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**DOCTORS AND DRUGS  
– HOW SWEDISH  
EMERGENCY AND FAMILY  
PHYSICIANS UNDERSTAND  
DRUG PRESCRIBING**

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## ABSTRACT

*Background:* Drug prescribing is increasing, making prescribing one of the most common interventions in healthcare. The beneficial effects of drugs are manifold, but drug use also involves risks of drug-drug interaction (DDI), side effects and other drug-related problems. Despite research, a gap remains in our knowledge about the variation in physicians' understanding of drug prescribing. Knowledge of how physicians think about and understand drug prescribing might make it possible to influence their behaviour, and thus improve drug treatment.

*Aims:* The overall aim of this thesis is to explore how physicians understand drug prescribing. Two groups of physicians were studied: emergency room physicians (ERs) and general practitioners (GPs). The specific aims were to (I) identify ERs' perception of possibilities and obstacles in the implementation of a computerised prescribing support system; (II) explore how ERs view their work with patient drug treatment; (III) identify ways of understanding drug prescribing among GPs; and (IV) explore GPs' understandings of who bears responsibility for a patient's drug list and how this responsibility is managed.

*Methods:* An inductive qualitative approach was used in order to gain deeper knowledge about physicians' experiences. Data were collected by means of semi-structured face-to-face interviews (Studies I, III-IV) and focus group discussions (Study II). Thematic (Studies I-II) and phenomenographic methods (Studies III-IV) were used in analysing data.

*Findings:* Variations were found between ERs and GPs in their views of drug prescribing, as well as within the group of GPs. The ERs expressed a need for more pharmacological training and support in working with patients' drug treatment. They wanted access to current patient drug lists in order to make the diagnosis safely and quickly. A lack of follow-up appointments forces ERs to refrain from making changes to a patient's drug regime. ERs perform their work "in the here and now". The GPs demonstrated how they understood drug prescribing in five ways, each of which had different foci: the biomedical aspects, the patient and society. Each GP had access to more than one view, but none included all five ways. The GPs also demonstrated a variation in understanding about responsibility for patient drug lists, and in particular about how they use different strategies to manage this responsibility. These strategies were described in five ways: imposed responsibility; responsibility for own prescriptions; responsibility for all drugs; different but shared responsibility; and patient responsibility for transferring drug information between healthcare providers.

*Implications:* The question of responsibility for current patient drug lists and communication between settings is of utmost importance. In Sweden, a new law was passed in 2008 allowing the sharing of patient-specific information between databases. In this thesis, we see how ERs and GPs understand the responsibility for current patient drug lists in different ways. These different ways indicate that information sharing between healthcare providers is insufficient to remove potential hazards in prescribing. In order to support physicians in moving towards a comprehensive approach to prescribing, there is a need for a parallel development in: 1) physicians' competence in drug prescribing; 2) patients' understandings of drug use; and 3) technological solutions to facilitate a shared understanding between different physicians and patients in drug prescribing/drug therapy.

*Key words:* drug prescribing, understanding, competence, patient drug lists, emergency room physicians, general practitioners, qualitative methods, Sweden.

# LIST OF PUBLICATIONS

This thesis is based on the following studies, which will be referred to in the text by their respective Roman numerals:

- I. **Physicians' perceptions of possibilities and obstacles prior to implementing a computerised drug prescribing support system.**  
Bastholm Rahmner P, Andersén-Karlsson E, Arnhjort T, Eliasson M, Gustafsson LL, Jacobsson L, Ovesjö M-L, Rosenqvist U, Sjövikar S, Tomson G and Holmström I.  
*International Journal of Health Care Quality Assurance* 2004; 17 (4): 173-176
- II. **“Limit work to here and now” – A focus group study on how emergency physicians view their work in relation to patients' drug treatment.**  
Bastholm Rahmner P, Gustafsson LL, Rosenqvist U, Tomson G, Holmström I.  
*International Journal of Qualitative Studies on Health and Well-being* 2008; 3 (3): 155-164
- III. **Variations in understanding the drug prescribing process: A qualitative study among Swedish general practitioners.**  
Bastholm Rahmner P, Gustafsson LL, Larsson J, Rosenqvist U, Tomson G, Holmström I. *Family Practice, Published online 22 Dec., 2008.*
- IV. **“Whose job is it anyway” – Swedish general practitioners' perception of their responsibility for the patient's drug list.**  
Bastholm Rahmner P, Gustafsson LL, Holmström I, Rosenqvist U, Tomson G. Submitted 2008.

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# ABBREVIATIONS AND DEFINITIONS

## List of abbreviations

DDI	Drug-Drug Interactions
ED	Emergency Department
ERs	Emergency Room Physicians
FGDs	Focus Group Discussions
GPs	General Practitioners
PHC	Primary Healthcare

## Definitions and explanations

Adverse Drug Reaction	Any noxious, unintended, and undesired effect of a drug, which occurs at doses used in humans for prophylaxis, diagnosis, or therapy (WHO, 1966).
Drug Error	Any error in the process of prescribing, dispensing, or administering a drug, whether or not there are adverse consequences (Leape et al., 1995).
Drug-Related Problem	An event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes (Strand et al., 1990).
General Practitioners	“General practitioners” and “family physicians” are used synonymously as the difference between them is insignificant (McWhinney, 2004).
Patient Drug Lists	A list including all drugs prescribed for a patient by different healthcare providers.
Understanding	Characterising how something is comprehended, thought about, or perceived is a way of understanding a phenomenon. The way people understand a certain aspect of reality relates to their experience of the phenomenon. Understanding can be described as “the place where we collect our experiences” or “the framework within which we construct our way of thinking” (Marton and Svensson, 1978) (see page 11).

# 1 PREFACE

My professional experience is in sociology. I joined the Janus project at the Department of Drug Management and Informatics at Stockholm County Council about 10 years ago. In 1996, the Stockholm Health Region initiated a project in cooperation with Karolinska Institutet to develop a computerised drug prescribing system with decision support, called the Janus prescribing system (Eliasson et al., 2006). The project had a clinical pharmacological approach, and the aim was to provide easy access to producer-independent and evidence-based medical guidelines, as well as alerts for drug interactions, alerts for drug therapy during pregnancy and breast-feeding, a search engine for adverse drug effects, and an electronic transfer of prescriptions to pharmacies (Sjöborg et al., 2007). The design and implementation of such a system is a challenge not only because of the infrastructure of information technology required and the need to handle patient data in a secure way, but also because of the profound changes in work flow that may follow.

In 2002 a large emergency hospital in Stockholm decided to implement the Janus prescribing system. The aim of the implementation was to discover and prevent drug-related problems. Before physicians started to use the system, I had a question: What possibilities and obstacles did they perceive with a prescribing system? This was the beginning of my research project.

I have two relevant areas of experience for this work: first, as an observer of the groups of physicians studied; and second, in my previous work in healthcare.

The observer experience: as an observer, I try to grasp how physicians understand drug prescribing. This can be both an advantage and a disadvantage. One of the advantages is that I can ask questions that seem obvious to the physician. This may allow the physician to talk about his/her unreflected thoughts that relate to their actions and not to wishful, rational, theoretical thinking of “how things should be”.

A disadvantage might be that I have a theoretical knowledge of “how things should be,” but might lack the knowledge to ask the relevant follow-up questions of human “flesh and blood thinking” in the encounter between physician and patient.

My healthcare experience: I am no outsider to the field of healthcare. I got my first job in healthcare about 30 years ago as an auxiliary nurse/psychiatric aide, and worked for a number of years within internal medicine care for elderly people, and for a number of years in a department of anaesthesia, followed by many years within psychiatric care. In these positions, I gained an understanding of the important role that drugs play in different healthcare units, especially from the perspective of patients.

## 2 INTRODUCTION

With today's technological solutions and medical know-how, new methods of drug treatment give us greater opportunities to cure, mitigate and curb serious illnesses. Over recent decades, the number of drugs on the market has increased, and more drugs are prescribed not only for treating diseases, but also for treating certain risk factors of a disease, such as high blood pressure and high cholesterol levels (Nilsson and Melander, 2006). The proportion of elderly people is growing, and the elderly are more likely to have a number of medical problems and take many drugs (Linjakumpu et al., 2002, Ulfvarson, 2004). Drug prescribing is therefore increasing, making prescribing one of the most common interventions in healthcare in Sweden and other countries (Socialstyrelsen, 2008).

