1.4 Aims and Objectives

This study contains two separate parts addressing separate research questions designed to fulfil the requirements for empirical project two (P2) and three (P3) for the DBA at Cranfield School of Management. For practical purposes data collection for both P2 and P3 will take place simultaneously with approximately 30 individual physicians. The projects will be analysed and reported separately as highlighted in the Project Plan section on page 10 in this document.

The aim of this project is to gain an in depth understanding of how physicians frame quality of health care delivery, identify enablers and barriers for provision of quality health care by physicians and describe the perceived role of physicians in balancing clinical and experiential quality while delivering health care. Specifically the project will:

- Identify and categorize key constructs physicians have in mind to understand and deliver health care when conducting clinical (with the patient) work
- Identify enablers and barriers for provision of quality health care as perceived by physicians
- Identify how physicians balance clinical and experiential quality when providing health care

Taking on a physician perspective in a hospital setting I therefore propose the following research question (RQ):

RQ: How do physicians perceive quality of health care delivery in a hospital setting?

Little or no good quality data exists addressing such issues, making quantitative analysis as basis for further understanding of the phenomenon impractical. So, in order to gain a better understanding of how physicians frame quality of health care provision, a qualitative approach was chosen. With this in mind, possible methods for gathering data was explored (list not exhaustive): interviews (face-to-face, telephone, e-mail), focus groups, comparison of records (reports, academic articles, etc.), case studies, and observation of phenomena in its natural environment.

In order to answer RQ I have chosen to adopt the methodology of repertory grid as first outlined by Kelly (1955).

B.1.5 The Context of the Research

The hospital in question is divided into separate divisions focusing on different therapy areas. Given the difference in focus there might be differences in perspectives between the divisions. Therefore, a decision to include several divisions was made. The method considered most suitable, ensuring both detection of potential contrasts between the divisions and extract the most valuable information, was repertory grid.

B.1.6 Scope of the Study

Table B-2 Scope of project two

Focus	The focus of the study is on how physicians frame health care service quality and what are the enablers and barriers for review Source: physician, university hospital, across specialties
Time Frame	The study will be conducted during the second half of 2012.
Geography	Norway, Oslo area
Discipline	The study will focus on hospital physicians across specialties at a university hospital.

B.1.7 Methodology

Repertory grid technique

The interviews will be conducted using the repertory grid technique based on Kelly's Personal Construct Theory (Kelly, 1955). This technique involves a form of structured interviews and has been found to be a powerful tool in management research (Goffin, 2002). Furthermore, the technique is useful for limiting jargon and social desirability (Goffin, 2002, Szwejczewski et al., 2005, Lemke et al., 2011).

The operationalization closely follows Goffin (2002).Two basic methods for selecting elements exist: supplied and elicited. Supplied elements are provided by the researcher, whereas, elicited elements are provided by the respondent. In addition, there are several rules for selecting supplied or elicited elements:

- Elements must be discrete (Stewart and Stewart, 1981)
- Elements must be homogeneous (Easterby-Smith, 1980)
- Elements must not be evaluative (Stewart and Stewart, 1981)
- Elements should be representative of the area to be investigated (Beail, 1985, Easterby-Smith, 1980)

Reger (1990) proposes three main reasons for why a researcher may want to supply elements. Firstly, the researcher may wish to learn more about a given set of elements from various respondents. Secondly, theory may guide the choice of elements. Finally, the researcher may wish to compare responses within a group

or across groups. The later instance will require a uniform set of elements to make cross group comparisons possible. Elements will be elicited from the respondents with the following question:

> *Can you please think of two patient encounters (please keep names anonymous) where quality of health care provision was excellent, two where quality of health care provision was medium and two where quality of health care delivery was poor?*

The respondent will be asked to write the elicited elements (*anonymous* patient encounters) on randomly numbered cards, including a brief description of each element (a few key descriptors or keywords).

Using the triad method from (Kelly, 1955, Kelly, 1963) as described by (Fransella et al., 2003) the interviewer will present the respondent with three cards asking:

> *"How are two of these similar and different from the third in terms of quality of health care delivery?"*

The triads will be chosen according to a preselected order and the results will be captured on a data capture sheet (repertory grid) by the researcher (see Appendix A: Repertory Grid). Each captured response resulted in a construct and a construct pole. The construct pole will be elicited by asking what the respondent feels is the opposite of the construct.

After the meaning of the constructs has been discussed with the respondent, the respondent will be asked to rate all elements on a five-point Likert scale (Fransella et al., 2003) where one represents the construct and five represents the construct pole.

The process is repeated by presenting the respondent with another set of three cards restating the original question. The respondents will be encouraged not to repeat constructs which had already been elicited. This process will continue until further constructs can no longer be elicited or the time limit of 60 minutes expires.

At the end of the interview the respondent will be asked to grade the elicited constructs on a five-point Likert scale with the following poles:

Enabler	–	Barrier
Clinical quality	–	Experiential quality

This last step is to ensure capture of each individuals understanding of the phenomenon of interest (Jankowicz, 2004 p. 170-71).

B.1.8 Study: Administrative phase

Ethical approval

Ethical approval in accordance with Cranfield University and Akershus University Hospital policy (internal approval by the privacy ombudsman) will be obtained before study start in order to ensure appropriate management of data and maintenance of privacy. The project is not considered to be within the scope of "Helseforskningsloven" (Norwegian research legislation) and will therefore not be submitted to the regional ethical committee (**R**egional **E**tisk **K**ommite) in Norway.

Selection of study subjects

Physicians across the five clinical divisions of a university hospital in the Oslo area in Norway will be invited to participate. The interviews will be formally booked using Microsoft Outlook 2007, including information about background, confidentiality and use of a tape recorder. Acceptance of interview participation will also be recorded in Microsoft Outlook.

The number of recruited individuals will depend on the point at which theoretical saturation is achieved (approximately 30 individuals expected).

The criteria to invite physicians to participate in the study are:

- Physicians in clinical practice
    - Employed by Akershus University Hospital at the time of the study
- Physicians not in administrative roles
- Physicians willing to participate in the study

Informed consent

Informed consent will be sought from study subjects prior to inclusion and recorded in writing (see Appendix C: Written Consent Form) and on voice recorder.

B.1.9 Study: Conduction phase

Pilot

On the basis of the research objective, an interview guide was developed (see Appendix B: Interview Guide) and subjected to evaluation and feedback from supervisor and course leader, before amendments were made. The interview guide will be piloted (3-4 interviews) and revised in accordance with feedback provided and personal learning's during the pilot stage. Revision of the interview guide will be done in collaboration with the study panel.

Data capture

The interviews will be conducted in a suitable office behind closed doors Q3-4 2012; acceptance of tape-recorder use will be recorded, as will the rest of the interview as per interview guide, using an Olympus Digital Voice Recorder DM-

550. During the interview data will be captured on the data capture sheet designed for the purpose (see Appendix A: Repertory Grid).

After the interview is completed the recording will be transcribed by the researcher. Only quotes to be used in the final report will be translated for meaning by the researcher as these best suites the purpose of the project.

Anonymization

Data will be anonymized by the researcher using a key. Only the researcher will have access to the key.

Data storage

Data will be stored securely (locked in a safe) to ensure that no unintended access to data takes place. All data will be destroyed after legislation or contractual requirements expire, at the latest after 10 years.

B.1.10 Analysis phase –Interview part one

Qualitative and quantitative data captured on pre-prepared grids, and tape recording (Olympus DM-550 digital recorder) of the interviews and works shops, and transcribed recordings in Norwegian will be used for analysis. Data analysis will follow (Goffin et al., 2006) and also included elements from Lemke et al. (2011).

Standardization of constructs

The grids will be examined by the researcher to identify repetition of constructs. The grids will be further examined for constructs having the same meaning.

Categorization of constructs

The resulting standardized constructs will be categorized in workshop with the respondents. Both categories and meanings of the categories will be elicited during the workshops.

The resulting categories with meaning from the workshop will be given to a scholar who will be asked to categorize the standardized constructs. The result will be discussed and the categories revised for content and meaning. The result will be compared to the one from the workshop in order to calculate an interrater variability index. The process will be repeated until an acceptable agreement is achieved (Jankowicz, 2004 p. 161).

Identification of key constructs

The most important constructs will be identified using frequency count and average normalized variability following the methodology of Lemke et al. (2003) and Goffin et al. (2006). The threshold for key construct is set at 25 % responder mention (Lemke et al., 2003). Average normalized variability will be calculated using Idogrid 2.4 and SPSS 19.1.

B.1.11 Project Plan

The study includes several stages and will be conducted during the period spanning from protocol approval (mid 2012) to final submission in November 2012 (DBA P2)P3). Work will only commence obtaining necessary protocol and ethical approval. Consultation is planned at various points during the review period and will take the form of monthly progress reviews with Dr. Javier Marcos. A face-to-face meeting with the panel was held on the 4th July 2012. Further, face-to-face meeting will be planned as required. First draft of P2 will be circulated among the panel members in October 2012, before final submission by November 2012

B.1.12 Dissemination of the Review and Further Research

The aim of this study is to fulfil the DBA requirements at the Cranfield School of Management. The study will adapted for publication in academic and practitioner journals.

B.1.13 Interview Guide

Personal statement/ introduction
First, thank you so much for agreeing to conduct this interview.

I am a student at Cranfield School of Management, Cranfield University, UK I am pursuing a doctorate in business administration which focus is investigating the factors that influence physician's decisions and work and their influence on the quality of health care delivery. Your perspectives on this subject will provide valuable insight to this research.

I would like to tape record this interview to enable a rigorous analysis of the data and to enhance the reliability of the methods. Would this be OK for you? Your answers will be confidential and the identity of participants in this study kept strictly anonymous. Also your participation in this study is totally voluntary.

I am not looking for any particular answer, but just you views and opinions on a number of areas. Please feel free to ask me to clarify any question you do not understand.

The interview will last approximately 90 minutes and has two parts. I will outline each part separately as we go.

Interview outline

This is a structured interview where I am interested in understanding how physicians frame quality of health care provision in your own terms, and not to collect «right answers». You are free to choose the level of detail of your response.

First you will be asked to provide six cases (elements), two representing excellent quality, two representing medium quality and two representing low quality.

You will then be asked to make a series of systematic comparison of different elements related to clinical and experiential quality. In addition you will be asked to rate your response on a scale from 1 – 5.

I will be taking some notes as we go and capture your responses on a data capture sheet designed for this purpose.

This part of the interview will not last more than 60 minutes. Any questions before we start?

B.1.14 Written consent form in Norwegian

Forespørsel om å delta i forskningsprosjektet «Legers forståelse av kvalitet av helsetjenester»

I forbindelse med min doktorgrad holder jeg nå på med et forskningsprosjekt. Temaet for studien er kvalitet i helsetjenesten, og jeg skal gjennomføre en eksplorativ undersøkelse for å kartlegge hvordan leger legger rammer for kvalitet av helsetjenesteleveranser, og hvilke faktorer som motvirker eller medvirker til kvalitet av helsetjenesteleveranser.

For å finne ut av dette, ønsker jeg å intervjue ca. 30 leger ved AHUS. Spørsmålene vil dreie seg om din forståelse av kvalitet i helsetjenesten. Som en del av studien vil jeg også forsøke å finne ut noe om hvilke faktorer som medvirker eller motvirker kvalitet av helsetjenesteleveranser fra et legeperspektiv.
Jeg vil bruke båndopptaker og ta notater mens vi snakker sammen. Intervjuet vil ta omtrent en 60 minutter, og vi blir sammen enige om tid og sted.

Det er frivillig å være med og du har mulighet til å trekke deg når som helst underveis, uten å måtte begrunne dette nærmere. Dersom du trekker deg vil alle innsamlede data om deg bli anonymisert. Opplysningene vil bli behandlet konfidensielt, og ingen enkeltpersoner vil kunne gjenkjennes. Opplysningene anonymiseres og opptakene slettes når studien er ferdig, innen utgangen av 2012.

Dersom du har lyst å være med på intervjuet, er det fint om du skriver under på den vedlagte samtykkeerklæringen.

Hvis det er noe du lurer på kan du ringe meg på +47 94987760, eller sende en e-post til yngve.mikkelsen@ahus.no. Du kan også kontakte min veileder Dr. Javier Marcos ved Cranfield School of Management, telefonnummer +44 1234751122 .

Studien er godkjent av Forskningsenheten ved AHUS og Cranfield School of

Management.

Med vennlig hilsen
Yngve Mikkelsen
Akershus universitetssykehus HF
1478 Lørenskog

Samtykkeerklæring:
Jeg har mottatt skriftlig informasjon og er villig til å delta i studien.

Signatur ……. Telefonnummer ……..

Table B-3 Construct categories

ID	Construct Label	Construct	Construct Pole	Explanation	Example quote	Freq	ANV	Honey	Key Construct
1	Abuse potential	High abuse potential	Low abuse potential	Abuse: abuse is related to the abuse potential at the patient level. The abuse potential	"I consider patients who abuse drugs or medicines to be unreliable. Sometimes they come to their follow-up appointments and sometimes they do not. This is a group of people requiring a lot of energy from us in order to make sure they come and get the necessary treatment."	2	14,27	L	No
2	Disease state	Acute	Chronic	Disease state: disease can present as acutely with dramatic symptoms or chronic with more salient symptoms.	"The patient presented with acute respiratory failure and dilated neck veins. I felt it was important to take action quickly to save the patient. Clinically, the patient had signs of heart failure and he was given intravenous medication and respiratory support."	5	15,03	M	No
3	Communication	Good communication	Poor communication	Communication: is the dialogue between patient and physician designed to gather important information and give information so that the physician and patient can make decisions based on the best available information possible.	"It was very easy to get contact with this patient. The patient had a good understanding of his condition and was able to communicate his symptoms clearly. This other patient had a poorly developed vocabulary and did not understand that the symptoms were related to disease. It was very difficult to get through to him."	12	13,37	H	Yes

4	Co-morbidity	More comorbidity	Less co-morbidity	Co-morbidity: the presence of other diseases than the primary disease being addressed.	"...this one patient was admitted for COPD and treated accordingly, but the heart was not considered. If more attention had been given to the whole patient then maybe the outcome had been better."	3	16,17	H	No
5	Competency level	More competent	Less competent	Competency: In this context confidences related to knowledge, skills, attitudes and their willingness to do what is necessary in order to solve the issue at hand. In other words, competency is not a state, but rather a dynamic condition where the necessary requirements are present in order to solve a given problem for a unique patient.	"The patient came to the ER complaining of a tight chest. It was early in my career as a physician and I was inexperienced. I figured it must be a myocardial infarction and did not involve the consultant. I gave the prescribed treatment for myocardial infarction, but the patient got worse. Finally, I called the consultant and pneumonia was diagnosed and treated."	6	10,76	H	No
6	Complexity	Complex	Simple	Complexity: the medical condition and/or context can be more or less complex and require different approaches, resources and competencies.	"Some patients can tolerate risk quite well. This one patient with hepatitis C was very focused on risk of immunotherapy, but not so concerned with the risk of the disease."	5	11,52	M	No
7	Confidence	More confidence	Less confidence	Confidence: physician can be more or less confident in the given situation and this will transfer to other staff and patient. Low levels of confidence are also a stress factor for the physician.	"...the procedure was complicated to perform, but I was confident that I could get the pacemaker in place. The nurses assisting me during the procedure sensed my confidence and remained calm throughout the procedure."	1	9,76	M	No

8	Context	Context more important	Context less important	Context: a set of circumstances or facts surrounding a particular event or situation.	"...his family was instrumental in getting the patient to agree to the treatment. I don't think he would have made it without them."	5	12,8	L	No
9	Continuity	More continuity	Less continuity	Continuity: is related to how many physicians or other health care workers are involved in the care. When many are involved information is lost during numerous exchanges. Furthermore, feeling of responsibility may also be affected.	"This patient had been to several of my colleagues with stomach pain for months. A few tests had been done and the patient repeatedly sent home without further to do. When he came to me I ordered a computer tomography of the abdomen and it showed liver cancer with widespread metastasis. He died two weeks later and …."	11	12,22	M	Yes
10	Cooperation	More cooperation	Less cooperation	Cooperation: cooperation among physicians and health care workers is necessary for a team approach and its synergies of effect.	"The ER is not very effective, the nurse and physician see the patient at different times and ask the same questions. It would be much better if we were there at the same time. Information would flow easily and the patient would not have to answer the same question twice."	7	12,24	H	Yes
11	Interpretation	Correct interpretation	Wrong interpretation	Interpretation: correct interpretation of information is central to the process of diagnosing and deciding on the appropriate therapy.	"…this particular patient was a young boy with down syndrome. I was dependent on his parent's information to make a correct diagnosis. Fortunately, his parents had a high social status and it made it easy to communicate. I think this was important	12	13,05	H	Yes

					in getting the correct information and making the diagnosis. It has also helped in the follow-up. At the time I had two such patients with genetic heart disorders and they both lived 10-15 years longer than they might otherwise have done.”				
12	Decision base	Academic	Flexible	Decisions base: is related to what base the physician is using for making decisions. The physician may adopt an evidence based approach or a flexible approach based on personal experience and preference.	"The patient demands to know exactly what and why things are done. She questions the use of all the questionnaire tools we use. It is important for me to be able to explain the full academic rationale for using the tests that necessary for a diagnosis."	2	7,16	M	No
13	Disease severity	More severe disease	Less severe disease	Disease severity: disease severity is related to the gravity of the disease with respect to possible outcomes, for example fatalities.	"I think that if a disease has a high chance of a fatal outcome in a relatively short time more focus and effort is given to the patient."	8	8,75	L	No
14	Duration of therapy	Short duration of therapy	Long duration of therapy	Duration of therapy: therapy can be short or long depending on condition and available resources.	"I feel lucky as I still have the possibility to decide for how long I will treat my patients. Some will only need a few months, but some will need longer, some even up to five years."	2	6,88	L	No
15	Early diagnosis and treatment	Early diagnosis and treatment	Delayed diagnosis and treatment	Early diagnosis and treatment: early diagnosis and treatment is related to the time it takes from patient presents with problem until treatment is started.	"Due to delay in diagnosis this patient did not receive the therapy needed to save his life."	17	12,86	H	Yes