While the beneficial effects of drugs are manifold, drug use also involves a risk of DDI, side effects and other drug-related problems. Inappropriate prescribing is associated with patient illness and increased costs for society (Chan et al., 2001). If drug-related problems go unrecognised or unresolved, they may cause increased morbidity or even mortality (Prybys, 2004). In Sweden, patient hospitalisation due to adverse drug effects is fairly common (Mjörndal et al., 2002, von Euler et al., 2006, Fryckstedt and Asker Hagelberg, 2008). Many of these errors are preventable if patients are prescribed the right drug, in an optimal dose and with the appropriate information and instructions. Prescribing is thus a core competence for all physicians.

There are many strategies for promoting rational and safe drug prescribing, but the concerns of healthcare professionals have focused almost exclusively on improving the quality of their own prescribing decisions (Marinker and Shaw, 2003). In a complex healthcare system, patients may visit different care providers and different drugs could be prescribed for the right indication but turn out to be wrong in relation to the overall treatment (Tamblyn et al., 2003, Gustafsson et al., 2003, Howard et al., 2008). As a result of increased professional specialisation, with the physicians' primary loyalty being to the profession rather than to the healthcare organisation *per se*, little effort has been made to coordinate prescribing across the continuum of care (Shortell and Kaluzny, 2005). When physicians become increasingly specialised, the risk of professional tunnel vision may increase.

There are various strategies for reducing and preventing drug-related problems. One theory says that, as physicians lack pharmacological knowledge, providing them with such knowledge will reduce these problems. One way of assisting physicians in this respect is to provide a computerised drug prescribing support system (Teich et al., 2000, Magnus et al., 2002, Bobb et al., 2004). Although studies demonstrate that these systems are effective in preventing and reducing medication errors (Teich et al., 2000, Bobb et al., 2004), many barriers have also been reported in the implementation and adoption of such software systems in clinical practice (Wears and Berg, 2005, Koppel et al., 2005, Sjöborg et al., 2007). These barriers often involve physicians' perspectives of both technology and the demands of clinical work. Another view is that these software programs are not customer-oriented and therefore do not respond to the realities of clinical work. The physicians might see such systems as irrational impositions rather than helpful tools (Koppel et al., 2005). Therefore, the successful

implementation of a computerised drug prescribing support system depends on physicians' perception of their own "benefit of change". This means that the physicians weigh up the calculated possibilities and obstacles of the system and are more inclined to accept an innovation if they believe it is useful (Berwick, 2003). Drug prescribing requires comprehensive theoretical knowledge. However, is it enough to provide physicians with the knowledge to make them more competent in drug prescribing?

Contemporary research in competence development has shown that competence is linked to the way professionals understand their work (Sandberg, 2000). These studies conclude that professionals with the same training and the same work task perform quite differently. Physicians working in the same discipline can "go to different jobs", because they understand their work differently (Larsson et al., 2003).

Despite an impressive body of research, a knowledge gap still remains regarding the variations in understanding drug prescribing. An attempt to describe how physicians understand the various aspects related to drug prescribing in general is therefore important. Knowledge of how physicians think and understand drug prescribing might make it possible to influence their behaviour, and thus improve drug treatment.

## 2.1 General aim and objectives

The overall aim of this thesis is to explore how physicians understand drug prescribing.

The specific objectives of the four studies were:

- To identify ERs' perceptions of possibilities and obstacles in the implementation of a computerised drug prescribing support system (Study I).
- To explore how ERs view their work with patients' drug treatment (Study II).
- To identify variations in GPs' ways of understanding drug prescribing (Study III).
- To explore GPs' understanding of who bears responsibility for patients' drug lists and how this responsibility is managed (Study IV).

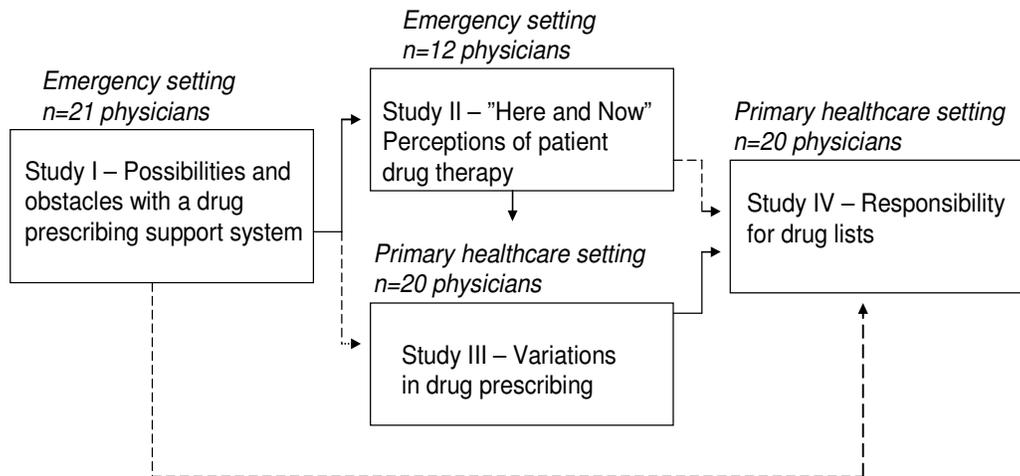


Figure 1 The links between the four sub-studies. Issues of responsibility for current patient drug lists were raised as early as the first study and grew in intensity throughout the project. The dashed lines show the indirect connection between sub-studies I-IV.

## 2.2 Links between the four studies

More information is required to help the reader understand the links between the sub-studies (Figure 1). From its very beginning, the research project was intended to document the implementation of a computerised drug prescribing support system in healthcare. This started with Study I – to identify ERs’ perception of possibilities and obstacles prior to implementing a computerised drug prescribing support system. ERs expressed a need for more pharmacological training and support in their work, especially with DDI information related to the current patient drug lists. One significant problem, however, was that the support system was not made for and could not fulfil the ERs’ request. No previous patient drug list was available to be automatically transferred from the electronic medical record system to the drug prescribing support system. Instead, physicians had to manually register the drugs of each patient in order to benefit from the supportive drug services. This was seen as an impossible task in terms of time. The system was, however, implemented despite this obstacle.

We later avoided these technical problems by letting a research nurse, for a period of three months, provide the physicians with patients’ self-reported drug lists (n=297) and a written analysis of potential DDIs made by the support system (Sjöviker, 2003). The support system detected the most relevant DDI information and pointed out a risk in 30 patients, but we could find no notes in the electronic medical record about these potential drug-related problems. It is possible that the physicians presented this information verbally to the next physician in charge, or they did not use the information.

This was an important learning moment for me, as it indicated that we have to understand how ERs think and act in practice with regard to patient drugs before developing different support tools. It was at this point that I had to choose the path my study was to take: should I continue with the question of how to implement a support system for physicians, or should I instead focus on how they understand their work? I chose the latter and studied how physicians understand drug prescribing. Questions were raised about ERs' general views about patient drug treatment, which led to Study II – an exploration of how emergency physicians view their work with patients' drug treatment. The findings indicate how the ERs refrained from becoming involved in ongoing drug treatment due to their inability to follow up patients' treatment. Instead, when they suspected potential drug-related problems, they had to hospitalise the patient or send a referral to the GP. This, in turn, raised questions about how other groups of physicians understand drug prescribing, especially GPs, (Study III) and the related question of who is responsible for patients' current drug lists (Study IV).

### 2.3 Outline of the thesis

Chapter 3 provides the background to the research questions. I present various research areas and concepts that are related to drug prescribing.

In all four studies (I-IV) qualitative methods were used. In Chapter 4 I therefore briefly present qualitative research in general, and then focus on settings, informants and methods of the data collection and analysis used in this thesis.

Chapter 5 presents the main findings of the sub-studies. More comprehensive information appears in the reprinted original Studies (I-IV).

Chapter 6 provides a discussion of the main findings. The methods used are discussed in Chapter 7. Chapter 8 sets out my conclusions from the findings, while ideas for future research are presented in Chapter 9.

### 3 BACKGROUND

#### 3.1 Physicians and drug prescribing

Drug prescribing can be seen as a dynamic process integrated into a biopsychosocial framework dominated by clinical and pharmacological factors (de Vries et al., 1995, Barber, 1995, Aronson, 2006). First, the diagnosis or indication for drug treatment, or whether to treat at all, must be made accurately (Aronson, 2006). In the act of prescribing, the physician should individualise the drug therapy, which means that he/she has to be aware of the potentially beneficial and harmful effects of the drug in relation to how the patient's individual characteristics might modify the probability of a good therapeutic outcome (Barber, 1995, Maxwell et al., 2002, Aronson, 2006). Second, patients should understand why they should take the drug and how to monitor the beneficial effects and potential adverse effects of the therapy (Hermann et al., 1978, Benson and Britten, 2002).

The concept of rational drug prescribing has been developed within the framework of the biomedical side of medicine, based on the objectivity of knowledge (Sackett et al., 1996). The biomedical approach is mirrored in the definitions of drug prescribing (Barber, 1995, Sjöqvist et al., 1997), which is usually defined with the prefix "rational," "good" or "appropriate". These normative attributes describe how prescribing should be performed, but they tell us nothing about how prescribing is performed in daily clinical practice. Furthermore, there are a range of stakeholders in prescribing, and each of these might define prescribing differently, depending on their own view of what should be achieved (Chapman et al., 2004).

According to Barber (Barber, 1995), the physician should try to achieve four aims when prescribing a drug and when monitoring the drug treatment. These aims are: 1) maximising effectiveness; 2) minimising risks; 3) minimising costs; and 4) respecting patient choices. Achieving these, often conflicting, aims places huge demands on the individual physician with regard to critical reasoning/thinking, clinical decision-making, integrating attitudes, problem-solving capacity and communication skills in order to understand the patient's perspective (Denig et al., 1988, Bradley, 1992, Wahlström, 1997).

Clinical thinking may differ among specialists as different physicians may have different views and priorities in diagnosing and treating the patient. Clinical thinking can even differ within the same discipline: for example, if the patient's symptoms comprise a wide variety of clinical problems, physicians are more likely to vary in diagnosis, treatment alternatives and competence (Josefson, 1998, Mattsson, 2006, Groopman, 2007). Moreover, there is no simple homogenous explanation of how physicians choose a drug. It seems that it may involve a mix of the rational problem-solving model (de Vries, 1993), habitual explanations (behavioural model) and a failure to think of other alternatives (cognitive explanation). Or, as stated by Bradley: (Bradley, 1991)

"...the truth of the matter may be that drug selection by doctors is a mixture of rational or thought out behaviour and habit, depending on familiarity of the problem or other such variables. Yet behind the habits there may be poorly recalled or subconscious constructs which are essentially rational. Likewise, behind the stated rationales there may be untested assumptions or habits of thought".

### 3.2 Evidence-based medicine

The movement of evidence-based medicine has certainly affected prescribing practice, and physicians' decisions are now expected to be informed by evidence (Sarmanta and Sarmanta, 2003). Evidence-based medicine is defined as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (Sackett et al., 1996). The practice of evidence-based medicine involves integrating the individual physician's experience of clinical practice with the best available external clinical evidence from systematic research. The scientific evidence, mostly derived from randomised controlled clinical trials, is then disseminated to physicians in the form of guidelines or expert recommendations (Wahlström, 1997). A computerised drug prescribing support system is part of an effort to make evidence-based knowledge accessible in clinical practice (Sjöborg et al., 2007).

### 3.3 Patient-centredness

An important principle in all healthcare is to involve the patient in decisions concerning his/her care. In recent decades, the patient's role has been strengthened due to widely available information on drugs, and by healthcare legalisation in Sweden that gives the patient an increased role in treatment decisions (SOU, 1997:154). Patient participation is particularly important in drug treatment, since the actual use of the drugs is among the most common and important decisions in which patients can participate (Makoul et al., 1995).

Various definitions of patient-centeredness exist. Mead and Bower define five aspects of the concept (Mead and Bower, 2002):

1. The biopsychosocial perspective – a perspective of illness that includes consideration of social and psychological (as well as biomedical) factors.
2. The 'patient as person' – understanding the personal meaning of the illness for each individual patient.
3. Sharing power and responsibility – sensitivity to patients' preferences for information and shared decision-making, and responding appropriately to these.
4. The therapeutic alliance – developing common therapeutic goals and enhancing the personal bond between doctor and patient.
5. The 'doctor as person' – awareness of the influence of the personal qualities and subjectivity of the doctor on the practice of medicine.

In a patient-centred model, patients become active participants in their own care. Strengthening the patient's role puts significant pressure on the prescribing physician's ability to incorporate shared decision-making in the encounter. Shared decision-making can only be achieved when both parties – the physician and the patient – commit to sharing the decision-making process (Charles et al., 1997). The pursuit of this goal of shared understandings calls for good communication between physician and patient.

### 3.4 Responsibility in drug prescribing

Patient and physician have different responsibilities with regard to drug prescribing and use. The patient is responsible for taking or not taking a drug. This means that the patient should have adequate information about the drug's intended effect and possible side effects, and how to manage the situation if side-effects occur (Ulfvarson, 2004). How patients use drugs could, to a large extent, be related to the information received in their encounter with the prescriber. One observation made at a follow-up appointment for antihypertensive medication showed how physicians mainly used a mix of four different strategies to motivate the patient to take the medication (Kjellgren et al., 1998). The most frequent strategy involved the physician simply claiming that the drug is good and convenient for the patient to take, without explaining the effect and goal of the therapy. The authors of the study conclude that when physician and patient discussed medication, they conducted the conversation from different perspectives. The patients mainly focused on the experience of being on the drug, and the physicians focused on the pharmacological effect and dosage. This gave the patient few opportunities to learn more about their drug treatment. Furthermore, different communication strategies are likely to affect the patient's adherence to the prescribed drug (Fallsberg, 1991, Kjellgren et al., 1998, Svensson et al., 2000). In a survey among Swedish GPs, physicians recognised that their behaviour determines patient adherence to a prescribed drug, but they also considered that adherence is the responsibility of the patient (Krigsman et al., 2007). Nonetheless, the GPs accepted that their behaviour was a major influence in shaping patient adherence.

Physicians are required to follow the regulation of the Swedish National Board of Health and Welfare (SOSFS/2000:1), which stipulates:

“Each physician is responsible for his/her prescriptions and ensuring that current patient drugs are available on a drug list. Physicians should, if possible, inform themselves about other drugs that the patient uses and assess whether the current prescription is appropriate. There is no one single healthcare professional who is responsible for the current drug list”.

In order to be informed about patients' earlier drug use, the physician requires information. An increased specialisation in healthcare means that patients meet several healthcare providers, increasing the risk of errors, e.g. possible duplication of drugs and potential DDIs (Gustafsson et al., 2003, Tamblyn et al., 2003, Howard et al., 2008). In Sweden today there is no link between the different providers' documentation in the electronic medical record. When the medical documentation is scattered between settings it is difficult for the physician to gain full access to individual patient information, other than by asking the patient. This raises challenging questions about who is responsible for the patient's current drug list when it includes drugs prescribed by different healthcare providers.

Studies on interventions with medication reconciliation have shown medication reconciliation to be effective in reducing drug errors in the communication process between providers (Pronovost et al., 2003, Saufl, 2006, Kramer et al., 2007). Medication reconciliation is defined as the implementation of a process that ensures that patients and their caregivers have the most accurate and up-to-date patient drug list possible. A complete list of a patient's drugs is communicated to the next provider of

service when the patient is transferred to another setting, service, practitioner, or level of care within or outside the organisation (The-Joint-Commission, 2007). This suggests that a database containing all drugs prescribed to a patient might enhance safety. A new law (Prop.2007/08:126) was passed in Sweden on July 1, 2008 allowing the sharing of patient-specific information between databases. Challenges include adding non-electronic medical records to databases, as well as getting the different computer programs to communicate with one another. There are still some 15 different electronic medical record systems in use in Sweden (Landstingsrevisorerna, 2004).