16	Effect of therapy	More effective therapy	Less effective therapy	Effect of therapy: therapy can be more or less effective in solving the presenting problem. Differentiation is made between curative effect and symptomatic effect. In some cases the symptomatic effect may be just as important dependent on the availability of curative therapies. For example palliation for terminal cancer patients.	"...intensive care is about two things: cure and palliation. Sometimes a cure is not available and then it is important to set therapy targets in line with what is the patient's interest."	10	13,8	M	Yes
17	Experience	More experience	Less experience	Experience: represents the knowledge or skill necessary to apply scientific medical knowledge to practice gained through exposure to similar events or cases.	"The patient came to the ER after a fight at a local bar. He was not conscious and the consultant did not come to see the patient. The hospital was full that night, but I managed to get the patient a bed on a ward. I felt uneasy about the whole thing. Later during the night I went to check on the patient and found him in a deep coma. A Ct was requested and an intracranial bleeding was found. The patient was flown by helicopter to the nearest trauma centre and died on the operating table. This is a case that has been with me for years and my lack of experience made me accept the cursory advice from the consultant even though my gut feeling	8	11,96	H	Yes

					told me otherwise."				
18	Full responsibility	Full responsibility	No responsibility	Full responsibility: denotes the fact that one physician is in charge of the care of the patient.	"I think this patient would have had a better outcome if I would have had the full responsibility. The problem was that I felt like a consultant without full responsibility and gave advice. If I would have had all the information and been involved from the beginning my advice would have been stressed differently. Unfortunately the poor boy died."	7	11,97	M	Yes
19	Information	More information	Less information	Information: in this context information is the message being expressed.	"...I had seen this patient before and had extensive knowledge about his previous diagnosis and therapy. The fact that this information was available made it simpler to treat his current problem."	7	10,04	M	No
20	Interest	More interest	Less interest	Interest: a feeling that causes special attention to the patient and his/her condition.	"If the patient is interesting, out of the ordinary, I will pay more attention and strive to find a solution. Older patients with diffuse symptoms will get less sympathy and attention."	3	12,5	H	No
21	Intervention	Technical intervention	Human intervention	Intervention: an effort to improve the health of a patient.	"This patient required a technical intervention. I had to prescribe medication. However, this other patient needed more help in accepting and dealing with anxieties about getting children. He needed a human touch."	4	14,75	L	No

22	Patient activate transfer	Patient transfer positive feelings	Patient transfer negative feelings	Transfer: the patient transfers positive or negative feelings to the physician.	"Everyone knows this patient. She has been in and out of institutions her whole life. When I became responsible for her care I thought I could make a difference. It is very difficult to deal with the patient that eats needles and razor blades when you have spent so much time and effort trying to help. I felt so angry and disappointed"	11	9,71	L	No
23	Patient adherence	More patient adherence	Less patient adherence	Adherence: on one hand, the patient follows advice and prescriptions given by physician without question; and on the other, the patient refuses to follow any advice given by the physician. In the latter situation, the use of force may be legitimate in order to save the patient or others from harm.	"I consider patients who abuse drugs or medicines to be unreliable. Sometimes they come to their follow-up appointments and sometimes they do not. This is a group of people requiring a lot of energy from us in order to make sure they come and get the necessary treatment."	5	13,56	M	No
24	Patient influence	More patient influence	Less patient influence	Patient influence: The patient may directly or indirectly influence the physician and therefore the delivery of health care.	"...it is central for the patient to associate symptoms with disease. If not the patient will not get in touch with the physician. Furthermore, I think this is one aspect of patient-delay."	7	11,39	M	No
25	Physician-patient relationship	More important	Less important	Physician-patient relationship: the quality of the patient-physician relationship	"...and I managed to get a good alliance with the patient and his family resulting in acceptance of a rather complicated therapeutic regimen."	9	9,45	M	No

26	Presenting problem	Clear presenting problem	Diffuse presenting problem	Presenting problem: clarity of the presenting problem may improve time from presentation to diagnosis and this therapy and resolution.	"This patient presented with diffuse symptoms, somnolence. I had to pull information out of the patient. It was difficult find a rational explanation and she had been to several other physicians during the past 20 years with the same complaint."	7	7,87	L	No
27	Responsibility	Primary responsibility	Shared responsibility	Responsibility: the feeling of obligation to follow a course or take action in order to prevent the loss of health or improve health.	"I think this patient would have had a better outcome if I would have had the full responsibility. The problem was that I felt like a consultant without full responsibility and gave advice. If I would have had all the information and been involved from the beginning my advice would have been stressed differently. Unfortunately the poor boy died."	2	8,24	H	No
28	Quality requirement	More quality required	Less quality required	Quality requirement: perception of technical and experiential quality. Technical quality is about what is done and experiential quality is about how it is done.	"This patient required detailed information about all aspect of diagnosis and treatment. I had to pay special attention to the quality of everything that that I did. Nothing escaped the scrutiny of the patient."	2	9,34	M	No
29	Resource availability	More resources available	Less resources available	Resource availability: Resources represents both human and technical resources.	"The patient was left in the ER for 12 hours without care. There were simply too many patients to take care of and some had to wait a really long time. Longer than what is acceptable."	20	12,32	M	Yes

30	Resource utilization	More resources used	Less resources used	Resource utilization: the use of resources is related to diagnostic and therapeutic resources. Resources refer to a wide variety of resources ranging from buildings, technical installations, IT, diagnostic and therapeutic modalities.	"This patient got more than what could be expected. All possible diagnostic and therapeutic avenues were tried. In other words, the health care system had no more resources available that could be used."	8	15,83	L	Yes
31	Risk	Higher risk	Lower risk	Risk: risk may determine the decision to treat or not to treat. Both patient and physician may be driving the effect of risk.	"Some patients can tolerate risk quite well. This one patient with hepatitis C was very focused on risk of immunotherapy, but not so concerned with the risk of the disease."	2	12,22	H	No
32	Symptoms	More severe symptoms	Less severe symptoms	Symptoms: severity of symptoms leads to different reaction patterns by physicians. If symptoms are severe it is more difficult to ignore and thus higher priority may be given.	"The patient had hit his knee while walking in the forest. He was young and could walk. Even though the knee was a bit swollen I gave him some antiflogistics and told him to come back in a few days if he was not better. He came back a few days later complaining of the same symptoms. Further investigation revealed a fracture in the tibia."	4	10,83	L	No

33	Time	More time	Less time	Time: available time is important in order to do what is necessary. Time available is often determined by patients/physicians per time unit.	"During a hectic day with many consultations, the colleague performing the initial echo of the heart only paid attention to the replacement valve and not to the whole heart. Only two months later, after looking at the recorded echo film, was I evident that the left ventricle was barely moving. At this point he was dying and therapy at this point did not have any effects. He died shortly thereafter."	9	13,25	M	Yes

Table B-4 Full listing

Int ID	#	Construct Label	Construct	E 1	E 2	E 3	E 4	E 5	E 6	Construct Pole	Overall Importance
1	1	Time	Long treatment period	1	2	5	3	1	1	Short treatment period	3
1	2	Continuity	Disrupted treatment	4	5	4	2	4	1	Non-disrupted treatment	2
1	3	Physician-patient relationship	Stable alliance with patient	2	1	3	4	2	4	Ambivalent alliance with patient	1
1	4	Decision base	Clear academic foundation and methodology	3	3	2	4	4	4	Flexible foundation and methodology	3
1	5	Patient activate transfer	Patient activate negative transfer	3	3	3	1	5	2	Patient activate positive transfer	2
1	6	Patient driven	Accept and understanding of past	2	4	2	5	1	3	Focus on present	3
1	7	Context	Family context important	2	2	2	4	2	2	Family context not important	2
1	8	Effect of therapy	Effect of intervention is important	3	2	1	1	4	4	Effect of intervention less important	3
2	1	Acute disease	Acute disease	5	2	1	1	5	2	Chronic disease	1
2	2	Intervention	Acute technical intervention (somatic Dx)	4	2	1	1	5	2	Chronic medical intervention (psychiatric Dx)	3
2	3	Resource utilization	Inpatient	5	1	1	1	5	1	Outpatient	5
2	4	Physician-patient relationship	Continuous empathy	3	2	1	1	4	2	Passing empathy	3
2	5	Competency	Requires high quality	4	2	1	1	4	2	Requires less quality	2
2	6	Context	Legal right to health care	4	1	1	1	5	3	No legal right to health care	5
2	7	Effect of therapy	Effect of intervention is important	3	2	1	1	4	4	Effect of intervention less important	3
2	8	Competency	Specialty knowledge	2	4	3	3	4	3	General knowledge	2
2	9	Communication	Communication with patient is important	1	1	5	4	3	2	Communication with patient is less important	1
2	10	Information	High degree of comparent information	3	4	4	5	1	4	Low degree of comparent information	4
3	1	Competency	Experience and knowledge	3	5	2	2	5	2	Experience and action	1
3	2	Responsibility	Did what I should have done	1	1	2	1	4	4	Did not do what I should have done	2
3	3	Intervention	Acute action	1	1	5	5	1	1	Follow up	3
3	4	Disease severity	Severe disease	1	4	1	4	4	2	Less severe disease	4
3	5	Competency	Previous experience	1	1	2	1	4	5	No previous experience	2
3	6	Responsibility	Attentive and catching the problem	1	1	2	3	5	5	Inattentive and missing the problem	1
3	7	Responsibility	Full responsibility	1	4	2	1	5	5	Shared responsibility	4
3	8	Resource availability	High need for time and resources	5	5	1	3	2	2	Low need for time and resources	2
4	1	Communication	Collect information in order to provide care	3	2	4	2	2	2	Give information in order to care	1
4	2	Time	Enough time	2	4	1	2	2	5	Not enough time	2
4	3	Responsibility	Interest in the patient and presenting problem	2	1	1	4	3	2	Lack of interest in the patient and presenting problem	2
4	4	Responsibility	My responsibility	2	2	1	3	4	3	Who's responsibility?	1
4	5	Complexity	Complex medical problem and context	5	4	4	2	1	1	Simple medical problem and context	2

4	6	Coordination and logistics	High degree of coordinated care	3	1	1	3	4	4	Low degree of coordinated care	1
4	7	Context	Involvement of close family	1	2	1	4	4	1	No involvement of close family	2
4	8	Decision base	Decision made on the basis of high degree of certainty	2	3	1	3	4	4	Decision made on the basis of low degree of certainty	1
4	9	Communication	Easy to get through to patient	1	3	1	1	3	4	Difficult to get through to patient	2
4	10	Continuity	Disrupted treatment	2	1	4	3	4	3	Non-disrupted treatment	3
5	1	Early diagnosis and treatment	Correct diagnosis and resolution	1	5	2	2	1	1	Missing diagnosis and no resolution	2
5	2	Effect of therapy	Good response to treatment	5	5	5	2	1	5	No response to treatment	1
5	3	Patient driven	High degree of patient engagement	2	1	2	4	2	1	Low degree of patient engagement	2
5	4	Communication	Interactive communication	5	1	1	5	1	2	Unilateral communication	1
5	5	Coordination and logistics	Thorough process	5	1	4	3	1	4	Less thorough process	1
5	6	Complexity	Complex experience based approach	2	1	2	3	5	3	Methodological approach	1
5	7	Clear presenting problem	Concrete reason for contact with health care	4	3	4	1	2	3	Diffuse reason for contact with health care	3
6	1	Effect of therapy	Very effective treatment	2	2	4	1	5	4	Not so effective treatment	2
6	2	Competency	Correct interpretation of investigation results	4	1	2	1	5	4	Wrong interpretation of investigation results	1
6	3	Resource utilization	Quality of treatment and diagnostics above normal	1	2	4	5	5	5	Quality of treatment and diagnostics normal	3
6	4	Responsibility	Take personal responsibility	1	2	2	4	5	5	Not to take personal responsibility	1
6	5	Clear presenting problem	Concrete reason for contact with health care	4	3	4	1	2	3	Diffuse reason for contact with health care	3
6	6	Context	Public health care	4	1	3	2	5	5	Private health care	2
6	7	Patient driven	High level of patients' ability to interpret symptoms	3	1	4	2	2	5	Low level of patients' ability to interpret symptoms	4
6	8	Disease severity	Situation with high priority	2	2	3	1	5	3	Situation with low priority	2
7	1	Patient driven	Patient responsible for own situation	2	4	1	2	5	5	Patient not responsible for own situation	1
7	2	Complexity	Complex and serious consequence of disease	2	4	3	2	5	1	Less complex and serious consequence of disease	4
7	3	Communication	Easy to understand what the patient wants	2	5	2	1	4	5	Difficult to understand what the patient wants	1
7	4	Patient driven	Patient wants resolution	2	2	1	1	5	4	Patient has given up	2
7	5	Patient driven	Patient knows a lot about own disease, system and what can influence course	2	3	1	1	4	4	Patient knows little about own disease....	2
7	6	Patient activate transfer	Dependent on frames	2	2	5	1	1	5	Independent of frames	3
7	7	Patient activate transfer	High degree of abuse potential	2	2	4	5	1	1	Low degree of abuse potential	2
7	8	Communication	Easy to get through to patient	1	3	1	1	5	5	Difficult to get through to patient	2

7	9	Competency	High degree of understanding about biological gender differences and its impact on communication	2	4	1	1	4	5	Low degree of understanding about biological gender differences and its impact on communication	2
8	1	Patient activate transfer	Attitude towards patient influence resource utilization positively	5	1	4	3	3	2	Attitude towards patient influence resource utilization negatively	2
8	2	Resource utilization	High resource utilization	5	1	4	4	1	1	Low resource utilization	3
8	3	Patient activate transfer	Academically interesting patient	5	1	5	3	3	1	Academically less interesting patient	2
8	4	Patient activate transfer	Positive patient give positive physician feeling	2	2	3	1	5	3	negative patient give negative physician feeling	2
8	5	Resource availability	Available resources	4	1	4	4	1	1	Lack of resources	4
8	6	Patient activate transfer	Healthy patient lifestyle	1	2	4	3	5	1	Unhealthy patient lifestyle	5
9	1	Communication	Conversation with high degree of common understanding	1	2	4	4	5	5	Conversation with low degree of common understanding	2
9	2	Continuity	Continuity in physician services	3	2	4	2	5	4	Discontinuity in physician services	2
9	3	Time	Enough time for patient and family	2	3	4	5	5	5	Lack of time for patient and family	2
9	4	Resource availability	Resource balance	5	3	1	1	5	4	Resource imbalance	2
9	5	Continuity	Patient followed over long time	1	4	3	4	5	5	Patient followed over short time	4
9	6	Competency	Correct competencies in physician services	2	1	2	2	5	5	Not enough competency in physician services	1
9	7	Patient adherence	High degree of patient adherence	2	2	3	5	1	1	Low degree of patient adherence	3
9	8	Responsibility	Full responsibility	1	1	3	3	5	5	Part responsibility	2
9	9	Competency	Correct level of diagnostics	1	2	3	1	5	5	Improper level of diagnostics	1
10	1	Patient activate transfer	High degree of engagement	1	3	1	4	1	2	Low degree of engagement	1
10	2	Information	High level of information available	1	1	1	3	2	1	Lack of information	2
10	3	Continuity	Continuity in physician services	1	1	2	5	4	4	Discontinuity in physician services	2
10	4	Early diagnosis and treatment	Early physician involvement in disease process	1	1	2	3	4	1	Late physician involvement in disease process	3
10	5	Competency	Available competencies	1	3	2	4	3	2	Lack of competencies	2
10	6	Resource availability	Control of diagnostic resources	2	2	3	2	1	5	Lacking control of diagnostic resources	2
10	7	Comorbidity	Low degree of comorbidity	1	2	3	5	1	2	High degree of comorbidity	2
10	8	Competency	Previous experience	1	1	2	1	4	5	No previous experience	2
11	1	Physician-patient relationship	Patient communicate trust	1	2	4	2	3	4	Patient communicates mistrust	2
11	2	Patient driven	Rational patient	4	4	3	1	3	5	Irrational patient	3
11	3	Clear presenting problem	Symptoms related to disease	4	1	4	2	5	1	No symptom of disease	2
11	4	Communication	Patient with rich language	5	3	2	3	1	4	Patient with poor language skills	3

11	5	Physician-patient relationship	Patient-physician relationship is based on long term relation	1	5	2	4	2	2	Patient-physician relationship is based on short term relation	2
11	6	Disease severity	Patient is severely ill	2	2	1	1	4	1	Patient is not so ill	1
11	7	Patient adherence	High degree of patient compliance	2	2	3	1	1	4	Low degree of patient compliance	2
11	8	Patient activate transfer	High degree of abuse	4	1	3	1	2	5	No abuse	3
11	9	Clear presenting problem	Patient presents with clear problem	2	3	2	1	3	2	Patient presents with diffuse problem	1
12	1	Resource availability	Specialised competencies available	5	1	1	3	3	1	Specialised competencies lacking	1
12	2	Risk	Complications free treatment	5	2	1	5	5	1	Complications associated with treatment	1
12	3	Information	Previous history of disease influence choice of diagnostics to a high degree	1	2	4	5	5	5	Previous history of disease influence choice to a lesser extent	4
12	4	Competency	High level of own experience	4	1	1	4	1	1	Low level of own experience	2
12	5	Coordination and logistics	Streamlined diagnosis and treatment	4	2	1	3	1	1	Not streamlined diagnosis and treatment	1
12	6	Acute disease	Acute disease	1	1	1	1	5	1	Chronic disease	5
12	7	Patient driven	Patient wants resolution	2	2	1	1	5	4	Patient has given up	2
12	8	Time	Enough time	3	3	2	5	3	1	Limited time	1
13	1	Early diagnosis and treatment	Early diagnosis	4	1	3	3	4	1	Delayed diagnosis	1
13	2	Communication	Good communication with patient and family	4	5	1	5	5	1	Lack of communication with patient and family	1
13	3	Resource availability	Necessary diagnostic modalities available	5	2	3	2	4	2	Necessary diagnostic modalities not available	1
13	4	Clear presenting problem	Characteristic clinical path	2	1	5	3	2	3	Very rare condition	5
13	5	Physician-patient relationship	Good alliance with patient and family	5	5	1	4	4	1	Poor alliance with patient and family	1
13	6	Clear presenting problem	Clear presenting problem	5	1	5	2	3	4	Diffuse presenting problem	5
13	7	Communication	Simple interaction with patient	4	4	1	5	2	1	Complex interaction with patient	3
14	1	Effect of therapy	Effective treatment	1	1	4	3	5	5	Less effective treatment	1
14	2	Risk	Fear governs patient choice	3	3	3	4	1	2	Life style governs patient choice	2
14	3	Patient adherence	High degree of adherence	1	1	2	4	5	4	Low degree of adherence	1
14	4	Resource availability	Therapeutic opportunities available	1	2	4	2	2	1	Therapeutic opportunities not available	1
14	5	Early diagnosis and treatment	Early diagnosis	1	1	1	3	5	5	Delayed diagnosis	1
14	6	Continuity	High degree of continuity	4	5	2	2	2	3	Lacking continuity	2
14	7	Competency	Highly competent staff	2	4	4	3	1	1	Less competent staff	2
14	8	Correct interpretation	Correct diagnosis	2	2	4	1	2	5	Diagnosis not clear	1
15	1	Complexity	Complex presenting problem	4	3	1	4	4	1	Simple presenting problem	2