### 3.5 Factors influencing physicians' behaviour in drug prescribing

Many factors, at different levels, influence physicians prescribing behaviour in practice. I have summarised some of these in Figure 2. These factors might be interrelated and vary depending on the situation, but little is known of each one's relative importance (Sterky et al., 1991). One factor is the variation in professionals and patients' experiences and thinking in relation to diagnosing and drug treatment (Sjöström and Dahlgren, 2002). This is one of many issues that makes drug prescribing complex. In this thesis, I focus on one aspect of the micro level: how physicians understand drug prescribing.

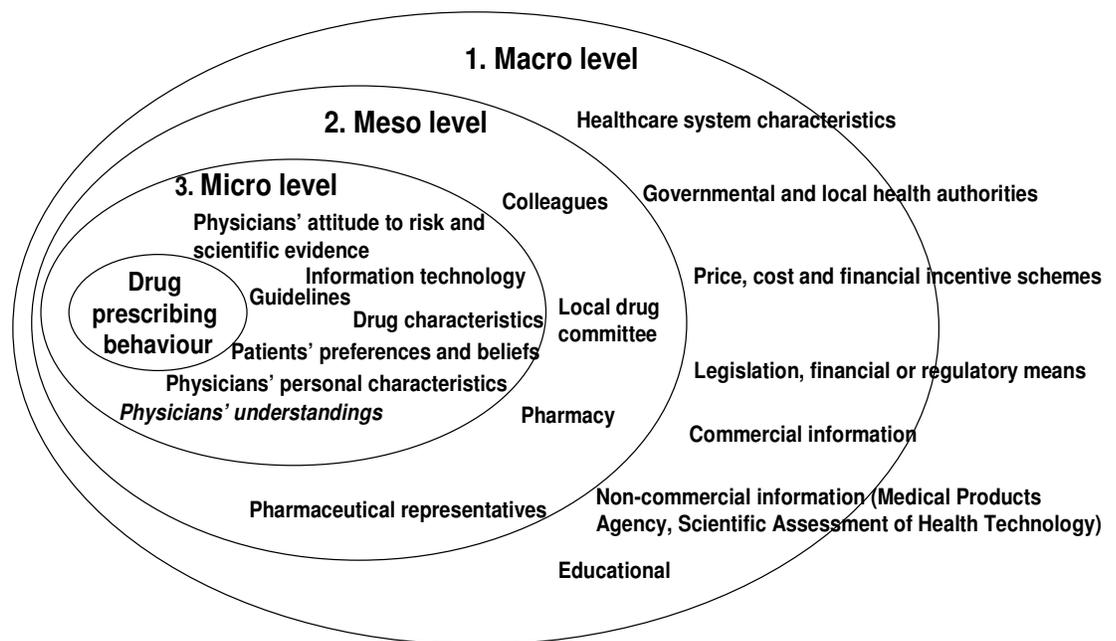


Figure 2 Factors at different levels in society influencing physicians' drug prescribing behaviour in clinical practice. In this thesis, physicians' understandings of drug prescribing were studied at the micro level.

### 3.6 Different foci in research on variations in drug prescribing

As more drugs are prescribed and the costs to society increase, there is a growing interest in what factors influence prescribing behaviour and how physician behaviour could be made more conscious of costs (Watkins et al., 2003). Prescribing research has focused primarily on the quantifiable aspects of variation in physicians' prescribing behaviour. Quantitative studies provide an analysis of the relationship between physician prescribing rates and the cost of a particular drug (Gonzales et al., 1997, Fretheim and Oxman, 2005); the variation in practice demographics in terms of socioeconomic status, age and sex of the population (Omar et al., 2008); and differences in the style of practice depending on the sex and age of physicians (Davidson et al., 1995). The above factors are often described as "fixed factors," where there is little or no potential for a change in physicians' behaviour (Watkins et al., 2003). Additionally, quantitative studies on prescribing have also identified factors by which means it is plausible to change physicians' behaviour so that they modify prescribing rates and costs. The factors identified by those studies were physicians' attitudes to generic and branded products (Banahan and Kolassa, 1997); attitudes toward and the pharmaceutical industry's influence on physicians' up-take of new drugs (Mason, 2008, Tobin et al., 2008); and policies such as prescribing incentive schemes or fund holding schemes (Wilson, 1996).

These quantitative studies provide us with information, but with only a limited understanding of why physicians prescribe the way they do and what factors physicians report as important in prescribing (Carthy et al., 2000, Prosser et al., 2003, Henriksen and Hansen, 2004). In recent decades, qualitative methods in drug prescribing research have broadened knowledge of the psychosocial influence on variations in drug prescribing behaviour (Prosser et al., 2003). These studies have focused on the decision-making process in drug choice by physicians (Skoglund et al., 2007, Buusman et al., 2007); the relationship between physician and patient; the importance of the dialogue between physician and patient (Kjellgren et al., 1998, Prosser and Walley, 2005, Howard et al., 2008); the communication process among providers (Howard et al., 2008); personal or unique physician characteristics and experiences (Carthy et al., 2000, Henriksen and Hansen, 2004); individual patient preferences; understandings and wishes (Fallsberg, 1991, Kjellgren et al., 1998, Benson and Britten, 2002); and the symbolic aspects associated with the prescription itself where the patient and the physician have different roles to fulfil (Bradley, 1991). It is clear that there is much in the prescribing process that cannot be attributed to purely pharmacological judgment. Previous studies provide us with only sparse knowledge of how physicians from different disciplines think when they prescribe, and an information gap still remains regarding the variation in the general thought process when physicians prescribe a drug.

### 3.7 Competence development and the perspective of understanding

The central focus of this thesis is physicians' "personal understanding" in drug prescribing. My theoretical standpoint is based on a non-dualistic ontology, which means that a multiple reality exists and that humans create the world by living in it (Marton, 1981). From this point of view, competence development is understood from the perspective of people's conception of their work. Work performance is related to how the work is understood, and competence comprises not only theoretical knowledge and practical skills, but also personal understanding that creates, forms and organises knowledge and skills into competence (Sandberg, 2000). Thus, competence development refers not only to the attainment of new knowledge and skills, but also to a new and different or revised understanding of the work.

A distinction exists between different understandings. One understanding might relate to opinions and another to people's experience of a phenomenon (Alexandersson, 1994). When investigating how a computerised drug prescribing system appears to a defined group of physicians (i.e., Study I), I wanted to describe how the system was understood from the perspective of the physicians. This way of understanding can be related to opinion-oriented understanding, as the informants express their reflections as "I think ...," etc.

When studying a phenomenon, there is a distinction between the first-order and the second-order perspective. In the first-order perspective, the researcher's interest focuses on the phenomenon (or the object) in order to explore it. In the second-order perspective, the researcher's interest is directed at a group of people to explore how they understand (experience, perceive, view) the phenomenon (Marton, 1981). Phenomenography is a qualitative research method aimed at describing the variation in people's understandings of phenomena in the world from the second-order perspective (Marton, 1981). The research is not directed at the phenomenon itself, but rather at how people experience and understand the phenomenon under study.

Understanding can be described as "the place where we collect our experiences" or "as the framework within which we construct our way of thinking" (Marton and Svensson, 1978). It is clear that understandings grow from earlier experiences from which we have learnt to interpret situations in a certain way (Piaget, 1977, Marton and Booth, 1997, Sandberg, 2000). For instance, research has shown that people's actions are not based on external factors like rules and instructions (Sandberg and Targama, 1998). Instead, people's actions are based on their understandings of the situation and, with that, how they understand and interpret those rules and instructions (e.g. study IV). When dealing with a complex situation or phenomenon, there is greater scope for different possibilities of ways of understanding the situation. A person with a more comprehensive understanding will therefore be more capable of dealing with the phenomenon and doing what the situation requires (Marton and Booth, 1997, Sandberg, 2000).