15	2	Correct interpretation	Correct diagnosis	2	2	4	1	2	5	Diagnosis not clear	1
15	3	Early diagnosis and treatment	Quick resolution (diagnosis and treatment)	1	3	4	1	4	5	Step-wise resolution (diagnosis and treatment)	3
15	4	Complexity	Complicated treatment regimen	4	3	1	3	4	3	Simple treatment regimen	3
15	5	Resource availability	Control of diagnostic resources	2	2	3	2	1	5	Lacking control of diagnostic resources	2
15	6	Disease severity	Pathophysiology of disease develops quickly	1	3	5	1	5	3	Pathophysiology of disease develops over time	3
15	7	Competency	Competency dependent to a high degree	2	1	1	1	3	5	Competency dependent to a lesser extent	1
16	1	Disease severity	Grave disease and consequence for patient	2	2	3	2	1	2	Less grave disease and consequence for patient	1
16	2	Early diagnosis and treatment	Quick diagnostics	3	1	2	1	5	3	Delayed diagnostics	2
16	3	Effect of therapy	Predictable effect of treatment	2	2	2	4	5	4	Less predictable effect of treatment	2
16	4	Patient driven	Patient expectations met	1	1	3	2	5	5	Patient expectations not met	2
16	5	Resource availability	Need for competencies not immediately available	5	1	5	1	2	1	No need for added competencies	1
16	6	Coordination and logistics	Many people involved - complex logistics	2	1	4	1	1	1	Few people involved - less complex logistics	1
16	7	Continuity	Continuity in physician services	2	2	1	1	3	4	Discontinuity in physician services	2
16	8	Responsibility	Primary responsibility	2	1	4	3	1	1	Secondary responsibility - consultancy	1
16	9	Team approach	High degree of cooperation between HCP	1	1	2	2	1	5	Cooperation lacking between HCP	2
17	1	Effect of therapy	Optimal treatment	2	2	5	1	2	1	Suboptimal treatment	1
17	2	Complexity	High degree of complexity	1	3	3	1	4	2	Low degree of complexity	4
17	3	Complexity	Complicated therapeutic regimen	2	4	3	1	1	3	Simple therapeutic regimen	1
17	4	Correct interpretation	Correct medical evaluation	2	1	5	1	1	1	Incorrect medical evaluation	1
17	5	Effect of therapy	Effective treatment	3	2	5	1	2	2	Ineffective treatment	4
17	6	Resource availability	Competency match presenting problem	2	1	3	1	1	1	Competency does not match presenting problem	1
17	7	Coordination and logistics	Cooperation with others to increase competency level	4	5	4	1	5	4	Manage by self	2
18	1	Competency	Clinical experience	1	2	5	1	4	5	Lacking clinical experience	1
18	2	Correct interpretation	Therapy matched to presenting problem	1	3	3	1	3	5	Therapy not matched to presenting problem	3
18	3	Team approach	Team approach to diagnosis and therapy	1	3	3	1	4	5	Individual approach to diagnosis and therapy	2
18	4	Competency	High degree of situational confidence	1	3	5	1	4	3	Low degree of situational confidence	2
18	5	Time	Enough time	4	4	1	1	1	5	Lacking time	3

18	6	Information	Information is central to therapy	3	5	1	2	1	5	Information not needed	1
18	7	Intervention	Technical intervention	1	1	5	2	5	1	Human approach	3
18	8	Resource availability	Hospital treatment necessary	1	2	5	5	5	1	Treatment outside hospital possible	3
18	9	Early diagnosis and treatment	Early diagnosis	1	2	5	4	2	2	Delayed diagnosis	1
19	1	Early diagnosis and treatment	Early diagnosis	1	2	5	4	2	2	Delayed diagnosis	1
19	2	Effect of therapy	Correct treatment for medical condition	1	2	5	3	1	1	Not correct treatment for medical condition	1
19	3	Acute disease	Acute disease with dramatic symptoms	1	2	3	4	1	1	Chronic disease with undramatic symptoms	2
19	4	Comorbidity	Low degree of comorbidity	1	2	3	5	1	2	High degree of comorbidity	2
19	5	Competency	Experience with patient and knowledge of previous history	5	4	3	1	5	5	No experience with patient or knowledge of previous history	2
19	6	Resource availability	Resources and relevant competency available	2	2	5	4	1	1	Resources and relevant competency not available	1
19	7	Competency	Highly competent staff	2	4	4	3	1	1	Less competent staff	2
19	8	Effect of therapy	Short duration of therapy	4	3	3	3	4	2	Long duration of therapy	2
20	1	Early diagnosis and treatment	Early involvement	2	1	5	3	1	1	Delayed involvement	2
20	2	Correct interpretation	Correct medical evaluation	1	1	3	2	4	5	Incorrect medical evaluation	1
20	3	Responsibility	Primary responsibility	2	1	4	3	1	1	Secondary responsibility - consultancy	1
20	4	Continuity	Few physicians involved	2	1	5	4	1	1	Many physicians involved	1
20	5		High level health care	2	1	2	2	5	4	Lowe level health care	3
20	6	Complexity	High level of complexity	2	1	5	2	1	1	Low level of complexity	1
20	7	Resource availability	Opportunity for follow-up	1	1	1	1	5	4	No opportunity for follow-up	2
20	8	Resource utilization	All possibilities utilized	1	1	1	1	4	5	All possibilities not utilized	2
20	9	Resource availability	Necessary competency available to resolve problem	1	1	2	1	4	4	Necessary competency not available to resolve problem	1
20	10	Resource availability	Diagnostic tools available	1	1	1	1	5	3	Diagnostic tools not available	2
21	1	Information	Extensive information about previous history available	5	1	1	5	3	3	Information about previous history not available	1
21	2	Time	Enough time for evaluation	1	1	1	1	5	1	Lack of time for evaluation	1
21	3	Responsibility	Fully responsibility for patient care	1	3	3	1	5	3	Partly responsible for patient care	1
21	4	Correct interpretation	Correct medical evaluation	1	1	2	2	5	2	Lacking medical evaluation	1
21	5	Correct interpretation	Quality of evaluation is high	1	1	2	1	5	4	Quality of evaluation is low	1
21	6	Team approach	Team approach	1	1	2	1	5	2	Individual approach	1
21	7	Early diagnosis and treatment	Early diagnosis	1	2	5	4	2	2	Delayed diagnosis	1
21	8	Patient activate transfer	Patient is demanding	1	2	1	4	3	4	Patient is not demanding	4
22	1	Continuity	Continuity in physician services	1	1	3	5	2	1	Discontinuity in physician services	1
22	2	Effect of therapy	Treatment with effect on disease	1	1	3	3	2	5	Treatment with symptomatic effect	3

22	3	Early diagnosis and treatment	Highly competent staff involved early	1	1	2	3	1	2	Delayed involvement of highly competent staff	1
22	4	Coordination and logistics	Everything went according to plan	1	1	3	2	3	1	Everything did not go according to plan	2
22	5	Early diagnosis and treatment	Quick diagnosis and treatment	1	1	1	3	1	1	Delayed diagnosis and treatment	1
22	6	Competency	High degree of experience	1	1	2	3	1	1	Lacking experience	1
22	7	Physician-patient relationship	High degree of trust	1	2	2	3	2	2	Lacking trust	2
22	8	Time	Enough time	2	1	3	1	1	4	Lacking time	3
23	1	Resource availability	Resources of adequate quality available	4	1	3	3	1	1	Quality resources lacking	2
23	2	Acute disease	Acute and severe disease	3	3	1	4	1	1	Gradual worsening of chronic disease	2
23	3	Time	Enough time	3	1	4	4	1	1	Limited time	1
23	4	Comorbidity	Patient care not limited by comorbidities	1	5	4	2	1	5	Patient care limited by comorbidities	1
23	5	Correct interpretation	Quality diagnosis	3	2	1	2	1	5	Limited diagnosis	2
23	6	Responsibility	Full responsibility	5	3	4	4	2	1	Shared responsibility	2
23	7	Early diagnosis and treatment	Early diagnosis	5	2	1	3	4	5	Delayed diagnosis	1
23	8	Patient activate transfer	Positive transfer	3	3	1	3	2	2	Negative transfer	3
23	9	Physician-patient relationship	High degree of trust	4	2	2	3	1	2	Lacking trust	3
24	1	Competency	Specialist competency required	1	1	4	4	1	3	General competency required	2
24	2	Early diagnosis and treatment	Early diagnosis	1	2	1	3	4	5	Delayed diagnosis	1
24	3	Clear presenting problem	Clear presenting problem	2	3	2	2	5	3	Diffuse presenting problem	2
24	4	Disease severity	Serious disease	1	2	2	1	1	3	Less serious disease	3
24	5	Time	Enough time	1	1	1	2	4	4	Pressed for time	2
24	6	Patient activate transfer	Positive transfer	3	3	1	3	2	2	Negative transfer	3
24	7	Resource availability	Diagnostic resources available	1	2	1	4	5	4	Diagnostic resources limited	2
24	8	Disease severity	Severe symptoms of disease	1	1	3	2	4	3	Mild symptoms of disease	4
24	9	Communication	Easy to communicate with patient	3	2	3	3	1	2	Difficult to communicate with patient	2
24	10	Early diagnosis and treatment	Early treatment	1	2	2	3	4	5	Delayed treatment	1
25	1	Early diagnosis and treatment	Early diagnosis and treatment	4	5	1	2	1	1	Delayed diagnosis and treatment	1
25	2	Acute disease	Acute disease	1	5	4	2	4	3	Chronic disease	2
25	3	Competency	Highly competent	2	5	1	2	2	2	Lacking commence	1
25	4	Patient adherence	Patient willing to participate in therapy	5	1	2	1	1	4	Patient not willing to participate in therapy	2
25	5	Physician-patient relationship	High degree of trust	5	3	2	1	2	2	Lacking trust	2
25	6	Continuity	High degree of continuity	4	5	2	2	2	3	Lacking continuity	2
25	7	Disease severity	Severe symptoms of disease	4	3	2	4	3	2	Mild symptoms of disease	2

26	1	Communication	Good communication with patient	1	2	4	3	2	5	Poor communication with patient	1
26	2	Early diagnosis and treatment	Early diagnosis and treatment of complications	1	1	3	3	3	5	Delayed diagnosis and treatment of complications	1
26	3	Continuity	Continuity in treatment - few physicians involved	1	1	2	4	3	4	Discontinuity in treatment - many physicians involved	2
26	4	Acute disease	Acute disease	5	5	1	3	5	5	Chronic disease	3
26	5	Patient activate transfer	Patient is demanding	1	2	1	4	3	4	Patient is not demanding	4
26	6	Early diagnosis and treatment	Early diagnosis of primary disease	1	1	2	3	4	5	Delayed diagnosis of primary disease	1
26	7	Resource utilization	High level of health care	1	1	2	3	3	5	Low level of health care	2
26	8	Coordination and logistics	High degree of cooperation between physician and nurses	1	1	2	2	1	5	Parallel paths	2
26	9	Resource availability	High level of policlinic follow up	1	1	2	3	2	4	Lower level of policlinic follow up	3
26	10	Competency	More supervision of junior doctors	3	3	1	3	4	4	Less supervision of junior doctors	1
27	1	Acute disease	Acute disease	5	2	1	1	5	2	Chronic disease	1
27	2	Intervention	Acute technical intervention (somatic Dx)	4	2	1	1	5	2	Chronic medical intervention (psychiatric Dx)	3
27	3	Context	Inpatient	5	1	1	1	5	1	Outpatient	5
27	4	Physician-patient relationship	Continuous empathy	3	2	1	1	4	2	Passing empathy	3
27	5	Resource availability	Requires high quality	4	2	1	1	4	2	Requires less quality	2
27	6	Context	Legal right to health care	4	1	1	1	5	3	No legal right to health care	5
27	7	Effect of therapy	Effect of intervention is important	3	2	1	1	4	4	Effect of intervention less important	3
27	8	Competency	Specialty knowledge	2	4	3	3	4	3	General knowledge	2
27	9	Communication	Communication with patient is important	1	1	5	4	3	2	Communication with patient is less important	1
27	10	Information	High degree of comparent information	3	4	4	5	1	4	Low degree of comparent information	4

Table B-5 Repertory Grid

REPERTORY GRID:

Date: / /2012 Interviewee: Interviewer: Yngve Mikkelsen Start: Finish:

CONSTRUCTS	Element 1	Element 2	Element 3	Element 4	Element 5	Element 6	CONSTRUCT POLE
1)	*	*	*				
2)				*	*	*	
3)	*	*		*			
4)	*		*		*		
5)	*			*		*	
6)		*	*		*		
7)			*	*		*	
8)	*				*	*	
9)		*		*		*	
10)			*		*	*	
11)		*	*	*			
12)	*		*			*	

* represents the elements in each of the triads

Table B-6 Theoretical saturation

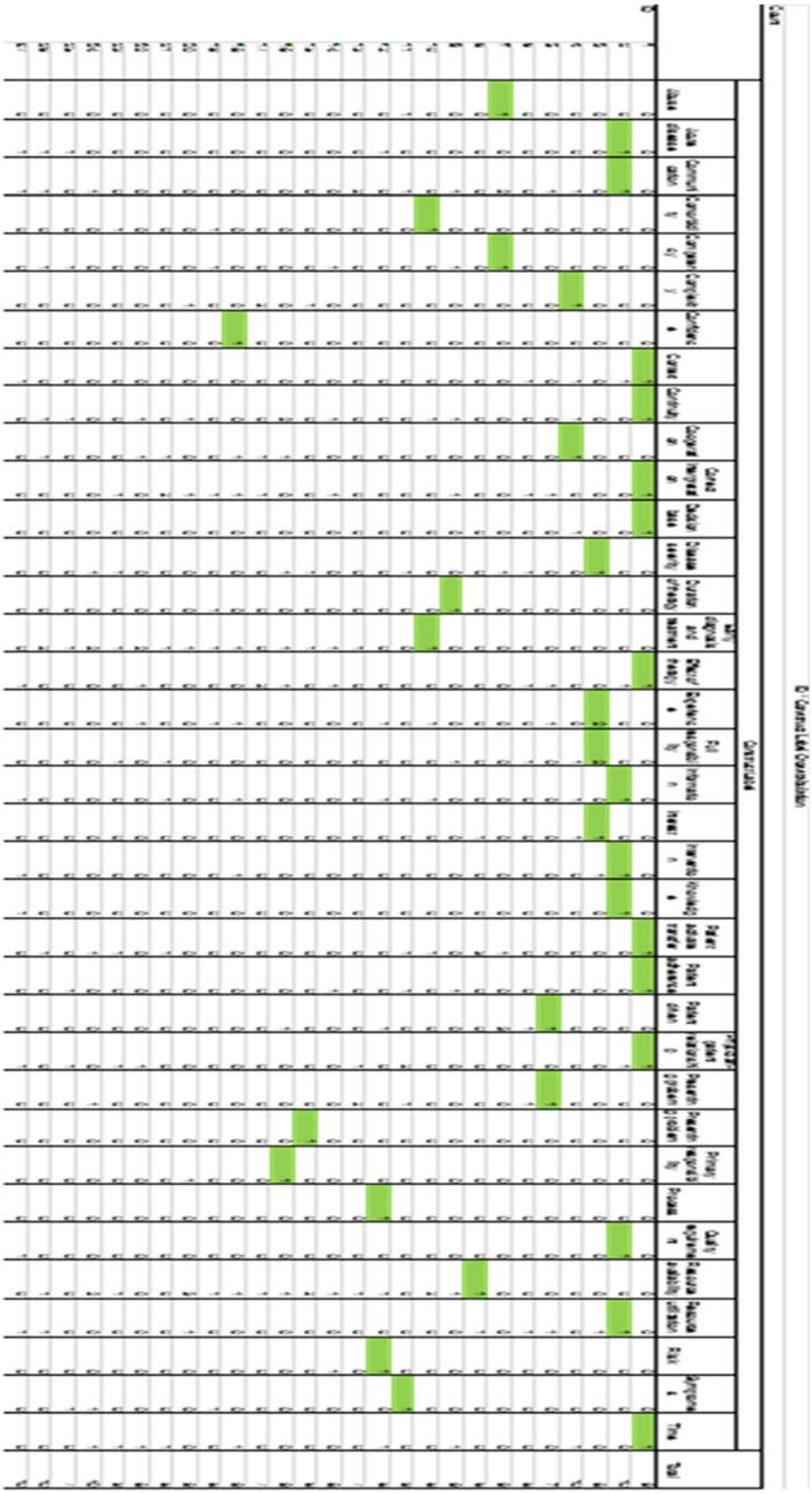


Table B-7 Key constructs

D	Construct Label	Construct	Construct Pole	Explanation	Example quote	Freq	ANV	Honey
3	Communication	Good communication	Poor communication	Communication: is the dialogue between patient and physician designed to gather important information and give information so that the physician and patient can make decisions based on the best available information possible.	"It was very easy to get contact with this patient. The patient had a good understanding of his condition and was able to communicate his symptoms clearly. This other patient had a poorly developed vocabulary and did not understand that the symptoms were related to disease. It was very difficult to get through to him."	12	13,37	H
9	Continuity	More continuity	Less continuity	Continuity: is related to how many physicians or other health care workers are involved in the care. When many are involved information is lost during numerous exchanges. Furthermore, feeling of responsibility may also be affected.	"This patient had been to several of my colleagues with stomach pain for months. A few tests had been done and the patient repeatedly sent home without further to do. When he came to me I ordered a computer tomography of the abdomen and it showed liver cancer with widespread metastasis. He died two weeks later and …."	11	12,22	M
10	Cooperation	More cooperation	Less cooperation	Cooperation: cooperation among physicians and health care workers is necessary for a team approach and its synergies of effect.	"The ER is not very effective, the nurse and physician see the patient at different times and ask the same questions. It would be much better if we were there at the same time. Information would flow easily and the patient would not have to answer the same question twice."	7	12,24	H
11	Interpretation	Correct interpretation	Wrong interpretation	Interpretation: correct interpretation of information is central to the process of diagnosing and deciding on the appropriate therapy.	"…this particular patient was a young boy with down syndrome. I was dependent on his parent's information to make a correct diagnosis. Fortunately, his parents had a high social status and it made it easy to communicate. I think this was important in getting the correct information and making the diagnosis. It has also helped in the follow-up. At the	12	13,05	H