### *3.7.1 Understanding and learning*

Since the 1970s, an extensive body of research focusing on people's approach to learning has emerged (Marton and Säljö, 1976, Rosenqvist and Theman, 1995). For example, two qualitatively different techniques used by students in learning has been described: surface and deep learning. Surface learning means that the person is focused on memorising factual knowledge, while deep learning means that a person tries to understand the meaning of what they are learning. Thus, the way people learn is dependent on how they understand the process.

Learning is now seen as an active change in understanding the world. People gain new knowledge and understandings when they start to question their interpretation of their experience (Piaget, 1977, Marton and Booth, 1997, Sandberg, 2000). A prerequisite for taking a step further in competence development therefore requires a qualitative shift in the method of understanding a job. After this, a change in behaviour may be reached (Marton and Säljö, 1976). In this respect, understanding and behaviour are closely interlinked, and a person's behaviour can be seen as a manifestation of understandings. To achieve a change in learning, the first step is to map what kind of understanding professionals have of a phenomenon (Marton, 1981). The more specifically we are able to describe the variation in the way physicians' understand prescribing, the more clearly we can see what areas are in need of competence development. This knowledge of the different ways in which the phenomenon can be understood provides us with a tool to use in competence development. This thesis maps how GPs understand drug prescribing (Study III) and GPs' perceived responsibility for current patient drug lists (Study IV).

One example that requires a change in understanding is the rapid development in technology. Introducing new technology often demands a different competence and a renewal of existing competence (Sandberg and Targama, 1998). When new technology is introduced in healthcare, e.g. computerised prescribing support, the challenge seldom consists in how to use the technology, but rather in how to make use of the system's potential (Westelius and Edenius, 2006), in this case for safer drug prescribing (i.e. Study I).

The traditional method of teaching and developing drug prescribing competence has been to provide physicians with lectures and written material (Hogerzeil, 1995). This approach implies that competence is about increasing the amount of theoretical knowledge (Bratthall et al., 1994). These methods will increase the physicians' theoretical knowledge, but there is no clear evidence that it develops their skills or performance (Bratthall et al., 1994, Davis et al., 1995). In traditional education, it is common for the physician's original understanding to remain, whether or not it is correct (Bratthall et al., 1994). The educator's task is important in changing the understanding of physicians. The outcome of the education depends on whether the educator can demonstrate the variation in understandings and how a more comprehensive understanding can better support the physician's objective (Marton and Booth, 1997, Holmström, 2002). An important educational task is adapting the new information to physicians' previous way of understanding drug prescribing. An important challenge in healthcare is to realise that conventional educational programs, with the aim of merely increasing theoretical knowledge, have a limited effect on physicians' performance (Davis et al., 1995).

## 4 METHODS

### 4.1 Health system research

Most healthcare research is biomedical in nature, but since the 1980s there has been an increasing awareness that social science has an important role to fill in health systems. Health system research has a broad perspective on the health system as a whole; places a strong emphasis on the social aspects of care; and is concerned with problem solving and promotes interdisciplinary research (Varkevisser et al., 2001). The aim of health system research has been defined as “to provide unbiased, scientific evidence to influence health service policy at all levels so as to improve the health of the public” (Black, 1997). Drug treatment plays an important role in improving public health. Previously, health system research within drug prescribing/treatment has been applied to better understand and improve decision-making in drug prescribing through the use of clinical guidelines (Wahlström, 1997), educational outreach visits (Stålsby Lundborg, 1999) and Swedish drug and therapeutics committees and pharmacists’ role in improving drug use (Björkman, 2006). The thesis presented here focuses on physicians’ thinking about and understanding of drug prescribing.

### 4.2 Qualitative methods

Qualitative research tries to explore new areas of knowledge by gaining a fresh perspective and deeper understanding of the actions and meanings of human phenomena in their social context (Patton, 1990, Malterud, 1998). This knowledge should be described through the eyes of the people themselves. Studies on drug prescribing are often about people, behaviour and contexts, and are often an investigation of a complex phenomenon in which many factors interact. To obtain a detailed description of and shed light on the multifaceted issue of drug prescribing, we need to carry out research from several angles (Sterky et al., 1991).

There are a range of techniques within qualitative research aimed at mirroring the flow of the research process, and which involve the systematic collection, organisation, and interpretation of the collected material (Malterud, 2001, Green et al., 2007). Although there are some common characteristics, there are also some differences in the history, strategies, epistemology and ontology of each approach (Holloway and Todres, 2003). The diversity among qualitative methodologies can be compared to those between quantitative and qualitative methods, and there are guidelines for interpreting the texts in qualitative analysis just as there are for interpreting the figures in statistical analysis (Malterud, 2001).

Qualitative research often focuses on descriptive data, i.e. an individual’s written or spoken word. This implies that qualitative research is inductive, meaning that the researcher develops concepts, insights and understandings from patterns in collected data. This is a process of creating meaning, regardless of the type of analysis, in which the researcher’s objective is to understand the informants (Green et al., 2007). In a qualitative research approach, many different, but equally valid, versions of reality exist (Malterud, 2001).

In a qualitative approach, representativeness with randomisation of informants of the sample is not a primary concern (Alexandersson, 1994, Mays and Pope, 1995). When the aim is to gain an idea of how a certain phenomenon manifests itself in a group of people or to identify and explore unknown phenomena in society, the informants are selected strategically. A strategic or purposeful sample selection refers to information-rich cases, i.e. people who have the best possible knowledge, experience or overview with respect to the study's research topic (Patton, 1990). Moreover, the informants should be willing to share this information with the researcher.

Data collection through interviews is common in qualitative research (Kvale, 1997). An interview can be structured in different ways, ranging from closed answers as in a survey, to a narrative with a loose structure whereby the informants speak freely about a topic (Dahlgren et al., 2004). Semi-structured interviews have a certain degree of structure, allowing for changes in the order of the questions, reformulation of questions and probing to gain a better understanding and clarification. There is a risk that by using overly detailed and structured interview questions the answers may reflect the pre-understanding of the researcher, rather than the informant's view of the phenomenon (Hallberg, 2008).

Establishing trustworthiness is fundamental in all research. Four commonly used criteria to create trustworthiness in qualitative studies have been developed: credibility, dependability, confirmability and transferability (Guba and Lincoln, 1989, Hamberg et al., 1994).

- Credibility refers to the accuracy of a result of the researcher's ability to communicate how the research process affects the validity of the knowledge produced. This can be made clear by including a detailed description of the research process with sampling strategy; the informant's motive for taking part in the study; the researcher-informant relationship; and the structure of the process from data collection to analysis (Guba and Lincoln, 1989, Hamberg et al., 1994). It is important that the analysis is true to the collected data and encompasses critical reflection.
- Dependability is a concept of consistency. In a qualitative study, the focus is on discovering, and not testing whether the findings are repeated in the same context with the same subjects. People live in a changing environment where nothing is constant, but the researcher's task is to describe the research process so that it can be easily followed by the reader, despite this changing environment. (Guba and Lincoln, 1989, Hamberg et al., 1994).
- Confirmability/neutrality refers to the notion that the research should convincingly show how the results are grounded in the material. In qualitative research, the researchers themselves are seen as an instrument, whereby they are subjective in relation to informants as the researchers often interact directly with the informants (Hamberg et al., 1994). But the researchers must be objective in relation to the data. This demands that they be open-minded, listen, and sensitive to the effect and influences that he/she might have on the informants. A researcher has to try to set aside his/her own beliefs, perspective and preconceptions to understand people from their frame of reference. His/her awareness of and willingness to reflect on these choices is the only way to secure rigour in research (Malterud, 2001).
- Transferability refers to findings that are more generally applicable, for example, in contexts, situations or times other than those directly studied. This implies that the onus is on the reader to evaluate the methods, setting and

findings, and decide whether these are transferable to his/her own situation (Guba and Lincoln, 1989). The researcher has a responsibility to provide a thorough description of the findings and context (Hamberg et al., 1994, Kvale, 1997). Transferability of the findings is conceptual rather than numerical (Fitzpatrick and Boulton, 1996).

The trustworthiness of the methods used in this thesis will be further discussed in Chapter 7.

### 4.3 Informants, data collection and analysis in Studies I-IV

#### 4.3.1 *Some common aspects in Studies I-V*

I wanted to become more familiar with how physicians think. All the data in this thesis were therefore collected by interviews. The interviews were semi-structured and were carried out at the informants' workplaces. A presentation of the interviewer was made in advance, and the informants received oral and written information about the study and the interviewer's telephone number in case they had questions later on. Some of the informants asked for the interview questions before the interview. This was denied, because I wanted to obtain the informants' unreflected thoughts and not their socially desirable way of thinking.

All interviews were tape-recorded and transcribed verbatim. The transcribed interview material was analysed in a process whereby the researchers went back and forth between the original text and the categories/themes developed. The analysis started with an individual reading of the text, with each researcher sorting the text with the special research question in focus, and then discussing the content in transcripts and creating categories/themes. No predetermined categories or themes were used. The different steps in the analysis are described in each of original Studies I-IV. In the presentation of quotes in the findings, I omitted word repetitions and speech hesitations (such as 'um' and 'er').

#### 4.3.2 *Context of studies*

To explore how physicians understand drug prescribing, two groups of physicians were studied; ERs and GPs. In Sweden, family medicine with general practice and emergency medicine are young specialities, and became medical specialities as late as 1982 and 2006, respectively. These two groups work in different settings and have different assignments, but have some work in common. The ED and PHC provide a unique clinical setting of multitasking, as they meet patients with a variety of different diagnosis, conditions and treatments. The physicians have to keep up to date with a wide range of different drugs and know their effects. Table 1 gives an overview of the number of informants, settings and methods used for the data collection and analysis in this thesis.

Table 1 Overview of informants and methods for data collection and analysis used in Studies I-IV

Study	No. of informants	Setting	Data collection method	Analysis	Date
I	21	Emergency Department	Semi-structured interviews	Thematic/ inductive/manifest	September to December 2002
II	12	Emergency Department	Focus group discussions	Thematic/ inductive/latent	September to November 2003
III	20	Primary Healthcare	Semi-structured interview	Phenomenographic	January to September 2007
IV	20	Primary Healthcare	Semi-structured interviews	Phenomenographic	January to September 2007

#### 4.3.3 Emergency Department setting, Studies I-II

ERs have developed specific lifesaving skills that span multiple disciplines and specialities. The physicians are trained to treat all types of adult emergencies, including medical, surgical, trauma, cardiac and orthopaedic. Patients come with a unique set of circumstances and medical issues, and ERs, under time pressure, need to quickly determine the best course of treatment (Malmquist, 2002). The ED is characterised as a multifaceted organisation in which physicians have to collaborate with other professionals from different departments and make quick decisions on often limited information, as the patients are usually unknown to the physicians (Croskerry et al., 2004). Furthermore, communication problems are frequent as team collaboration is often based on verbal orders with disruptions as patients are treated concurrently. Drug errors are common as a wide range of drugs are in use, and drug-related problems can easily be caused as new drugs are frequently prescribed (Gaddis et al., 2002). Many patients come to the ED with complex and extensive medication regimens and some of them present symptoms and signs caused by adverse drug effects or by DDIs (Prybys, 2004, Fryckstedt and Asker Hagelberg, 2008). Elderly patients in particular run a high risk of drug errors that require hospitalisation (Spinewine et al., 2005).

#### *Informants and data collection*

Since April 2000, a project has been conducted at a large hospital in Stockholm, Sweden with the aim of educating physicians with trauma and emergency specialist competence. The group of physicians consisted of two internal medicine specialists and one surgical specialist, who functioned as supervisors and trainers as well as direct caregivers, and 18 generalist physicians receiving training while employed at the department. The group currently cares for approximately 20% of all patients visiting the department, or about 18,000 visitors per year.

In Study I, all 21 ERs were personally invited and accepted to participate in an interview about possibilities and obstacles before the implementation of a computerised drug prescribing support system. Individual interviews were used, as I wanted to get closer to the informants' personal views of the three main questions: 1) How do you usually prescribe drugs? 2) How do you choose a drug? 3) What possibilities and obstacles do you perceive with the drug prescribing support system? The follow-up questions focused on possibilities and obstacles with the forthcoming support system.

In Study II, I wanted to gain an idea of the nature of the common rules and the collective thinking about how the ERs perceived their work in relation to patients' drug treatment. To reach different aspects of this objective, three questions were used: 1) What does it mean to work as a physician in the ED? 2) Is there any follow-up of patients receiving drug treatment? If so, what does the follow-up consist of? 3) How do you limit your work? The aim of using this type of broad questioning was to gain information about their work in general. The follow-up questions focused on the patients' drug treatment by asking the informants to reflect in particular on elderly patients with multi-drug therapy.

With that aim in focus I found focus group discussions (FGDs) the most suitable data collection method. FGDs are described as an effective method for data collection for exploring opinions, as well as defining consensus, whereas the group homogeneity promotes the exposition of hidden attitudes – an advantage over individual interviews (Morgan, 1988). The idea behind this method is that the group process can help informants explore and clarify their views – ways that would be less easily accessible in individual interviews (Kitzinger, 1995).

All 21 physicians at the study hospital were invited to participate in the FGDs at a group meeting at the ED, and 12 ERs accepted the invitation. There were different reasons why nine physicians declined the invitation, including lack of time and attendance of training for another speciality. Another possible reason might be my method of recruiting informants compared with Study I, for which the ERs were invited personally and all accepted. However, there was no difference in age, length of service as registered physician and working time between FGDs participants and non-participants (for more information see Table I, original Study II).

With this sample of 12 informants, the next challenge was how to organise the group sessions. According to the available literature, opinions vary on the optimum size of FGDs, and it of course depends on the research issue. Kitzinger (Kitzinger, 1995) states that the ideal group size is between four and eight informants in each group. Smaller groups are more suitable when the informants are deeply involved in the topic and are expected to contribute a lot (Dahlgren et al., 2004). There was also a practical aspect to consider at the ED, as the ERs would have to participate during working time and could not leave the department at the same time. For practical reasons, and with the recommendations from the available literature in mind, the physicians were divided into three groups of four informants. The first group included one tutor, the second group included two tutors and the third group consequently had no tutor. This practical issue raised issues about the group dynamics that should be considered. The informants were familiar with each other, which might have made them avoid talking about important issues that could negatively affect their relations (Dahlgren et al., 2004).

After re-reading the transcripts and notes, I believe this familiarity was one of the strengths. The informants were familiar with the environment of the ED and quickly got together and talked openly about different patients and aspects related to their drug therapy. Another issue of group dynamics to consider was the participation of the tutors in the discussions, which might have restricted what trainee physicians said. I sometimes experienced that the tutors' taught the trainee physicians to narrow their scope of work. This might be interpreted as a strategy for the tutors to help the trainees to handle difficult situations. Even in this respect, when re-reading the transcripts, I could find no difference between the group without a tutor and those with tutors.

The FGDs were led by a moderator, who was a physician experienced in the focus group method. I took notes and observed the group dynamic.

#### *Qualitative inductive thematic analysis*

In Studies I and II an inductive thematic analysis was performed. Thematic analysis is a method widely used in healthcare research. There is, however, some argument as to whether thematic analysis is a separate research method or a tool with which to sort data (Braun and Clarke, 2006, Holloway and Todres, 2007). In this thesis I have used thematic analysis as a pragmatic research tool and an instrument with which to "think" in the process of sorting data in the analysis. There are two different levels of interpretation in thematic analysis (Green et al., 2007): 1) the manifest content level – describing the visible and obvious components of the text, used in Study I; and 2) the latent content level – whereby the researcher goes one step further and interprets the underlying meaning of the text, used in Study II.

Despite different data collection methods (individual interviews and FGDs), the transcribed material can be analysed in similar ways using a thematic analysis. However, the depth of the analyses varies depending on the various aims. In Study I, the character of the data collection questions was more practical, concerning the possibilities and obstacles of a support system that could not be questioned and analysed in a deeper way or using another method. In Study II, the aim of the analysis was to explore the physicians' "common way of thinking" and thematic analysis was therefore found to be the most suitable method. Thematic analysis is a flexible method that makes it possible, in a clear way, to identify and present the most relevant material under different themes (Braun and Clarke, 2006, Green et al., 2007).