					time I had two such patients with genetic heart disorders and they both lived 10-15 years longer than they might otherwise have done.”			
15	Early diagnosis and treatment	Early diagnosis and treatment	Delayed diagnosis and treatment	Early diagnosis and treatment: early diagnosis and treatment is related to the time it takes from patient presents with problem until treatment is started.	"Due to delay in diagnosis this patient did not receive the therapy needed to save his life."	17	12,86	H
16	Effect of therapy	More effective therapy	Less effective therapy	Effect of therapy: therapy can be more or less effective in solving the presenting problem. Differentiation is made between curative effect and symptomatic effect. In some cases the symptomatic effect may be just as important dependent on the availability of curative therapies. For example palliation for terminal cancer patients.	"...intensive care is about two things: cure and palliation. Sometimes a cure is not available and then it is important to set therapy targets in line with what is the patient’s interest."	10	13,8	M
17	Experience	More experience	Less experience	Experience: represents the knowledge or skill necessary to apply scientific medical knowledge to practice gained through exposure to similar events or cases.	"The patient came to the ER after a fight at a local bar. He was not conscious and the consultant did not come to see the patient. The hospital was full that night, but I managed to get the patient a bed on a ward. I felt uneasy about the whole thing. Later during the night I went to check on the patient and found him in a deep coma. A Ct was requested and an intracranial bleeding was found. The patient was flown by helicopter to the nearest trauma centre and died on the operating table. This is a case that has been with me for years and my lack of experience made me accept the cursory advice from the consultant even though my	8	11,96	H

					gut feeling told me otherwise."			
18	Full responsibility	Full responsibility	No responsibility	Full responsibility: denotes the fact that one physician is in charge of the care of the patient.	"I think this patient would have had a better outcome if I would have had the full responsibility. The problem was that I felt like a consultant without full responsibility and gave advice. If I would have had all the information and been involved from the beginning my advice would have been stressed differently. Unfortunately the poor boy died."	7	11,97	M
29	Resource availability	More resources available	Less resources available	Resource availability: Resources represents both human and technical resources.	"The patient was left in the ER for 12 hours without care. There were simply too many patients to take care of and some had to wait a really long time. Longer than what is acceptable."	20	12,32	M
30	Resource utilization	More resources used	Less resources used	Resource utilization: the use of resources is related to diagnostic and therapeutic resources. Resources refer to a wide variety of resources ranging from buildings, technical installations, IT, diagnostic and therapeutic modalities.	"This patient got more than what could be expected. All possible diagnostic and therapeutic avenues were tried. In other words, the health care system had no more resources available that could be used."	8	15,83	L
33	Time	More time	Less time	Time: available time is important in order to do what is necessary. Time available is often determined by patients/physicians per time unit.	"During a hectic day with many consultations, the colleague performing the initial echo of the heart only paid attention to the replacement valve and not to the whole heart. Only two months later, after looking at the recorded echo film, was I evident that the left ventricle was barely moving. At this point he was dying and therapy at this point did not have any effects. He died shortly thereafter."	9	13,25	M

Table B-8 Word Cloud

Table B-9 Word Tree

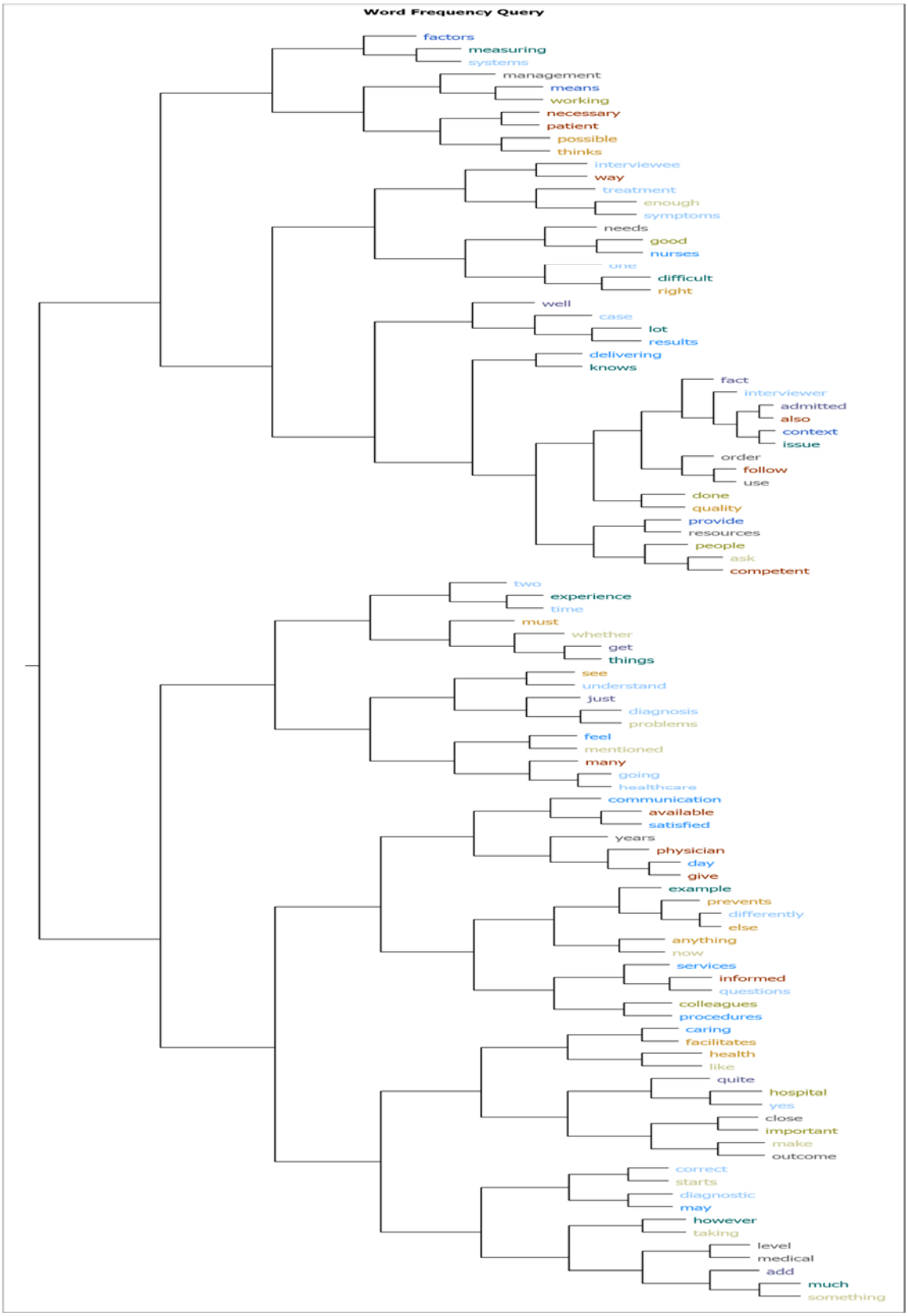
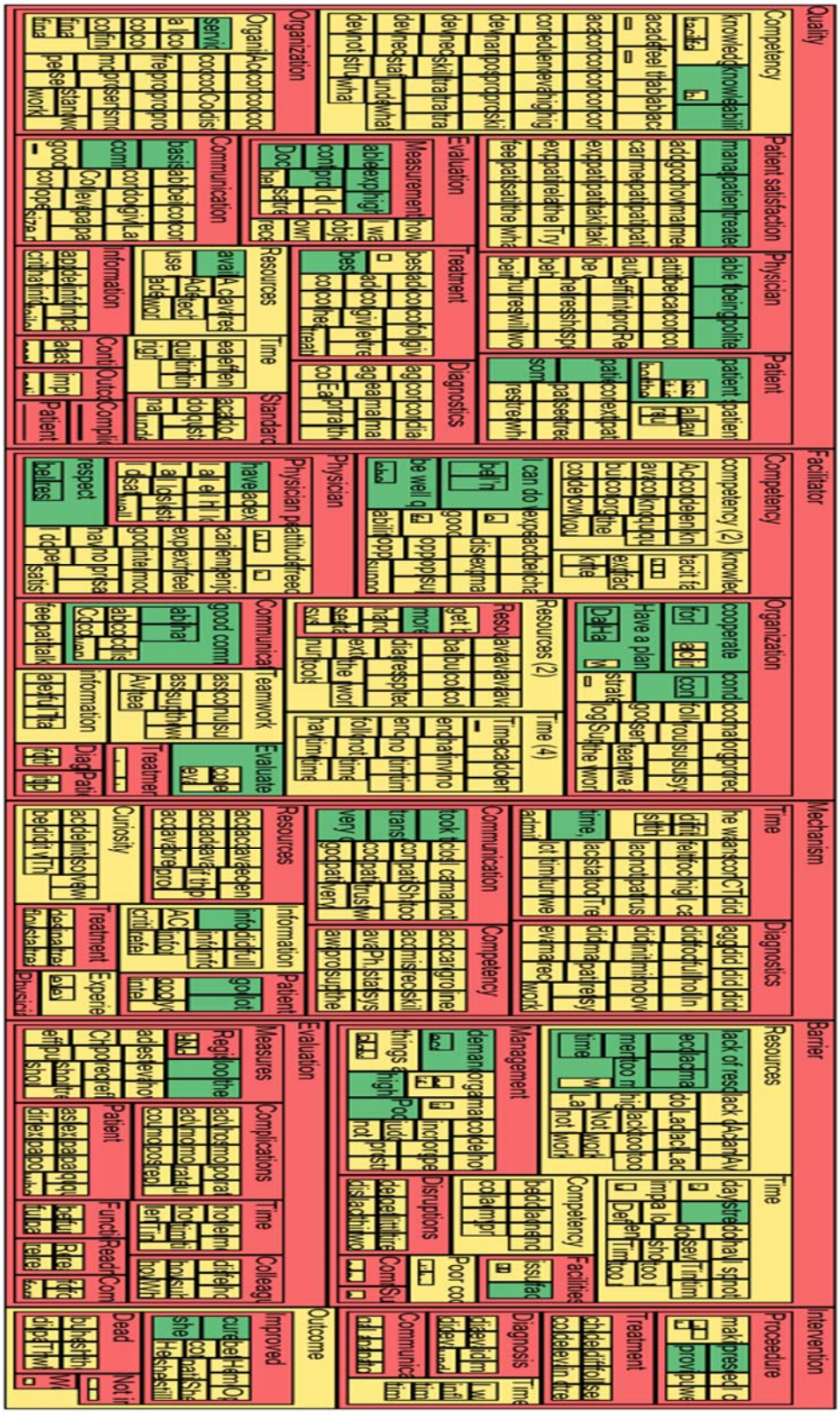


Table B-10 Grid Output by NVIVO



Nodes compared by number of coding references

Table B-11 Frequency of nodes and references by interview

Name	Nodes	References
Interview 1	62	121
Interview 2	61	103
Interview 3	51	88
Interview 4	62	126
Interview 5	56	111
Interview 6	66	123
Interview 7	49	84
Interview 8	47	84
Interview 9	64	118
Interview 10	58	95
Interview 11	45	81
Interview 12	60	100
Interview 13	56	88
Interview 14	56	96
Interview 15	52	85
Interview 16	59	92
Interview 17	42	63
Interview 18	48	73
Interview 19	68	104
Interview 20	70	118
Interview 21	49	84
Interview 22	60	101
Interview 23	54	91
Interview 24	75	133
Interview 25	91	182
Interview 26	67	143
Interview 27	62	101
TOTAL	1 590	2 788
MEAN	58,89	103,26
MEDIAN	59,00	100,00
STDV	10,32	24,61
HIGH	91,00	182,00
LOW	42,00	63,00
RANGE	49,00	119,00
SKEW	1,03	1,30
KURTOSIS	2,34	2,80

Appendix C PROJECT THREE

C.1 Protocol

C.1.1 Background

It has been widely recognized that access to medical interventions necessitates physician initiative and concurrence (McGuire, 2001). Furthermore, it is widely recognized that because medical decisions have an impact on patients' health, they should be of high quality (Klein, 2005).

There appears to be consensus that decision making in medicine is made under uncertainty (Bornstein and Emler, 2001, Elstein, 1999, Elstein and Schwarz, 2002, Payne et al., 1993, Reyna and Rivers, 2008, Spring, 2008). A systematic review conducted prior to the present project revealed that no general theory of medical decision has been formulated, but the theory of reasoned action is the most studied theoretical framework informing on the topic of physician's decision behaviour (Reyna, 2008). Given the complexities of medical decision making and that no grand theoretical framework exists, deciding how to decide is central (Payne et al., 1993). Despite being highly trained, doctors are prone to making mistakes and cognitive biases may detract from the use of logical and statistical decision heuristics (Hershberger et al., 1994). In summary, there is a lack of contextually sensitive evidence informing medical decision processes.

A report from the Institute of Medicine has documented that close to one million people per year are injured and close to one hundred thousand people a year dies as a result of preventable medical errors (Kohn et al., 1999). As a consequence, standardization of the provision of care in hospitals has come into greater focus. Implementing approaches to implement more systematically compliance with guidelines can help reduce variation in core processes of organizations (Flynn et al., 1994) and the same increase the quality of health care provided (Leape, 1994).

The focus on quality of health care provision focuses on two main components. First, improvement of clinical quality where clinical quality refers to performance relative to process of care performance measures which are represented by clinical protocols of best practice to achieve high levels of patient safety (Chandrasekaran et al., 2012). Second, experiential quality is represented by the quality of care as experienced by the patient (Donabedian, 1988). It focuses on how care is provided and is distinct from the clinical quality as it is focused on what is provided.

Tension between the two paths may occur when hospital management try to balance the two; as focus on clinical quality can reduce variation and focus on experiential quality increase variation (Chandrasekaran et al., 2012). Clinical quality has been shown to be closely linked to experiential quality (Blackwell, 1973, Butler et al., 2002, Camron, 1996) and vice versa. Thus, it is argued that the quality of care is dependent on both clinical- and experiential quality.

C.1.2 Justification for the Study: Findings from Systematic Literature Review

Though a good amount of research exists on outcomes of medical care, this study is justified, among others for the following reasons:

Lack of grand medical Decision Theory

Medical decision making has been given due attention due to the fact that such decisions may have a profound impact on patients' health. Although there is wide agreement that medical decisions are made under uncertainty, as of yet, no grand theory of medical decision making exists (Reyna & Rivers 2008). Deciding how to decide is therefore important (Payne, Bettman, & Johnson 1993). This was a key finding of the systematic review preceding this study.

Overall lack of information regarding outcomes

It is widely recognized that because medical decisions have an impact on patients' health, they should be of high quality (Klein, 2005). Factors influencing physician prescribing behaviour have been widely stated, but the linkage between these factors and evidence of how and under which circumstances (contexts) influence is exerted remains unanswered (Bornstein and Emler, 2001, Bradley, 1991). Furthermore, effect on patients' health of any intervention designed to affect physician decisions is sadly lacking (Bornstein & Emler 2001;Bradley 1991;Smith 1977).

The need for understanding how factors influence decision behaviour

There is a wide body of evidence informing on the topic of influence and persuasion (O'Keefe 2002), but very little on effect in the context of physician prescribing behaviour (Lambert et al. 1997;O'Keefe 2002). Furthermore, there is a lack of contextual evidence and understanding of how factors affect physician decisions.

Overall, the above findings mean that factors influencing physician decision behaviour may impact quality of the health care provided. It is therefore important to understand how and what role the physician play in determining the quality of health care provision.

C.1.3 Study Panel

The study panel will consist of the primary investigator (Yngve Mikkelsen, MD), his lead supervisor (Dr. Javier Marcos), a senior academic supervisor (Professor Hugh Wilson) and senior academic supervisor (Professor Simon Knox). In addition, other academics with which the researchers have contact and are knowledgeable in the field may be consulted to discuss the approach and findings of the present study.

Table C-1 Study panel for project three

Person	Role / Title and organization
Dr. Javier Marcos	Lead supervisor, Lecturer, Cranfield School of Management.
Professor Simon Knox	Senior supervisor, Professor, Cranfield School of Management
Professor Hugh Wilson	Senior supervisor, Professor, Cranfield School of Management

C.1.4 Aims and Objectives

This study contains two separate parts addressing separate research questions designed to fulfil the requirements for empirical project three (P3) for the DBA at Cranfield School of Management. For practical purposes data collection for P3 will take place on the same day as data collection for P2 from approximately 30 individual physicians. The projects will be analysed and reported separately as highlighted in the Project Plan section on page 376.

The aim of this project is to gain an in depth understanding of how physicians frame quality of health care delivery, identify enablers and barriers for provision of quality health care by physicians and describe the perceived role of physicians in balancing clinical and experiential quality while delivering health care. Specifically the project will:

- Identify and categorize key constructs physicians have in mind to understand and deliver health care when conducting clinical (with the patient) work
- Identify enablers and barriers for provision of quality health care as perceived by physicians
- Identify how physicians balance clinical and experiential quality when providing health care

Taking on a physician perspective in a hospital setting I therefore propose the following research question (RQ):

RQ 1: How do physicians perceive quality of health care delivery in a hospital setting?

RQ 2: What are the perceived enablers and barriers of quality health care delivery by physicians in a hospital setting?

Little or no good quality data exists addressing such issues, making quantitative analysis as basis for further understanding of the phenomenon impractical. So, in order to gain a better understanding of how physicians frame quality of health care provision, a qualitative approach was chosen. With this in mind, possible methods for gathering data was explored (list not exhaustive): interviews (face-to-face, telephone, e-mail), focus groups, comparison of records (reports, academic articles, etc.), case studies, and observation of phenomena in its natural environment.

Both RQs will be addressed using semi structured interviews employing projective technique.