#### *4.3.4 Primary Healthcare setting, Studies III-IV*

Swedish GPs are specialists in family medicine and are usually organised in group practices where they serve the basic medical needs of all patients of different ages. The general practice is intended to be the core of the healthcare system, and the aim is for all citizens to have the possibility of a regular contact with a GP. The main focus of disease management and preventive work is the individual patient (SFAM, 2008). An increased specialisation in healthcare means that the patient could have several providers, but is mostly followed-up in primary care. Care of the elderly, who often have several chronic diseases with complex drug regimes, constitutes an extensive part of GPs' workload (Toth-Pal, 2007). Due to the broad spectrum of patient conditions that GPs meet, they prescribe drugs from a wide range of drug groups compared to physicians in many other specialities, and a majority of GPs' consultations result in prescriptions (Haaijer-Ruskamp et al., 2004, Skoglund et al., 2007).

### *Informants and data collection*

In a phenomenographic study, 20 informants is usually sufficient to capture the possible variation of a phenomenon (Stålsby Lundborg et al., 1999, Sandberg, 2000). To reach a sample size of 20 informants I had to contact 32 potential informants. Of those, five GPs declined the invitation due to lack of time, and seven did not reply. A tendency for younger/trainee and female GPs to decline the invitation was observed. Data was collected in the same interview session for Studies III and IV. In Studies III and IV, all physicians interviewed were GPs (n=17) or underwent vocational training as a GP (n=3) working at 13 different group practices in the Stockholm area.

In Study III, three questions were asked: 1) What is the central feature in work with drugs generally, and drug prescribing in particular? 2) What is difficult about drug prescribing? 3) When do you feel you have been successful with drug prescribing? Similar questions have been found useful when exploring the concept of how people understand their work (Holmström et al., 2000, Larsson et al., 2003).

In Study IV, informants were asked two main questions: 1) Who is ultimately responsible for the patient's drug list when drugs are prescribed by different healthcare providers? 2) Do you take that responsibility, and if so, how?

In both Studies III and IV, informants were asked to give examples from their own experience, and follow-up questions were used to further clarify the meaning of the answers.

### *Phenomenography*

Phenomenography was developed by a group of researchers within education at Gothenburg University in the early 1970s (Marton, 1981). Phenomenography means "learning about descriptions of experienced phenomenon" and originates as a research approach to describing variations in people's ways of experiencing a phenomenon (Marton and Booth, 1997). The study object is not directed at the phenomenon itself, but rather at how people understand and relate to the phenomenon being studied. In a phenomenographic study, the researcher is interested in highlighting and describing variations in the understanding of a phenomenon, but is not looking for the causes of the variation (Marton, 1981). Aspects of reality are experienced in a relatively limited number of qualitatively different ways, usually two to six different ways (Marton, 1981). An assumption in the approach is that people act from their understanding of their perceived world and that this understanding could be of a different nature among different people (Marton, 1981).

In the analysis, the researcher identifies the different ways of understanding and classifies them under categories of description based on similarities and differences. These categories describe the different ways the phenomenon can be understood. The final result in a phenomenographic study can be shown in an outcome space (Marton, 1994). The outcome space shows the relationships between the categories of description, which are often related to one another in a hierarchical way.

Results from phenomenographic research have been used to develop new strategies in education and learning. This approach can be useful in two ways: as an empirically-based research method to identify variations in a certain phenomenon among a group of people (mapping understandings); and as an educational tool to help change understandings (Marton and Booth, 1997, Marton and Pang, 1999). Phenomenographic

analysis is now frequently used in healthcare research (Fallsberg, 1991, Stålsby Lundborg et al., 1999, Wahlström et al., 2001, Holmström, 2002, Larsson, 2004, Björkman et al., 2007, Lindh-Åstrand et al., 2007, Röing et al., 2006).

#### *Phenomenographic analysis*

In Studies III and IV, the aim was to describe the variation in understanding drug prescribing and understanding responsibility for patient drug lists. In the analysis, I wanted to become familiar with the GPs' actual practice and describe how they act in quite similar external circumstances. According to phenomenographic theory, people's different ways of understanding are related to how they act in their work (Sandberg, 2000). The aim of a phenomenographic analysis is to stay close to the informants' verbal expression and minimise interpretation (Sandberg, 2000).

#### 4.4 Ethical considerations

According to Swedish law (SFS, 2003:460), approval from the relevant ethics committee is required for research that implies physical or psychological influence on the participants. This means that approval was not needed for the studies concerning healthcare professionals presented in this thesis. Nevertheless, good ethical practice is important in all studies in which individuals participate, and this has been conducted throughout this work. In all of the Studies I-IV the informants were informed of the purpose of the study and that the findings were to be published in scientific journals. All informants gave their informed consent to participate after receiving detailed written and verbal information. Informants were assured that their participation was confidential and voluntary, and that they had the opportunity to withdraw at any time. The interviews were audio-taped after approval by the informants. The identities of the informants were removed from the transcripts to guarantee confidentiality.

Although no approval was required, an application was sent retrospectively for Study I to The Ethics Committee at Karolinska Institutet, Huddinge University Hospital (Dnr 430/03). An application was also sent for Studies III and IV to The Regional Ethics Committee (EPN) at Karolinska Institutet (Dnr 2007/326-31/3). In no case did the Ethics Committees raise any objection to the studies.

## 5 MAIN FINDINGS

### 5.1 Possibilities and obstacles in a drug prescribing support system (Study I)

This study aims to identify ERs' perceptions of possibilities and obstacles that might arise with the implementation of a computerised prescription system with decision support.

#### *Main findings*

Four categories of possibilities and obstacles were identified among the 21 physicians interviewed:

#### Possibilities:

- Access to current patient drug history
- Increased pharmacological knowledge
- Easy access to information
- Timesaving

#### Obstacles:

- Technical problems
- Shortage of computers
- Disrupted routines and habits
- Less patient contact

The ERs expressed a need for more pharmacological training and support in their work, especially with DDI information related to current patient drug lists. The wide variety in patient diagnosis requires that physicians handle many different kinds of drugs. By having access to automatically generated DDI alerts and producer-independent information on drugs, physicians hoped that they would be able to learn more clinical pharmacology. They had knowledge and were observant about certain therapeutic drug groups that they knew to be sensitive to interactions with other drugs. The alerts were perceived to function as reminders and as simplifying their work.

The physicians did not check DDIs as a standard procedure, mainly due to lack of time. There was no time for physicians to evaluate a patient drug list. Instead, they considered this to be the task of the patient's regular physician. Furthermore, to benefit from the drug prescribing support system the physicians needed to gain access to current patient drug lists including drugs prescribed from all healthcare providers. Administrative work often consisted of calling other healthcare providers, nursing homes and families for drug information, as well as writing patients' drugs on admission lists. If physicians could be provided with patient drug lists, they said, much of this duplication of administrative work would be eliminated.

Information about patients' current drugs gives the physicians indirect knowledge of patient status and health. The physicians described how the availability of drug lists would significantly improve patient safety, as well as their own working environment. The support system was not developed for this purpose, and thus could not fulfil this need. An important element in avoiding misunderstandings between physician and patient was the use of the prescription pad as a pedagogic tool in communication. Without the prescription pad it might be more difficult for the physician to explain the prescription to the patient, and consequently more problematic for the patient to ask questions about the drug(s).

In summary: ERs expressed a need for more pharmacological training and support in their work with patients' drug treatment. To make use of the computerised drug prescribing support system they wanted access to the current patient drug lists. This is a need for which the system was not developed, and thus could not fulfil. The physicians seldom made changes in current patient lists due to the lack of patient-specific information and a lack of follow-up of a patient's drug treatment. GPs were seen as responsible for evaluating the patient drug lists. One physician summarised this as follows:

*"Sometimes you must evaluate the patient's drug list, a job that is not ours but rather the general practitioner's. Elderly patients, in particular, can have several drugs that cause, for example, dizziness as an adverse drug effect. Patients come in and can't stand on their own two feet because of dizziness. Then we have to intervene and withdraw drugs. Often we find that patients don't need that many drugs..."*

Findings from this study raised a new issue about how ERs viewed their work with patients' drug treatment. This led to Study II.