C.1.5 The Context of the Research

The hospital in question is divided into separate divisions focusing on different therapy areas. Given the difference in focus there might be differences in perspectives between the divisions. Therefore, a decision to include several divisions was made. The method considered most suitable, ensuring both detection of potential contrasts between the divisions and extract the most valuable information, was repertory grid.

C.1.6 Scope of the Study

Table C-2 Scope of project three

Focus	The focus of the study is on how physicians frame health care service quality and what are the enablers and barriers for review Source: physician, university hospital, across specialties
Time Frame	The study will be conducted during the second half of 2012.
Geography	Norway, Oslo area
Discipline	The study will focus on hospital physicians across specialties at a university hospital.

C.1.7 Methodology

Semi-structured interviews

Semi-structured interviews will be used in order to elicit information from the participants' about the phenomenon in question. The methodology closely follows that described by Kvale and Brinkmann (2009) p. 97-141

Projective approaches

Projective techniques and selection of episodes / cases will be used to help elicit participants' view of the phenomenon in question. The methodology is suitable for eliciting information that the participants' may not be explicitly conscious of (Mason, 1950). For instance, participants will be asked what they would do differently if conditions were ideal.

Furthermore, the realist synthesis methodology suggested by Pawson et al. (2004) where focus is on gaining insights from the respondent perspective about the relationship between context, intervention, mechanism and outcomes,.

C.1.8 Study: Administrative phase

Ethical approval

Ethical approval in accordance with Cranfield University and Akershus University Hospital policy (internal approval by the privacy ombudsman) will be obtained before study start in order to ensure appropriate management of data and

maintenance of privacy. The project is not considered to be within the scope of "Helseforskningsloven" (Norwegian research legislation) and will therefore not be submitted to the regional ethical committee (**R**egional **E**tisk **K**ommite) in Norway.

Selection of study subjects

Physicians across the five clinical divisions of a university hospital in the Oslo area in Norway will be invited to participate. The interviews will be formally booked using Microsoft Outlook 2007, including information about background, confidentiality and use of a tape recorder. Acceptance of interview participation will also be recorded in Microsoft Outlook.

The number of recruited individuals will depend on the point at which theoretical saturation is achieved (approximately 30 individuals expected).

The criteria to invite physicians to participate in the study are:

- Physicians in clinical practice
    - Employed by Akershus University Hospital at the time of the study
- Physicians not in administrative roles
- Physicians willing to participate in the study

Informed consent

Informed consent will be sought from study subjects prior to inclusion and recorded in writing (see Appendix C: Written Consent Form) and on voice recorder.

C.1.9 Study: Conduction phase

Pilot

On the basis of the research objective, an interview guide was developed (see Appendix B: Interview Guide) and subjected to evaluation and feedback from supervisor and course leader, before amendments were made. The interview guide will be piloted (3-4 interviews) and revised in accordance with feedback provided and personal learning's during the pilot stage. Revision of the interview guide will be done in collaboration with the study panel.

Data capture

The interviews will be conducted in a suitable office behind closed doors Q3-4 2012; acceptance of tape-recorder use will be recorded, as will the rest of the interview as per interview guide, using an Olympus Digital Voice Recorder DM-550.

After the interview is completed the recording will be transcribed by the researcher. Only quotes to be used in the final report will be translated for meaning by the researcher as these best suites the purpose of the project.

Anonymisation

Data will be anonymized by the researcher using a key. Only the researcher will have access to the key.

Data storage

Data will be stored securely (locked in a safe) to ensure that no unintended access to data takes place. All data will be destroyed after legislation or contractual requirements expire, at the latest after 10 years.

C.1.10 Analysis phase

An open coding approach was chosen for this project as it is well suited for understanding phenomena (Kvale and Brinkmann, 2009).

Transcript of the first interview will be studied in detail and concepts identified line by line. The concepts will be given rudimentary codes in the margin of the written transcript. These codes will be compared to new codes from the next transcript, continuously going back and forth comparing the data. The process will be repeated until all transcripts have been conceptualized.

During the process, concepts will be merged into new concepts, grouped into categories, and finally labelled as tentative categories. Using the tentative categories as a guide, transcripts and interview notes will be revisited establishing the final categorical coding reflecting a cognitive map of how physicians frame quality in health care service delivery, and physician enablers & barriers.

The categories will then be probed for properties and dimensions by going back and forth comparing data from transcripts, interview notes and re-listening to the recordings for additional data granularity. The resulting coding structure consists of four levels consisting of: category, sub-category, property and dimension. Evolution of the coding process will be tracked in Microsoft Excel 2010 using progressive sheets, resulting in a detailed coding log. NVivo 10 will be used for final text analysis and coding.

C.1.11 Project Plan

The study includes several stages and will be conducted during the period spanning from protocol approval (mid 2012) to final submission in May 2013. Work will only commence obtaining necessary protocol and ethical approval. Consultation is planned at various points during the review period and will take the form of monthly progress reviews with Dr. Javier Marcos. A face-to-face meeting with the panel was held on the 4th July 2012. Further, face-to-face meeting will be planned as required First draft of P3 will be circulated among panel members in March 2012, before final submission in May 2013.

C.1.12 Dissemination of the Review and Further Research

The aim of this study is to fulfil the DBA requirements at the Cranfield School of Management. The study will adapted for publication in academic and practitioner journals.

C.1.13 Interview Guide

Personal statement/ introduction

First, thank you so much for agreeing to conduct this interview.

I am a student at Cranfield School of Management, Cranfield University, UK I am pursuing a doctorate in business administration which focus is investigating the factors that influence physician's decisions and work and their influence on the quality of health care delivery. Your perspectives on this subject will provide valuable insight to this research.

I would like to tape record this interview to enable a rigorous analysis of the data and to enhance the reliability of the methods. Would this be OK for you? Your answers will be confidential and the identity of participants in this study kept strictly anonymous. Also your participation in this study is totally voluntary.

I am not looking for any particular answer, but just you views and opinions on a number of areas. Please feel free to ask me to clarify any question you do not understand.

The interview will last approximately 90 minutes and has two parts. I will outline each part separately as we go.

Interview outline

I expect this part of the interview will last about 30 minutes. I will now give you a brief outline of the interview.

1. First, I will ask general questions about how you view the provision of health care
    a. Please feel free to elaborate or illustrate in any way you want
    b. When I may ask follow up questions to gain a clearer understanding of your views
2. Third, I would like to gain your insights about ways in which quality of health provision may be enhanced.

I will also take some notes as we go.
Any questions about the interview, may we start then?

Open question

Please tell me, how you would describe Quality of Health Care provision

I see…. Please tell me more; what does quality of health care service mean to you?

How do you assess quality of health care?

Perceived enablers of quality of health care

1º Q: You've described your view of quality health care provision which I appreciate. I'd like to ask you

- what gets facilitates YOU delivering quality of health care
- I see, what other enablers you see in helping you deliver quality health care?

Please describe the cases provide in part one of the interview that represent a patient encounter where the quality of service was excellent.

- what was the **C**ontext
- what did you and/or your service do (**I**ntervention)
- what was the **O**utcome
- what were the factors (in other words **M**echanisms) that contributed to such outcome?

Perceived barriers of quality of health care

2º Q: You've described your view of quality health care provision which I appreciate. I'd like to ask you

- what gets in the way (or precludes) for YOU from delivering quality of health care
- I see, what other barriers you see in preventing you from delivering quality health care?

You've mentioned X, Y, Z. Let's imaging that those constrains/barriers did not exist…

What would you do differently?

Please describe the cases provide in part one of the interview that represent a patient encounter where the quality of service was not satisfactory.

- what was the **C**ontext
- what did you do (**I**ntervention)
- what was the **O**utcome
- what were the factors (in other words **M**echanisms) associated with such outcome?

2º Q: What do you mean by?
Please explain further.
Can you elaborate further?
In your answer you mentioned….

Concluding

I am about to wrap up. I there anything else you would like to add that may help understand…?

I would also like to ask you, what is your experience of this interview?

C.1.14 Samtykkeerklæring (Written consent form in Norwegian)

Forespørsel om å delta i forskningsprosjektet «Legers forståelse av kvalitet av helsetjenester»

I forbindelse med min doktorgrad holder jeg nå på med et forskningsprosjekt. Temaet for studien er kvalitet i helsetjenesten, og jeg skal gjennomføre en eksplorativ undersøkelse for å kartlegge hvordan leger legger rammer for kvalitet av helsetjenesteleveranser, og hvilke faktorer som motvirker eller medvirker til kvalitet av helsetjenesteleveranser.
For å finne ut av dette, ønsker jeg å intervjue ca. 30 leger ved AHUS. Spørsmålene vil dreie seg om din forståelse av kvalitet i helsetjenesten. Som en del av studien vil jeg også forsøke å finne ut noe om hvilke faktorer som medvirker eller motvirker kvalitet av helsetjenesteleveranser fra et legeperspektiv.
Jeg vil bruke båndopptaker og ta notater mens vi snakker sammen. Intervjuet vil ta omtrent en 30 minutter, og vi blir sammen enige om tid og sted.

Det er frivillig å være med og du har mulighet til å trekke deg når som helst underveis, uten å måtte begrunne dette nærmere. Dersom du trekker deg vil alle innsamlede data om deg bli anonymisert. Opplysningene vil bli behandlet konfidensielt, og ingen enkeltpersoner vil kunne gjenkjennes. Opplysningene anonymiseres og opptakene slettes når studien er ferdig, innen utgangen av 2012.

Dersom du har lyst å være med på intervjuet, er det fint om du skriver under på den vedlagte samtykkeerklæringen.

Hvis det er noe du lurer på kan du ringe meg på +47 94987760, eller sende en e-post til yngve.mikkelsen@ahus.no. Du kan også kontakte min veileder Dr. Javier Marcos ved Cranfield School of Management, telefonnummer +44 1234751122 .

Studien er godkjent av Forskningsenheten ved AHUS og Cranfield School of Management.

Med vennlig hilsen
Yngve Mikkelsen
Akershus universitetssykehus HF
1478 Lørenskog

Samtykkeerklæring:
Jeg har mottatt skriftlig informasjon og er villig til å delta i studien.

Signatur ……. Telefonnummer ……..

Table C-3 NVIVO screen shot

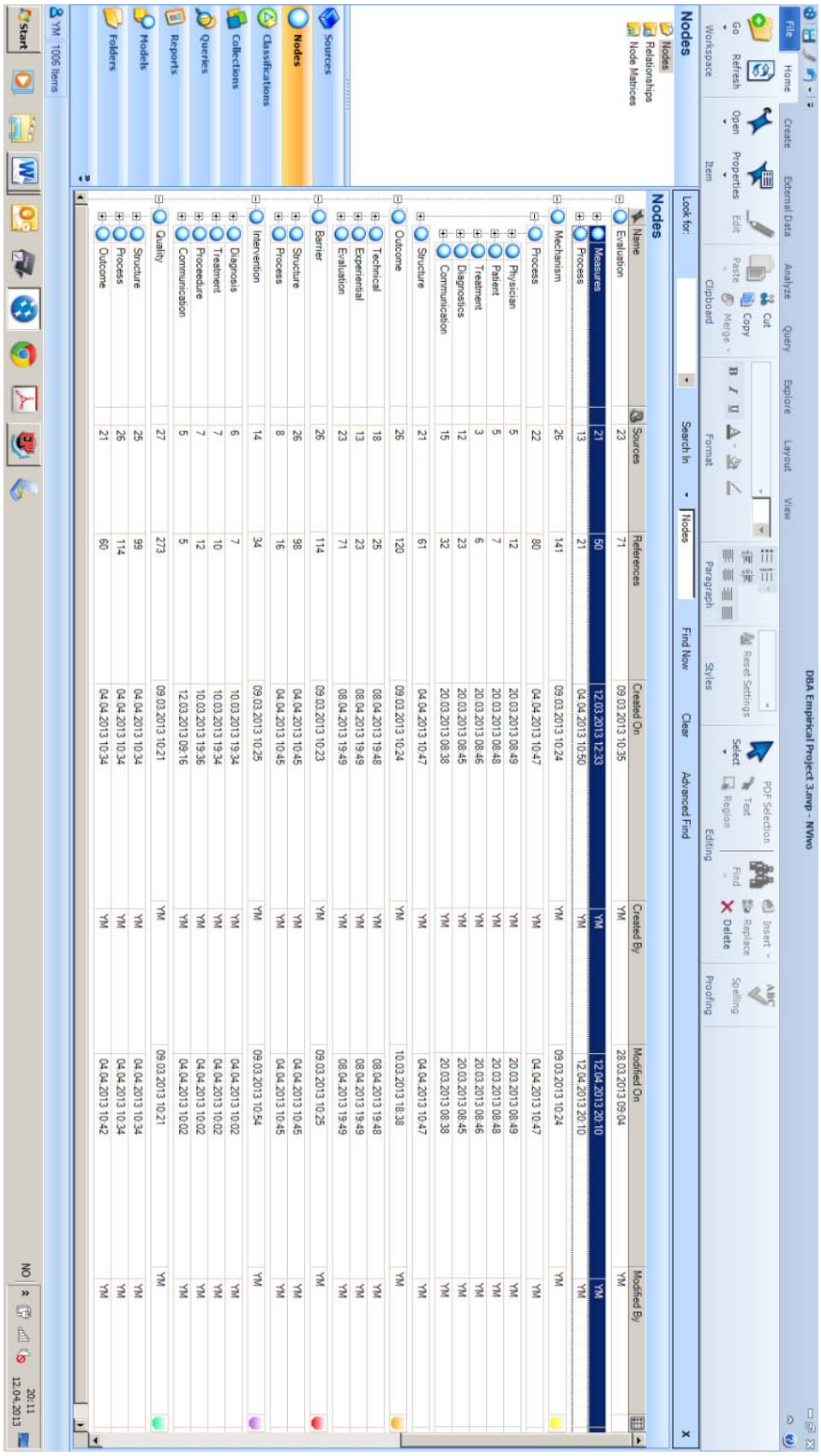


Table C-4 Word frequency of the 100 most common words

Word	Length	Count	Weighted Percentage (%)	Similar Words
add	3	130	0,29	add, brings, contributed, contributing, sums, supply, total, totally
admitted	8	206	0,46	accept, acceptable, acceptance, accepted, accepts, acknowledge, acknowledged, admit, admitted, admitting, allow, allowed, confess, hold, holds, include, included, includes, including, take, takes, taking, true
also	4	172	0,65	also
anything	8	158	0,59	anything
available	9	158	0,26	access, accessible, availability, available, help, helped, helpful, helping, helps
back	4	124	0,29	back, backing, backward, cover, covered, covering, covers, fund, funding, funds, game, hinder, hinders, reared, second, secondly, support, supported, supporter, supporting, supportive, supports
better	6	111	0,36	advance, advanced, amended, amending, best, better, breaks, improve, improved, improvement, improving
call	4	84	0,23	address, addressed, addressing, anticipation, call, called, calling, calls, career, crying, name, phone, phones, predictability, predictable, predicted, promise, ring, rings, shout, songs, visit, visiting, visits
care	4	722	1,75	aid, aides, aiding, attention, attentive, care, cared, carefully, caring, charge, concerned, concerns, deal, dealing, deals, fear, handled, like, liked, likely, maintenance, manage, managed, management, manager, manages, managing, measurable, measure, measured, measurement, measures, measuring, tend, wish, wished, worry
case	4	343	0,90	case, cases, cause, caused, causes, causing, event, events, example, examples, face, faces, facing, font, instance, slipped, subject, subjective, suit, type, types
close	5	150	0,23	close, closed, closely, closing, complete, completely, conclude, concluded, conclusion, end, ended, ending, ends, final, finally, finish, finished, last, lasted, tight
colleagues	10	65	0,24	colleague, colleagues
communication	13	112	0,36	communicate, communicated, communicating, communication, community, convey, national, pass, passed, passing
competency	10	100	0,35	capability, capable, competencies, competency, competent
condition	9	134	0,29	check, condition, conditions, consideration, learn, learned, learning, learns, qualified, shape, shaped, status, term, terms, train, trained, training
context	7	88	0,27	context, set, setting
day	3	167	0,48	day, days, year, years
delivering	10	181	0,55	deliver, delivered, delivering, present, presented, presenting, presents, rescue, return, returned, save, saving
department	10	211	0,28	asleep, department, departments, go, going, gone, leave, part, parted, parts, section, start, started, starting, starts, varied, varies, varying
diagnosis	9	114	0,40	diagnose, diagnosed, diagnoses, diagnosing, diagnosis
different	9	172	0,64	conflict, conflicting, conflicts, differ, difference, differences, different, differently, differing, otherwise
difficult	9	68	0,25	difficult, difficulty, hard
done	4	76	0,29	done
else	4	148	0,56	else
enough	6	90	0,30	adequate, adequately, enough, sufficient
example	7	142	0,25	example, examples, exercise, exercising, illustrate, instance, model, represent, representative, representing, represents
experience	10	567	1,27	experience, experienced, experiences, experiencing, experiment, feel, feeling, feelings, feels, get, gets, getting, know, knowing, knows, live, lived, lives, living, receive, received, receiving, see, seeing, sees
facilitates	11	123	0,34	alleviated, facilitate, facilitated, facilitates, facilitating, facilitators, help, helped, helpful, helping, helps

factors	7	67	0,23	agent, element, elements, factor, factors, gene
feel	4	216	0,32	belief, feel, feeling, feelings, feels, find, finding, findings, finger, flavour, impression, look, looked, looking, looks, opinion, palpated, palpation, sense, spirit, touch, touched, touching
focus	5	99	0,24	centre, concentrate, concentration, direct, directed, direction, directly, focal, focus, focused, focusing, stress, stressed
get	3	692	0,83	aim, amazing, arrest, arrive, arrived, beating, become, becomes, becoming, begin, beginning, brings, catch, cause, caused, causes, causing, come, comes, coming, convey, develop, developed, developing, development, draw, drive, drives, find, finding, findings, fix, generate, generated, generates, generating, get, gets, getting, go, going, growing, grows, let, make, makes, making, mother, pose, produce, produced, producer, producing, receive, received, receiving, start, started, starting, starts, suffer, suffered, suffering, suffers, take, takes, taking
give	4	255	0,32	applies, apply, big, breaks, collapsed, contributed, contributing, dedicated, establish, established, establishing, feed, generate, generated, generates, generating, give, gives, giving, granted, hand, hands, leave, open, opened, opening, pass, passed, passing, present, presented, presenting, presents, reaching, return, returned, sacrifice, spring, throw, throws
going	5	297	0,31	belongings, breaks, die, died, dies, dying, endure, exited, extend, extended, extending, fail, failed, failing, fit, fits, go, going, last, lasted, lead, leading, leave, live, lived, lives, living, loss, move, moved, moving, offer, offered, offers, pass, passed, passing, proceed, run, running, sound, sounds, start, started, starting, starts, survival, survived, travel, travelled, travels, turn, turned, turning, turns, x
good	4	849	2,05	beneficial, dependencies, dependent, depending, effect, effective, effectively, effects, estimate, expert, experts, full, good, healthy, honest, just, practical, practice, respect, respected, respectful, right, rightly, safe, secure, secured, security, serious, seriously, skill, skilled, skills, sound, sounds, thorough, tidy, upright, well
health	6	282	0,72	health, well
healthcare	10	120	0,45	healthcare
hospital	8	111	0,42	hospital, hospitals
however	7	128	0,38	however, still, yet
important	9	502	1,20	consequence, consequences, consequent, consequently, implication, implications, importance, important, mean, meaning, means, moment
indicated	9	116	0,23	argued, design, designed, indicate, indicated, indicates, indicating, indication, indicative, indicator, indicators, point, points, read, reading, show, showed, shows, signals, suggest, suggested, suggestion
information	11	125	0,43	conversation, conversations, conversion, data, inform, information, informed, informing, loose, sources
interviewee	11	714	2,68	interviewee
interviewer	11	885	3,18	consult, consultation, consultations, consulted, consulting, interview, interviewer, question, questionable, questioned, questioning, questions
know	4	191	0,33	acknowledge, acknowledged, banging, bed, beds, fucking, intention, know, knowing, knowledge, knows, learn, learned, learning, learns, letter, love, recognise, recognised, recognising, wisely
level	5	167	0,40	charge, degree, degrees, equal, equality, equally, equals, even, evening, level, levels, point, points, stage, stories, story
like	4	222	0,40	comparable, compare, compared, like, liked, likely, potential, potentially, probabilities, probability, probably, similar
lot	3	258	0,60	band, deal, dealing, deals, draw, load, lot, lots, luck, mess, much, score, scored, scoring, set, setting
make	4	410	0,51	build, building, builds, cause, caused, causes, causing, clear, clearly, constructive, create, created, creates, creating, draw, establish, established, establishing, fix, form, formed, gain, gained, give, gives, giving, hit, hits, hold, holds, make, makes, making, name, preparation, prepare, prepared, produce, produced, producer, producing, reaching, ready, realise,

				realised, score, scored, scoring, shit, stool, take, takes, taking, throw, throws, urine
managed	7	167	0,24	achieve, achieved, cope, deal, dealing, deals, direct, directed, direction, directly, director, handled, manage, managed, management, manager, manages, managing, supervised, supervising, supervision
many	4	65	0,24	many
may	3	104	0,39	may
mean	4	441	0,65	agencies, base, based, close, closed, closely, closing, humble, implies, intended, mean, meaning, means, pregnant, substances, tight, way, ways
measure	7	243	0,42	amount, amounts, beating, calculate, calculated, evaluate, evaluated, evaluating, evaluation, evaluations, measurable, measure, measured, measurement, measures, measuring, quantity, standard, standards, stepped, valuation, value, values
medical	7	128	0,48	medical, medically, medication, medications, medicine, medicines
mentioned	9	127	0,32	acknowledge, acknowledged, mention, mentioned, mentioning, name, note, noted, notes, observable, observation, observations, observe, observed, refer, referred, referring
must	4	70	0,26	must
necessary	9	99	0,33	essential, necessary, require, requirement, requirements, requires, requiring
need	4	377	0,87	ask, asked, asking, asks, demand, demanded, demands, involve, involved, involvement, involves, involving, motivate, motivated, motivation, necessarily, need, needed, needing, needs, require, requirement, requirements, requires, requiring, take, takes, taking, want, wanted, wants
next	4	108	0,29	follow, followed, following, follows, future, next, succeed
now	3	155	0,40	direct, directed, direction, directly, immediate, immediately, now, present, presented, presenting, presents, today
nurses	6	78	0,28	hold, holds, lactate, nurse, nurses, nursing
one	3	139	0,51	1, ace, one, ones, single
order	5	192	0,30	arrange, consisting, consists, dictated, governance, government, logic, logical, order, ordered, place, placed, places, placing, prescribed, put, putting, range, rate, rates, regular, regularly, regulated, regulations, saying, society, tell, tells
outcome	7	277	0,61	consequence, consequences, consequent, consequently, effect, effective, effectively, effects, event, events, issue, issues, outcome, outcomes, result, resulted, resulting, results, terminal
patient	7	952	3,57	patient, patients
person	6	88	0,28	individual, individuals, mortality, person, personal, personality, personally, pose, someone, soul
physician	9	192	0,72	doctor, doctors, physician, physicians
place	5	225	0,26	aim, direct, directed, direction, directly, home, identified, identify, identifying, invest, investment, local, located, location, place, placed, places, placing, point, points, pose, position, positive, positively, positives, post, put, putting, send, set, setting, space, spot, target, targeted, targets
positive	8	131	0,27	advantages, attitude, attitudes, confidence, confident, confirm, confirmed, confirming, convince, located, location, perspective, position, positive, positively, positives, posture, prescribed, side, sides, state, stated, status, view, viewed, views
possible	8	126	0,42	maybe, open, opened, opening, possibility, possible, possibly, potential, potentially, theory
prevents	8	90	0,30	hinder, hinders, keep, keeping, keeps, prevent, preventable, prevented, preventing, prevents
problem	7	128	0,41	job, jobs, problem, problems
procedures	10	150	0,27	function, functioning, functions, operate, operated, operating, operation, operative, procedure, procedures, process, processes, routine, routines

providing	9	130	0,40	allow, allowed, leave, offer, offered, offers, provide, provided, provides, providing, supply
quality	7	566	2,11	choice, choices, qualities, quality
quite	5	129	0,35	department, departments, quite, rather, stop, stopped, stops
related	7	182	0,32	associated, association, comparable, compare, compared, concerned, concerns, congress, congresses, connected, connecting, connection, deal, dealing, deals, link, linked, pertaining, refer, referred, referring, relate, related, relation, relations, relatively, tell, tells, touch, touched, touching
resources	9	98	0,36	imagine, resource, resources
right	5	276	0,47	appropriate, appropriately, compensate, correct, corrected, correction, correctly, just, justifiable, laws, power, properly, rectified, rectify, right, rightly, true, truly
satisfied	9	154	0,46	comfort, comfortable, filling, fulfill, meet, meeting, meetings, meets, satisfied, satisfy, satisfying, solid, square
see	3	469	0,62	assurance, assure, attend, attended, catch, check, consider, considered, considering, control, controlled, controlling, controls, date, determine, determines, determining, discover, discovered, ensure, ensured, ensuring, examination, examine, examined, examining, figure, find, finding, findings, hear, imaging, insurance, interpret, interpretation, interpreted, learn, learned, learning, learns, look, looked, looking, looks, meet, meeting, meetings, meets, picture, pictures, project, projection, projects, realise, realised, regard, regarding, regards, see, seeing, sees, understand, understanding, understands, view, viewed, views, visit, visiting, visits, watching
services	8	383	1,14	availability, available, help, helped, helpful, helping, helps, serve, served, service, services, serving
situation	9	173	0,32	fix, located, location, office, officer, offices, place, placed, places, placing, position, positive, positively, positives, post, set, setting, situation, situations, spot
something	9	143	0,54	something
system	6	177	0,46	arrange, order, ordered, organ, organisation, organisational, organise, organised, organising, system, systematic, systematically, systemic, systems
take	4	426	0,43	accept, acceptable, acceptance, accepted, accepts, aim, assume, brings, carried, carries, carry, choose, consider, considered, considering, contains, convey, deal, dealing, deals, direct, directed, direction, directly, drive, drives, engage, engaged, engagement, exact, exactly, filling, film, hiring, hold, holds, issue, issues, lead, leading, learn, learned, learning, learns, pick, proceed, read, reading, removed, removes, return, returned, studied, studies, study, take, takes, taking, train, trained, training
test	4	112	0,27	exam, examination, examine, examined, examining, run, running, screen, test, testing, tests, tried, try, trying
things	6	190	0,68	matter, matters, thing, things
think	5	591	1,31	believe, believed, believing, cerebral, consider, considered, considering, guess, imagine, intellect, intelligence, intelligent, intended, mean, meaning, means, reason, reasonable, reasons, remember, remembering, supposed, think, thinking, thinks, thought, thoughts
time	4	343	1,29	clock, time, times, timing
treatment	9	231	0,80	discuss, discussed, discussing, discussion, discussions, handled, intervention, interventional, treatment, treatments
two	3	65	0,24	2, two
use	3	186	0,43	applies, apply, employed, employing, enjoy, enjoyable, enjoyed, enjoys, exercise, exercising, function, functioning, functions, habits, practical, practice, purpose, purposes, role, roles, use, used, useful, using, utilisation, utilise, utilised, utilization
waiting	7	153	0,26	awaiting, delay, delayed, delaying, delays, expect, expectancy, expectation, expectations, expected, hold, holds, look, looked, looking, looks, wait, waiting
way	3	147	0,24	direct, directed, direction, directly, manner, path, paths, room, rooms, style, way, ways
whether	7	77	0,29	whether

words	5	91	0,25	book, books, discuss, discussed, discussing, discussion, discussions, formulate, intelligence, intelligent, language, news, speech, word, words
work	4	570	1,08	act, acted, acting, brings, employed, employing, exercise, exercising, form, formed, function, functioning, functions, go, going, influence, influenced, influencing, make, makes, making, operate, operated, operating, operation, operative, played, process, processes, run, running, shape, shaped, solve, solved, solving, sour, studied, studies, study, turn, turned, turning, turns, work, worked, working, works
yes	3	85	0,32	yes

Table C-5 Word Cloud

Table C-6 Word frequency tree map

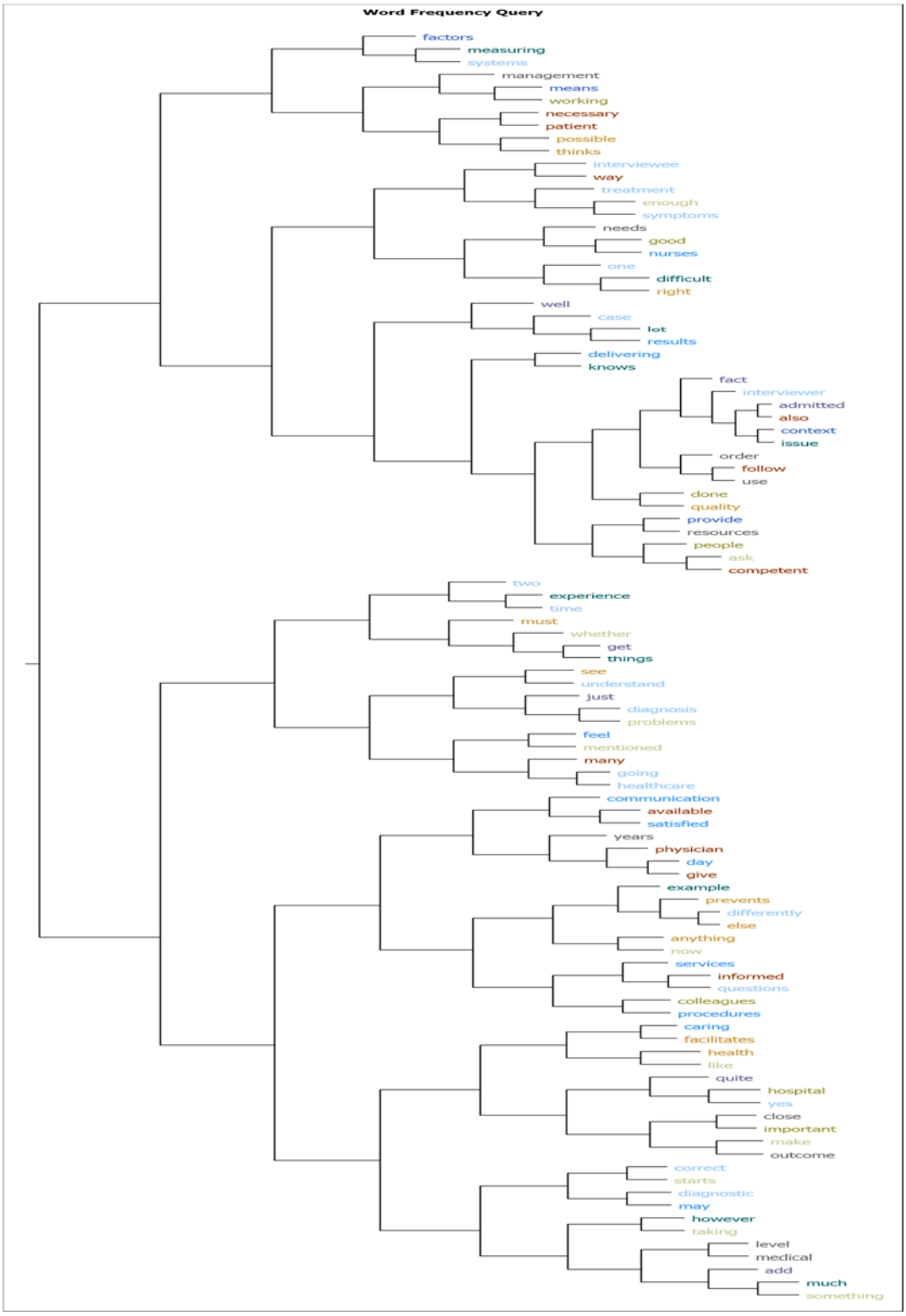


Table C-7 Distribution of nodes (categories) and references by interview respondent

Name	Nodes	References
Interview 1	62	121
Interview 2	61	103
Interview 3	51	88
Interview 4	62	126
Interview 5	56	111
Interview 6	66	123
Interview 7	49	84
Interview 8	47	84
Interview 9	64	118
Interview 10	58	95
Interview 11	45	81
Interview 12	60	100
Interview 13	56	88
Interview 14	56	96
Interview 15	52	85
Interview 16	59	92
Interview 17	42	63
Interview 18	48	73
Interview 19	68	104
Interview 20	70	118
Interview 21	49	84
Interview 22	60	101
Interview 23	54	91
Interview 24	75	133
Interview 25	91	182
Interview 26	67	143
Interview 27	62	101
TOTAL	1 590	2 788
MEAN	58,89	103,26
MEDIAN	59,00	100,00
STDV	10,32	24,61
HIGH	91,00	182,00
LOW	42,00	63,00
RANGE	49,00	119,00
SKEW	1,03	1,30
KURTOSIS	2,34	2,80

Table C-8 Influencers of quality

Category	Sub-category	Property	Dimension
Evaluation	Feedback	Level of feedback and ability to change based on feedback received	High - Low
	Measures	Being able to objectively measure	High - Low
Intervention	Diagnosis	Ability to make a correct diagnosis without delay	High - Low
	Treatment	Ability to give appropriate treatment without delay or undue risk to patients	High - Low
	Procedure	Ability to perform procedure correctly	High -Low
	Communication	Quality of communication	High - Low
Mechanism	Time	Availability of time to do what is necessary	High - Low
	Communication	Ability to communicate, get and give necessary information in a tailored manner	High - Low
	Diagnostics	Ability to correctly diagnose patients without delay	High - Low
	Treatment	Ability to correctly treat patients without delay	High - Low
	Resources	Availability of necessary technical, building and human resources	High - Low
	Competency	Availability of necessary competency (knowledge, experience and skill)	High - Low
	Physician attitude	Ability to show and real interest and level of curiosity	High - Low
	Patient	Willingness to cooperate and adhere to medical advice given	High - Low
Barriers	Availability of time	Having enough time to do what is necessary	High – Low
	Resource availability	Adequate resources available	High – Low
	Competency	Level of competency available on the personal level	High – Low
	Organization	Organization of work that support delivery of health care	High – Low
Enablers	Evaluation	Ability to evaluate	High – Low
	Time	Availability of time to do what is necessary	High – Low
	Competency	Availability of necessary competency (knowledge, experience and skill)	High – Low
	Communication	Ability to communicate, get and give necessary information in a tailored manner	High – Low
	Organization	Organization of work that support delivery of health care	High – Low
	Physician	Physician attitude	High – Low
	Patient	Willingness to cooperate and adhere to medical advice given	High – Low
	Diagnostics	Ability to correctly diagnose patients without delay	High – Low
	Treatment	Ability to correctly treat patients without delay	High – Low
Quality	Communication	Ability to communicate, get and give necessary information in a tailored manner	High – Low
	Resources	Adequate resources available	High – Low
	Competency	Availability of necessary competency (knowledge, experience and skill)	High – Low
	Diagnostics	Ability to correctly diagnose patients without delay	High – Low
	Treatment	Ability to correctly treat patients without delay	High – Low
	Patient	Willingness to cooperate and adhere to medical advice given	High – Low
	Physician	Physician attitude	High – Low
	Organization	Organization of work that support delivery of health care	High – Low
	Evaluation	Ability to evaluate and learn	High – Low
	Continuity	Level of continuity of care	High – Low
	Patient satisfaction	Level of experiential quality	High – Low

Table C-9 Enablers and barriers

Barriers and enablers						
Category	**Sub-category**	**Property**	**Dimension**	**Ref # ***	**Sample quote**	**Elements**
Barriers	Time	Having enough time to do what is necessary	High – Low	21	"…often I feel it's about not having enough time which could be caused by a combination of factors, one being that we have a lot of patients and therefore more patients per physician, both admitted and outpatients."	Structure
	Resource	Adequate resources fir for purpose available	High – Low	35	"…well, it may be worthwhile mentioning resource access, well, actually that's also very important, one of the patients we have discussed earlier was definitely an example of lack of resources, as he did not get access to a respirator, was placed in the hallway of a hospital and died."	Structure
	Competency	Level of competency available on the personal level	High – Low	10	"…lack of knowledge and skills, lack of competency. I will have to define competency. The problem is we need to sort of often walk through the door. We can sit down and read. But the lack of competency in general, is a barrier."	Structure
	Organization	Organization of work that support delivery of health care	High – Low	23	"The economic model increases the demands for reporting to satisfy the bureaucracy. This detracts from good quality health care services. "	Structure
Enablers	Evaluation	Ability to evaluate	High – Low	5	"…evaluation of effect and follow up…"	Process
	Time	Availability of time to do what is necessary	High – Low	22	"…often I feel it's about not having enough time which could be caused by a combination of factors, one being that we have a lot of patients and therefore more patients per physician, both admitted and outpatients."	
	Competency	Availability of necessary competency (knowledge, experience and skill)	High – Low	52	"…lack of knowledge and skills, lack of competency. I will have to define competency. The problem is we need to sort of often walk through the door. We can sit down and read. But the lack of competency in general, is a barrier."	Structure
	Communication	Ability to communicate, get and give necessary information in a tailored manner	High – Low	22	"…it's mostly about me listening and I am able to pose good questions, and that I am very honest when giving my advice, no compromise."	Process
	Organization	Organization of work that support delivery of health care	High – Low	36	"The economic model increases the demands for reporting to satisfy the bureaucracy. This detracts from good quality health care services. "	Structure
	Physician	Physician attitude	High – Low	42	"Being professionally curious and interested is important, the moment you stop being curious and believe you know everything you have lost."	Process
	Patient	Willingness to cooperate and adhere to medical advice given	High – Low	2	"…good compliance at the patient level, she complied and took medicines."	Process
	Diagnostics	Ability to correctly diagnose patients without delay	High – Low	2	"…the combination of an early diagnosis and treatment, close monitoring and a competent team around her were key success factors for a positive outcome."	Process
	Treatment	Ability to correctly treat	High – Low	3	"…continuity in the treatment so that you get the same patient	Process

		patients without delay			back in order to evaluate whether the treatment is effective and if the patient is satisfied or not, and allow for correction of emerging issues.”	
* Ref # = number of references						

Table C-10 tag cloud of quality influencers

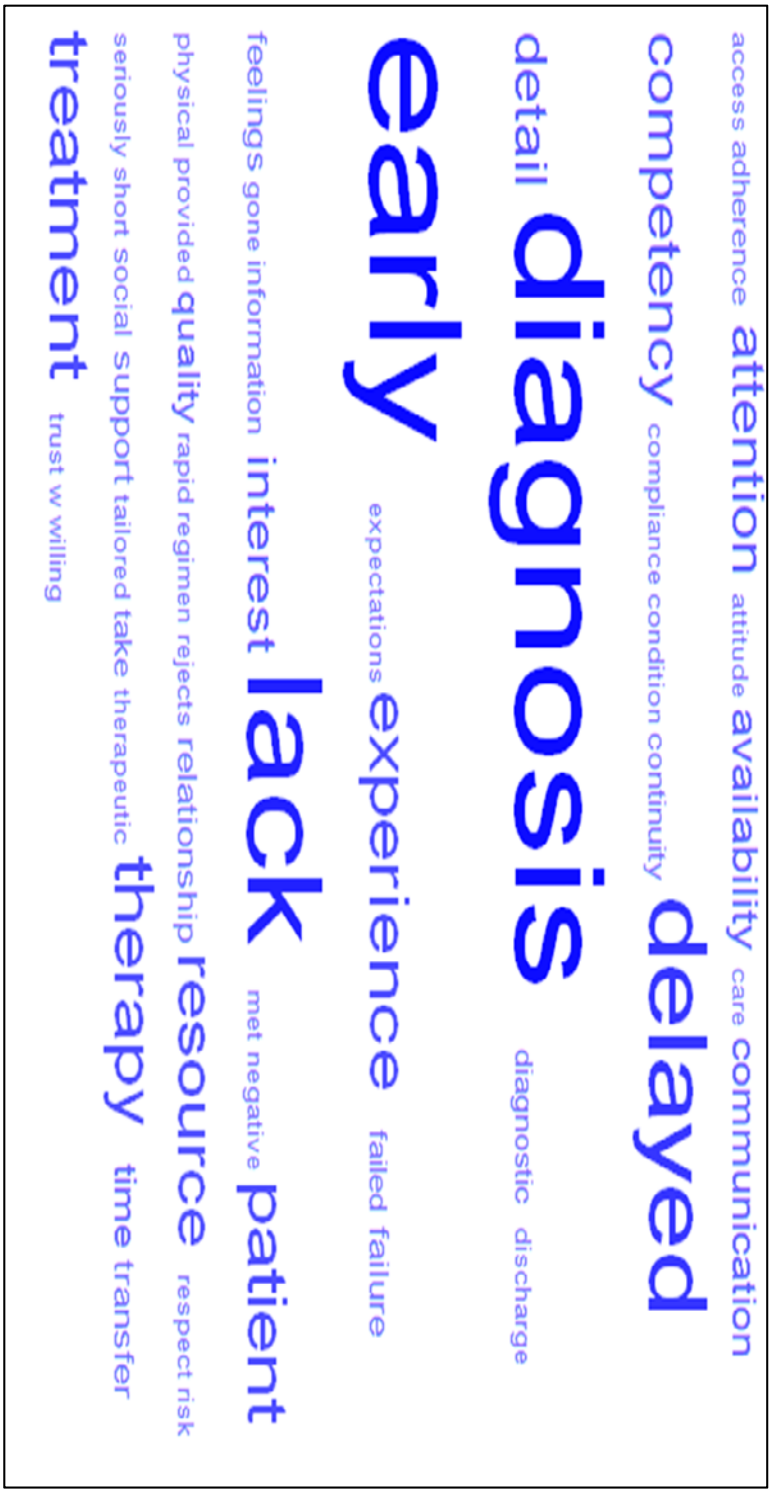


Table C-11 Frequency distribution of quality influencers

Row Labels	Attitude	Competency	Continuity	Patient	Relationship	Resource	Support	Grand Total
Acute	**17 %**	**19 %**	**4 %**	**8 %**	**2 %**	**25 %**	**2 %**	**75 %**
Cured	**9 %**	**8 %**	**0 %**	**4 %**	**2 %**	**4 %**	**0 %**	**26 %**
High quality	8 %	8 %	0 %	4 %	2 %	2 %	0 %	23 %
Low quality	2 %	0 %	0 %	0 %	0 %	2 %	0 %	4 %
Death	**6 %**	**6 %**	**0 %**	**0 %**	**0 %**	**8 %**	**0 %**	**19 %**
High quality	2 %	0 %	0 %	0 %	0 %	2 %	0 %	4 %
Low quality	4 %	6 %	0 %	0 %	0 %	6 %	0 %	15 %
Improved	**2 %**	**2 %**	**2 %**	**0 %**	**0 %**	**6 %**	**2 %**	**13 %**
High quality	0 %	2 %	0 %	0 %	0 %	6 %	2 %	9 %
Low quality	2 %	0 %	2 %	0 %	0 %	0 %	0 %	4 %
No change	**0 %**	**2 %**	**0 %**	**2 %**	**0 %**	**2 %**	**0 %**	**6 %**
High quality	0 %	0 %	0 %	2 %	0 %	0 %	0 %	2 %
Low quality	0 %	2 %	0 %	0 %	0 %	2 %	0 %	4 %
Worse	**0 %**	**2 %**	**2 %**	**2 %**	**0 %**	**6 %**	**0 %**	**11 %**
Low quality	0 %	2 %	2 %	2 %	0 %	6 %	0 %	11 %
Chronic	**8 %**	**9 %**	**0 %**	**2 %**	**2 %**	**2 %**	**2 %**	**25 %**
Cured	**2 %**	**4 %**	**0 %**	**0 %**	**0 %**	**0 %**	**0 %**	**6 %**
High quality	2 %	4 %	0 %	0 %	0 %	0 %	0 %	6 %
Death	**2 %**	**4 %**	**0 %**	**0 %**	**0 %**	**0 %**	**2 %**	**8 %**
Low quality	2 %	4 %	0 %	0 %	0 %	0 %	2 %	8 %
Improve	**0 %**	**0 %**	**0 %**	**2 %**	**0 %**	**0 %**	**0 %**	**2 %**
High quality	0 %	0 %	0 %	2 %	0 %	0 %	0 %	2 %
Improved	**2 %**	**2 %**	**0 %**	**0 %**	**2 %**	**0 %**	**0 %**	**6 %**
High quality	2 %	2 %	0 %	0 %	2 %	0 %	0 %	6 %
Worse	**2 %**	**0 %**	**0 %**	**0 %**	**0 %**	**2 %**	**0 %**	**4 %**
Low quality	2 %	0 %	0 %	0 %	0 %	2 %	0 %	4 %
Grand Total	**25 %**	**28 %**	**4 %**	**9 %**	**4 %**	**26 %**	**4 %**	**100 %**

Table C-12 Patient cases - High quality

#	Medical condition/context	Influencers of quality	Medical outcome	Medical intervention
1	Single-parent, social and personality related problems, does not hold down a job, lives with parents	Support from next of kin Support from social services	Back to work full time Lives by her self	Direct and honest communication
2	Chronic pain patient	Good communication Respect	Cured	Took the patient seriously Provided injection therapy
3	GP calls to discuss child with large tonsils, something seems not right, turn out to be an aggressive for of lymphoma	Attitude Attention to detail	Child survived	Asked GP to send the patient the next day Examined the child and took tests Referred for treatment
4	Female patient admitted and diagnosed and treated for meningitis, something felt wrong and it turned out to be an epidural abscess	Short-cuts taken by admitting physician Experience – having seen a similar case earlier	Patient was operated and discharged a few days later without problems	Good case history Did not buy the initial story
5	Young female patient referred for evaluation, she did not function at all, lack of energy	Experience Recognising symptoms Working systematically	Patient became well	Diagnose vitamin D deficiency from case history Prescribe vitamin D
6	Older female patient, in her 70's, admitted due to poor general condition, physical examination revealed a swollen lymph node, CT showed stomach cancer and she was scheduled for surgery 2 days later, postoperative period was uncomplicated, she died after 6 months due to metastatic cancer	Detailed routine physical examination CT established diagnosis Surgery removed cancer	Patient died after about 6 months due to metastatic cancer	Diagnostic workup Surgery
7	Family of two adults and two children. Two traumatic events, first, car accident where father gets injured and suffers from shoulder pain, second, wife gets ankle fracture with complications and loses function	Patient explicitly communicated needs Strong family	Both parents and children cope well	Support when needed Pushed for action
8	Sailor collapsed on a ship outside of Nigeria, was found to be severely hypoxic, flown back to Norway for further investigation, referred for lung transplant but denied due to lack of a firm diagnosis	Considering the option of a shunt	Correct diagnosis Surgical correction is to be attempted	Suggest that further investigation should look for a shunt
9	Female patient presenting with abdominal pain, gastroscopy showed a small ulceration, but pain level did not fit with findings,	Enough capacity Quick gastroscopy Nurses provided excellent care Everything worked out	Patient was well taken care off	Evaluation of patient, treatment and referral to nephrologist
10	Female patient admitted during a weekend with a myocardial infarction and heart failure, echocardiography showed that she was dehydrated, she was given fluids and medicines to aid her failing heart,	Access to competent staff and equipment Early diagnosis and aggressive treatment Close monitoring Good patient compliance	Discharged doing well Ejection fraction improved from 30 to 50%	Echocardiographic evaluation
11	Girl referred from haematology to infectious disease outpatient ward due to low platelet count, liver cirrhosis was discovered and hepatitis-c diagnosed, life-saving treatment was given	Physician interest in problem Competent staff Adequate resources	Patient is alive and virus free	Decide to use the resource and take the risk of interferon treatment
12	75 year old male patient with unsteady gait due to CNS gliosis admitted due to syncope, diagnosed with atrial flutter and observed on telemetry	Access to competent physicians and equipment	Discharged in good health	Evaluated patient with echocardiography Prescribed pacemaker
13	Female patient that since childhood had become unwell upon physical exertions and infections, she came without a diagnosis even though she had been to see countless physicians for her problem	Gain patient trust Competent staff available	Patient is well when she sticks to special diet	Understand what could be the cause and establish a diagnosis
14	Patient had previously been treated for breast and lung cancer and felt that she was cured, came to colonoscopy and a biopsy was taken from a suspect area	Quick answer to patients concerns	No new cancer detected	Informed the patient very quickly about the results

15	A young female patient admitted with symptoms of septicaemia, she had chills and tentatively she was diagnosed with a urinary tract infection, the question was whether she was pregnant or not, antibiotics were started and she became better the next day	Young patient that can tolerate a lot	Discharged in good health	Established a diagnosis Initiated treatment Checked baby with ultrasound
16	Male patient in his 40s, gained weight and felt out of shape, started to exercise, administered anabolic steroids, got dyspnoea and was diagnosed quickly	Self-destructive behaviour Patient understood the severity of the situation	Patient stopped using anabolic steroids His lung condition resolved	Established diagnosis Treated his condition and follow-up
17	Male patient that had been operated for CNS lymphoma, came for control and was asked about his prognosis by the controlling physician, the patient did not expect the question and became anxious	Lack of competency Lack of personal sensitivity from physician Poor patient-physician communication	Patient was satisfied with information Patient is doing well	Informed the patient Gave honest and relevant information in the right dose
18	Patient admitted to medical ICU with slow heart rate, he was given electric shock 5 times during the night and was anxious the next morning as were the nurses	Supportive staff Experienced staff	Problem solved Patient discharged in good health	Identify episodes of ventricular tachycardia Implant pacemaker
19	Abnormal heart rhythm during syncope and would wake up when normal rhythm returned, he was given a temporary pacemaker and a permanent one was implanted a few days later. and tendency for syncope, admitted to ICU and observed, he had	Patient came to the right place at the right time Resources and competent staff were available	Patient discharged in good health	Pacemaker implanted
20	3-year old patient admitted, he did not want to walk and had back pain, MRI scan showed possible two tumours, he was diagnosed with an aggressive for of myelogenic leukaemia	Available diagnostic modalities Available colleagues for discussion Diagnosis established quickly Correct treatment started very quickly	Patient died	Established diagnosis quickly Started correct treatment quickly
21	Patient presenting with a serious depression and suicidal thoughts, patient was admitted acutely for evaluation	Quality of alliance with patient Information quality was important	Patient became well	Designed process and course of treatment
22	Mature male patient admitted o ICU with pneumococcal pneumonia, aggressive diagnosis revealed that the patient had cancer with metastasis as well, intensive treatment was successful and patient was discharged, but condition deteriorated after 3-4 months due to the cancer	Communication and information to next of kin Focus on adherence to treatment regimen	Patient successfully treated for pneumonia and discharged	Aggressive diagnostics Aggressive therapy and adherence to therapy
23	Older female patient admitted at night with symptoms of shock, low blood pressure and unconscious, shock therapy was given in ICU and uro-sepsis was diagnosed and treated	Access to necessary resources Specialty support Did not give up even though situation appeared hopeless	Discharged after a few days with a nephrostomy, in good health	Initial shock therapy Antibiotics for septicaemia Nephrostomy
24	Female patient in her 40s, had problems keeping herself awake since 16 years of age, would fall asleep during conversations, little social life, not taken seriously by previous physicians	Considering the possibility Experience Interest in the patient and problem	Diagnosed with narcolepsy and given appropriate treatment	Established a tentative diagnosis Referred to neurologist for confirmation and therapy
25	Female patient with genetic heart disease (Eisenmenger and shunt), patient was given a back pack with oxygen, experimental treatment, her condition improved and she lived 15 years longer than expected.	Close contact and good communication with parents Willing to take the risk (experiment) Being interested in the patient and the problem Competent team	Patient lived 15 years longer than expected	Experimental therapy with oxygen Good communication
26	Patient with COPD admitted with respiratory distress, it appeared to be an inspiratory problem, after inspection a foreign body was located and removed freeing the compromised airway, patient would have died a few minutes later if intervention had not been done	Experience Interest in the problem and patient	Patient discharged in good health	Removed foreign body causing blocked airways

27	Male patient in his early 60's admitted in the middle of the night, he was known to be a heavy drinker and smelled of alcohol, reduced consciousness, spinal puncture was done and it showed meningitis, antibiotics started and he regained consciousness in the morning	Experience Appropriate diagnostics Early diagnosis and treatment	Patient recovered without problems	Lumbar puncture Started antibiotics

Table C-13 Patient cases - Low quality

#	Medical condition/context	Influencers of quality	Medical outcome	Clinical intervention
1	Paediatric psychiatry patient admitted with restraints, changes between nice behaviour and self-destructive behaviour	Transfer of negative feelings	Patient is fully institutionalized	Therapy for six months including medication and the use of restraints
2	Female patient with clear expectation of what treatment she needed	Lack of time Information from next of kin affected choice of therapy	Patient expectations not met	Prescription of a controlled substance
3	Urologic patient with re-bleeding after surgery, need reoperation and was given an epidural, patient got cardiac arrest	Lack of experience Sub-optimal pain management?	Patient died	Epidural anaesthesia
4	Multi-morbid patient, undergone aortic valve replacement surgery, infiltrates on both lungs, CT showed abscess	Samples taken, but forgotten to send for analysis Poor follow up by physicians Lack of continuity	Still in ICU getting treatment and slowly getting better	Asked: what is going on and ordered CT Prescribed antibiotics
5	Male patient in his 40s, condition varying between not being able to get out of bed to being able to do hard exercise, CT showed minimal CNS change	Diffuse symptoms No diagnosis	Wheel chair bound Unresolved diagnosis	Diagnostic work-up
6	Male patient in his 50's, previous history of malignant melanoma more than 5 years back, swollen lymph node on the neck, had a sore throat as primary symptom,	Did not take condition seriously Lack of experience	Delayed diagnosis and treatment of metastatic cancer Patient died	Diagnostic work-up on primary symptom Asked patient to return if not better
7	Older woman followed for 20 years or so, well regulated diabetes, active life with walks, husband is caretaker and initiators, and husband gets sick and dies.	Her world disappeared when her husband died	Patient dies at the age of 85, 3 months after husband dies	Treated her diabetes
8	65 year old male admitted with pneumonia, initially give appropriate antibiotic treatment and chest drain,	Discharged too early initially Active treatment was too short Outpatient control with X-ray not done according t plan	Alive with fibro-thorax and can no longer work	Prolonged therapy upon readmission
9	Older female patient admitted with epigastric pain, observed and discharged after two negative troponin tests. Pain did not go away and readmitted, pain upon palpation of the liver, ultrasound showed gallstones	ER focus on rapid discharge Patient-physician communication	Gallstones removed and patient doing well	Order ultrasound and control after discharge
10	Patient admitted during the summer and referral papers did not mention that he used B-blocker, this was not noticed and he was discharged without. He was readmitted due to unstable heart rhythm	No system for medication follow-up Admitting physician did not question current treatment Patient did not question change in medication	Patient is alive and well	Evaluate ICD readout and reinstate B-blocker
11	Female outpatient with friend, diffuse case history, weight loss and slightly elevated CRP, had been given a hemochromatosis diagnosis, ordered CT and scheduled control in one month, missed the elevated ANA on lab results, had to tidy up mess with new referral	Diffuse case history Transfer of negative feelings from patient and accompanying friend Rushed consultation Missed lab result	Patient was given correct treatment and is doing well	Patient referred for Lupus treatment at centre of excellence
12	Older male patient admitted acutely with chest and back pain, ultrasound was done to exclude	CT resource not available	Patient died	Patient evaluation Ordered ultrasound Initiated therapy

	aorta dissection, no dissection detected and anticoagulants were given, condition did not improve and patient was transferred to another hospital for rescue.			Referred to another hospital for rescue
13	Male patient in his 40s admitted during a busy weekend, he had a cerebral infarction earlier the same year and was a bit reduced, CT was initially negative for a brain haemorrhage, however, upon re-examination it showed a huge bleeding at the base of the brain	Lack of radiology competency Lack of communication about findings No MRI available	Patient died after an unsuccessful surgical attempt to save his life	CT results were not communicated to neurologist
14	Male patient in his 70s afraid of contacting physicians, he had change in stool pattern, faecal blood and weight loss	Patient delay	Advanced cancer with very poor prognosis	Patient cancelled many appointments for colonoscopy
15	Older female patient admitted with diffuse pain, colonoscopy and CT was ordered, delay in diagnostic procedures, no clear diagnosis established, transferred t lower level of care facility, condition slowly improved over time	Difficult to choose level of intervention Lack of continuity of care Diagnostic procedures were delayed	No diagnosis established Condition improved slowly over time Patient was very dissatisfied	Investigate patient Order diagnostic procedures and tests
16	26 year old male patient that had been living in Sweden for the last 4 years, he was very ill and could not stand upright, x-rays of his lungs showed huge destructions due to TBC, he also had pneumothorax, he had tachycardia, but due to infection no further examinations were done before it was too late. The cardiologist found out that he had a genetic heart condition, and that most patients would die before they were 30.	TBC anxiety delayed diagnosis No enough information about the cause of his condition	Patient died	Discussion of his case
17	Female patient with blood cancer, gentamycin was not given as a starter dose, the physician that saw the patient the next day took for granted that gentamycin was dosed for the following days,	Gentamycin not dosed correctly Septicaemia not detected early enough Accepting the evaluation of supporting service at face value	Patient died	Mistake discovered too late
18	Older patient with high heart rate due to atrial fibrillation, electro conversion was considered, but physician decided against, Ca-blocker was given and BP dropped and patient died.	Lack of experience	Blood pressure dropped Patient died	Calcium blocker was given
19	Female patient in her 70s with aortic stenosis identified during a routine control, she was supposed to come for a control after a year, but had fallen out of the system. She was admitted because she was short of breath, placed on the pulmonology ward and waited 5-6 days before transfer to cardiology where echocardiography was done medication changed, she felt a bit better after that, cardiac arrest the next day.	ACE inhibitors were given when it was contraindicated Condition not properly evaluated due to lack of resources and time	Cardiac arrest Patient died	Evaluated and changed treatment regimen while patient was on the cardiology ward.
20	65 year old male patient presents in the ER with chest pain, pain in chest upon palpation, ECG not very specific, the patient was sent home	Lack of experience Lack of competency Did not want to burden the cardiology ward	Patient was admitted the following day with myocardial infarction	Missed the diagnosis
21	Male patient that had been drinking alcohol, engaged in a fight at a local disco, admitted to hospital and CT was delayed, patient was comatose but it was considered a cause of drinking and not fighting, CT showed brain haemorrhage, transferred to neurosurgery and died on the operating table	Patient was not admitted directly to neurosurgery Delayed diagnosis Delayed treatment	Patient died on the operating table	Delayed diagnosis and treatment
22	Middle aged falls and hits the head, surgical evacuation of hematoma, transferred to ICU with pneumonia, treated and transferred to the ward with a cannula, inappropriate care	Inexperienced physicians in ICU Inappropriate care of cannula	Patient back in ICU after 9 weeks	Set treatment target in ICU

	of cannula cause patient to be readmitted to ICU	Limits for treatment set in ICU were cancelled without consideration		
23	Patient with many symptoms and diseases, he presented with two distinct problems, but only one was treated	Lack of capacity Physician focus on what they are good at and do not take the time to focus on problems outside their speciality	Patient discharged without resolution and readmitted shortly thereafter	Focus on one out of two medical problems only
24	Male patient in his 50s with flue like symptoms, soreness in the chest, possibly after crab fishing, slight fever, given penicillin in case of pneumonia and asked to call back if not better, he did not get better, increasingly ill and loss of blood pressure, admitted to the local hospital, endocarditis was diagnosed and transferred to another hospital for heart surgery, patient died on the operating table.	Missed diagnosis Lack of experience Did not take symptoms seriously	Patient died	Patient not admitted initially
25	Male patient with widespread coronary disease, admitted due to an abdominal aortic aneurysm and scheduled for operation, coronary artery disease was deemed more important and he was operated with by-pass, operation was a success, but patient suffered re-bleeding and needed to be re-operated and suffered a myocardial infarction during the second operation,. Operated in April and echocardiography control in May, came for a second control in June and it was then that the MI was noticed. The MI was overlooked initially and during the control, the echocardiography film was very clear and showed the evidence retrospectively	Diagnosis overlooked twice Narrow focus due to lack of time	Patient died	Diagnosis overlooked
26	Male patient in his 20s presented with knee pain after a trauma during a hike in the forest, initially treated with NSAIDs and asked to come back if not better, he did not get better and came back 3 days later, aspiration from the knee was bloody indicating a fracture-rays were ordered and confirmed a tibia fracture involving the knee joint	Lack of time Lack of experience Lack of radiology service Did not do a full examination	Knee arthritis	Diagnosis overlooked
27	Female patient in her early 20's admitted for evaluation of epilepsy with focus on possible surgery, medication was reduced to provoke seizure, she had a seizure in the bathroom, hit her head and got bruises and cuts	No one followed her to the bathroom Nor surveillance in bathroom Bathroom facilities not adequately padded	Bruises and cuts in the face due to trauma in connection with epileptic seizure	Reduction in medication to provoke seizure

Table C-14 Coding for patient cases

#	Classification of medical condition				Medical intervention	Clinical outcome	Influencers of quality	Physician quality perceptio n
	Disease type	**Acute vs chronic**	**Symptom**	**Severity**				
1	Mental	Acute	Clear	No	Communication Therapy	Improved	Social support	High quality
2	Physical	Chronic	Clear	No	Communication Procedure	Cured	Respect Take patient seriously	High quality
3	Physical	Acute	Clear	Yes	Diagnostics	Cured	Attitude (attention to detail) Early diagnosis	High quality
4	Physical	Acute	Clear	Yes	Communication	Cured	Experience Interest in patient	High quality
5	Physical	Chronic	Clear	No	Diagnostics Therapy	Cured	Experience Early diagnosis	High quality

							Early treatment	
6	Physical	Acute	Clear	Yes	Diagnostics Therapy Procedure	Death	Attention to detail Early diagnosis Early treatment	High quality
7	Physical	Chronic	Clear	No	Diagnostics Therapy	Improve	Patient communicatio n Relationship quality	High quality
8	Physical	Acute	Diffuse	Yes	Diagnostics	Improved	Experience Early diagnosis	High quality
9	Physical	Acute	Diffuse	No	Diagnostics Therapy	Cured	Quality care provided Early diagnosis Early treatment	High quality
10	Physical	Acute	Clear	Yes	Diagnostics	Improved	Resource availability Patient compliance Early diagnosis	High quality
11	Physical	Acute	Diffuse	Yes	Diagnostics Therapy	Cured	Interest in patient Competency Early therapy	High quality
12	Physical	Acute	Clear	No	Diagnostics Therapy	Improved	Resource availability Competency Early diagnosis Early treatment	High quality
13	Physical	Chronic	Diffuse	No	Diagnostics Therapy	Improved	Trust Competency Early diagnosis Early treatment	High quality
14	Physical	Acute	Clear	No	Diagnostics Procedure Communication	No change	Communicatio n quality Early diagnosis	High quality
15	Physical	Acute	Clear	Yes	Diagnostics Therapy	Cured	Physical condition of patient Early diagnosis Early treatment	High quality
16	Physical	Acute	Clear	Yes	Diagnostics Therapy	Cured	Patient adherence Early diagnosis Early treatment	High quality
17	Physical	Chronic	Clear	No	Communication	Cured	Competency Tailored communicatio n	High quality
18	Physical	Acute	Clear	Yes	Diagnostics Therapy	Cured	Experience Support Early diagnosis Early treatment	High quality
19	Physical	Acute	Clear	Yes	Therapy	Cured	Resource availability Competency Early therapy	High quality
20	Physical	Acute	Clear	Yes	Diagnostics Therapy	Death	Available resources Available competency Early diagnosis	High quality

							Early treatment	
21	Mental	Acute	Clear	Yes	Diagnostics Therapy Communication	Cured	Relationship Information quality Early diagnosis Early treatment	High quality
22	Physical	Acute	Clear	Yes	Communication Diagnostics Therapy	Cured	Adherence to therapeutic regimen Early diagnosis Early treatment	High quality
23	Physical	Acute	Clear	Yes	Diagnostics Therapy	Improved	Resource access Competency Early diagnosis Early treatment	High quality
24	Physical	Chronic	Clear	No	Diagnostics Therapy	Improved	Experience Interest in patient Early diagnosis Early treatment	High quality
25	Physical	Chronic	Clear	Yes	Therapy Communication	Improved	Willing to take risk Interest in patient Competency Relationship w/patient Early therapy	High quality
26	Physical	Acute	Clear	Yes	Diagnostics Therapy Procedure	Cured	Experience Interest in patient Early diagnosis Early treatment	High quality
27	Physical	Acute	Clear	Yes	Procedure Therapy	Cured	Experience Early diagnosis Early therapy	High quality
28	Mental	Chronic	Clear	Yes	Diagnostics Therapy	Worse	Transfer of feelings Early diagnosis Early therapy Therapy failure	Low quality
29	Physical	Chronic	Clear	No	Diagnostics Procedure	Worse	Lack of time Transfer of feelings Expectations not met	Low quality
30	Physical	Acute	Clear	Yes	Diagnostics Therapy Procedure	Death	Experience Early diagnosis Therapy failure	Low quality
31	Physical	Acute	Clear	Yes	Diagnostics Therapy	Improved	Lack of continuity Interest in patient Delayed diagnosis Delayed therapy	Low quality
32	Physical	Chronic	Diffuse	No	Diagnostics	Worse	Failed diagnostics	Low quality
33	Physical	Acute	Clear	Yes	Diagnostics Therapy	Death	Attention to detail lacking Delayed diagnosis	Low quality
34	Physical	Chronic	Clear	No	Therapy	Death	Social support gone	Low quality

							Patient rejects therapy	
35	Physical	Acute	Clear	Yes	Therapy	Worse	Lack of resource Therapy too short	Low quality
36	Physical	Acute	Clear	No	Diagnostics Therapy Procedure	Cured	Rapid discharge Communicatio n Diagnostic failure	Low quality
37	Physical	Acute	Clear	No	Diagnostics Therapy	Cured	Lack of attention to detail Delayed diagnosis	Low quality
38	Physical	Acute	Diffuse	No	Diagnostics Therapy	Improved	Transfer of negative feelings Lack of time Delayed diagnosis	Low quality
39	Physical	Acute	Clear	Yes	Diagnostics Therapy Procedure	Death	Resource not available Delayed diagnosis	Low quality
40	Physical	Chronic	Diffuse	Yes	Diagnostics Therapy	Death	Lack of competency Lack of resource Lack of communicatio n Delayed diagnosis	Low quality
41	Physical	Acute	Clear	No	Communication	Worse	Patient delay Delayed diagnosis	Low quality
42	Physical	Acute	Diffuse	No	Diagnostics	Worse	Lack of continuity Delayed diagnosis	Low quality
43	Physical	Acute	Clear	Yes	Diagnostics Therapy	Death	Lack of information Delayed diagnosis	Low quality
44	Physical	Acute	Clear	Yes	Diagnostics Therapy	Death	Lack of attention to detail Delayed diagnosis Delayed therapy	Low quality
45	Physical	Acute	Clear	Yes	Diagnostics Therapy	Death	Lack of experience Failed therapy	Low quality
46	Physical	Acute	Clear	Yes	Diagnostics Therapy	Death	Lack of resource Lack of time Lack of attention to detail Delayed diagnosis	Low quality
47	Physical	Acute	Diffuse	No	Diagnostics	Worse	Lack of experience Lack of competency Delayed diagnosis	Low quality
48	Physical	Acute	Clear	Yes	Diagnostics Therapy	Death	Lack of experience Delayed diagnosis Delayed therapy	Low quality
49	Physical	Acute	Clear	No	Therapy	No change	Lack of experience Delayed therapy	Low quality

50	Physical	Acute	Diffuse	No	Diagnostics	No change	Lack of resource Lack of attention to detail Lack of interest Delayed diagnosis	Low quality
51	Physical	Chronic	Clear	Yes	Diagnostics	Death	Lack of experience Delayed diagnosis	Low quality
52	Physical	Chronic	Clear	No	Diagnostics	Death	Lack of attention to detail Lack of interest Delayed diagnosis	Low quality
53	Physical	Acute	Clear	No	Diagnostics	Worse	Lack of time Lack of experience Lack of resource Delayed diagnosis	Low quality
54	Physical	Acute	Clear	No	Diagnostics	Worse	Lack of resource Lack of attention to detail Delayed diagnosis	Low quality

Table C-15 Sub-categories of quality

Quality				
Sub-category	**Property**	**Dimension**	**Number of respondents**	**Number of references**
Communication	Ability to communicate, get and give necessary information in a tailored manner	High – Low	12	20
Time	Availability of time to do what is necessary	High – Low	6	8
Resources	Adequate resources available	High – Low	8	12
Competency	Availability of necessary competency (knowledge, experience and skill)	High – Low	20	50
Diagnostics	Ability to correctly diagnose patients without delay	High – Low	10	13
Treatment	Ability to correctly treat patients without delay	High – Low	13	23
Patient	Willingness to cooperate and adhere to medical advice given	High – Low	14	26
Physician	Physician attitude	High – Low	13	27
Organization	Organization of work that support delivery of health care	High – Low	22	39
Evaluation	Ability to evaluate and learn	High – Low	9	22
Continuity	Level of continuity of care	High – Low	2	3
Patient satisfaction	Level of experiential quality	High – Low	19	31

Table C-16 Summary of quality sub-categories by quality elements

Elements of quality					
Sub-category	**Property**	**Dimension**	**Number of respondents**	**Number of references**	**Elements**
Communication	Ability to communicate, get and give necessary information in a tailored manner	High – Low	12	20	Process
Resources	Adequate resources available	High – Low	15	20	Structure
Competency	Availability of necessary competency (knowledge, experience and skill)	High – Low	20	50	Structure
Diagnostics	Ability to correctly diagnose patients without delay	High – Low	10	13	Process
Treatment	Ability to correctly treat patients without delay	High – Low	13	23	Process
Patient	Willingness to cooperate and adhere to medical advice given	High – Low	14	26	Process
Physician	Physician attitude	High – Low	13	27	Process
Organization	Organization of work that support delivery of health care	High – Low	24	41	Structure
Evaluation	Ability to evaluate and learn	High – Low	9	22	Outcome
Patient satisfaction	Level of experiential quality	High – Low	19	31	Outcome

Table C-17 Elements by frequency of respondents and references

Element	Respondents (cumulative)	References	Ratio (Ref/Res)
Structure	57	109	1,91
Process	64	112	1,75
Outcome	28	53	1,89

Table C-18 Evaluation

Evaluation					
Sub-category	**Property**	**Dimension**	**Respondents**	**References**	**Example quote**
Feedback	Level of feedback and ability to change based on feedback received	High - Low	13	21	"It's largely based on direct feedback from patients, with this satisfied or not satisfied. No matter what happened, if there are satisfied I feel that I have done some good."
Measures	Being able to objectively measure	High - Low	21	50	" …we stopped measuring, because the measures showed an adherence rate of about 92%, and there was always a good reason why the last 8% did not use the medication according to guidelines, for example the patient might have an ulcer disease…"

Table C-19 Influencers of quality

Influencers of quality					
Sub-category	**Property**	**Dimension**	**Ref #***	**Example quotes**	**Element**
Time	Availability of time to do what is necessary	High - Low	28	"I had a lot of patients waiting in a waiting room and felt stressed due to lack of time; I didn't spend enough time to evaluate the patient properly and missed the diagnosis."	Structure
Communication	Ability to communicate, get and give necessary information in a tailored manner	High - Low	32	"I think that the fact that they have been very explicit in what they need has made it easy to be their physician and give them the support that they needed."	Process
Diagnostics	Ability to correctly diagnose patients without delay	High - Low	23	"Due to very aggressive diagnostics, we discovered that this patient has a cancer with metastasis."	Process
Therapy	Ability to correctly treat patients without delay	High - Low	6	"I didn't diagnose the patient correctly and started inappropriate treatment which may have masked the symptoms. When I realised the patient was getting worse I contacted a more senior physician, a cardiologist, and he could make the correct diagnosis and start appropriate treatment but it was too late."	Process
Resources	Availability of necessary technical, building and human resources	High - Low	14	"…the patient came to the right place at the right time, there were available resources and time was available ensuring good quality treatment and information."	Structure
Competency	Availability of necessary competency (knowledge, experience and skill)	High - Low	19	"I think the most important other factor was my previous experience with narcolepsy. "	Structure
Physician attitude	Ability to show and real interest and level of curiosity	High - Low	12	"First, you need to respect the patient and the patient's experience of his problem. Second, you need to respect the patient as an equal with respect to yourself. You need to believe that people are equal. This belief needs to be rooted deep in your soul. However, sometimes it may be very difficult. "	Process
Patient	Willingness to cooperate and adhere to medical advice given	High - Low	7	"...demanding patients create negative feelings and I fear I may give suboptimal therapy due to this fact..."	Process
* Ref # = number of references					