## 5.2 Limiting work to here and now (Study II)

The aim of Study II was to explore how emergency physicians view their work with patients' drug treatment.

### *Main findings*

A central theme emerged of how ERs viewed their work with their patients' drug treatment. This theme was labelled "limiting work to here and now." This theme was the most important due to its central role in the physicians' work, and was closely connected to the three underlying themes: 1) focussing to cope with work; 2) decision-making based on limited patient-specific information; and 3) actively seeking learning moments. In this multifaceted context, trainees must learn to think as an emergency physician and to narrow the scope to cope with work. A necessary strategy involved quickly establishing what the most acute problem is for the moment, meaning "limiting work to here and now". This strategy aimed to help physicians handle difficult situations in a stressful work situation and make decisions with limited information.

The findings indicate that the physicians neither have the time nor training to screen the patient drug lists for potential drug-related problems. Only obvious drug-related problems were taken care of at the ED. When ERs suspected that an illness might be drug-related, they had no strategy other than to hospitalise the patient or send a referral to the GP. The trainees felt that it was difficult to just send a referral for an overview of the patient's drug list to the GP. They believed that GPs were aware of the problem with long drug lists, but assumed that GPs also lack time. The ERs were unwilling to interfere with drugs prescribed by a colleague because they did not know how the colleague had reasoned when he/she started the drug regime. Due to a lack of follow-up on patients' drug treatment, the ERs did not want access to current patient drug lists in order to make corrections, but rather to get more information about the unique patient condition. When the physicians had access to information about patients' current drug lists, there was an increased ability to make the right diagnosis "here and now".

The ERs actively sought learning moments in their work. One example involved their waiting to sign their own notes in the electronic medical record. When the physicians signed their own notes, they could learn from other physicians. This self-initiated learning moment was a way for the physicians to reflect on their own actions and was seen as a large part of their clinical education. In this setting, the electronic medical record made this learning process possible in the case of patients admitted to a ward at the hospital.

In summary: The situation, with limited time and limited information, resulted in the ERs needing to focus on the patient's acute condition and leaving non-acute symptoms, e.g. potential drug-related problems, to other healthcare providers. The ERs did not want access to the current patient drug list for making corrections to the patients' drug lists, but rather to make a diagnosis. The lack of follow-up forced the physicians to abstain from making changes in the drug regime. The quotation below from one of the study participants indicates that there is also a lack of communication between ERs and GPs:

*“I believe it would be beneficial not only to send a referral of the patient's drug list. Everybody knows there is a problem with side effects and that they hurt people, but I think the problem in primary care is that the patient has time booked for something else. It is seldom that people get time in primary care for an overview of their drug list, because GPs do not have the time either. It is like our situation: the patient is here for something else, and when you come to the drugs you have two minutes left, then you hand over the drug list...You need to be aware of this problem and have some plan for the patient's drug list in addition to everything else. I do not believe there is time for this question in general practice either...”*

This led to the third question: How do GPs understand drug prescribing?

### 5.3 Different ways of understanding drug prescribing (Study III)

The aim of this study was to identify variations in understanding drug prescribing among GPs.

#### *Main findings*

Five qualitatively different categories of understanding drug prescribing were found:

- A) GP prescribed safe, reliable and well-documented drugs for obvious complaints.
- B) GP sought to convince the patient of the most effective drug treatment.
- C) GP chose the best drug treatment, taking into consideration the patient's entire life situation.
- D) GP used clinical judgement and close follow-up to minimise unnecessary drug prescribing.
- E) GP prescribed drugs that are cheap for society and environmentally friendly.

The five categories represent the collective GP approach and could be seen as a “work map” describing where the GPs direct their attention while prescribing (Figure 1). The categories had three different foci: the biomedical aspects (A and D), the patient (B and C) and society (E). A combination of understandings (A-E) could be seen in all 20 GPs. In some cases, three or four different understandings were reported for the same GP (Table 3, original Study III). For example, the society-oriented focus (E) could be combined either with a focus on the patient as an object (B), the patient as a subject (C) or considered from a biomedical perspective (A and D). None of the GPs held category D or E as their predominant way of understanding prescribing. Category D refers to the GPs’ more comprehensive way of thinking, as it includes aspects of the other categories.

(D) Minimise unnecessary drug prescribing		
(B) The patient as an object who should take the drug	(E) Cheap and environmentally friendly drugs	(C) The patient as a subject who shares part of the responsibility for their treatment
(A) Achieve clinical benefits and minimise harm by using safe drugs		

Figure 3 The outcome space illustrates the internal relationship between the five categories of description, i.e. the collective understanding of the group of GPs. The categories are labelled according to what the informants prioritised when prescribing. Categories A and D have the biomedical perspective in focus, but from different perspectives. A constitutes the basic level of the biomedical perspective and D is the most comprehensive level, which requires a broader way of thinking concerning all aspects of drug prescribing.

Category A represents the base category, with its biomedical focus on prescribing a safe, well-documented drug. All informants described this way of understanding. When GPs were thinking from the point of view of category A it seems that they were thinking in quite similar ways, focusing on the drug’s pharmaceutical characteristics that should cure the patient.

A more complex view was described in categories B, C and D when a drug was indicated for prevention, such as for hypertension or high cholesterol. In these ways of understanding, the physicians use different communication strategies to inform the patient whether or not to take the drug. Consequently, the way that GPs understand drug prescribing is likely to affect their relationship to the patient.

Summary: Despite similar external circumstances, the findings demonstrate a substantial variation in understanding drug prescribing in the group of GPs. Each GP had access to more than one view, but none included all five ways. The most significant factor in influencing prescribing behaviour was the GP-patient relationship approach. Furthermore, the complexity increased when a drug was prescribed for a primary or secondary prevention. One informant stated:

*“I think we are seeing an extreme medicalisation whereby we not only prescribe drugs for all kinds of ailments, but we also make medical issues out of everyday problems, like when someone is having a hard time at work, is mourning the loss of a relative or just got divorced. This used to be regarded as part of life, but nowadays you aren't allowed to feel down. Instead people make an appointment with a physician who is expected to do something about that person's life situation. The patient is stripped of responsibility. The physician is supposed to come up with a diagnosis and, in the best case, prescribe a pill to ease the anxiety”.*

Findings from Studies I-III formed the basis for the question of who the physicians perceived as responsible for current patient drug lists.

#### 5.4 Responsibility for current patient drug lists (Study IV)

The aim was to explore GPs' understandings of who bears responsibility for the patient's drug list and how this responsibility is managed.

##### *Main findings*

All GPs were aware of the legal aspects of responsibility in association with drug prescribing. Despite this, five categories emerged from the interviews that reflect five separate approaches to the issue of responsibility: A) imposed responsibility; B) responsibility for own prescriptions; C) responsibility for all drugs; D) different but shared responsibility; and E) patient responsibility for transferring drug information between healthcare providers.

A combination of views could also be seen among all 20 GPs in this study. It seems that each GP may adopt several approaches, depending on the situation, e.g. what kind of patient (age) and problem (illness, disease) the GP is treating. The relationship between the five categories is shown in an outcome space below and represents the GPs' collective ways of understanding responsibility for a patient's drug list (Figure 4).

The five categories constitute a hierarchy, with category D the most comprehensive way of thinking, since it incorporates the other categories (A, B, C and E), although not all aspects are included at the same time. In D, the focus is on shared responsibility with the patient, which means that the GPs are trying to help the patient understand why and how they should use a drug. In this category, the GP adopts a patient-centred approach. In category C, the GPs state that they have overall responsibility for all drugs prescribed for a patient. The patients are in focus, but are not seen as an active party. In this category, the GPs have a more doctor-centred approach and communication is more biomedically oriented.

(D) Different but shared responsibility	
(E) Patient transferring drug information	(C) Responsible for all drugs
	(B) Responsible for own prescriptions
	(A) Imposed responsibility

Figure 4 Outcome space illustrates the internal relationship between the five categories of description, i.e. the GPs’ collective approach to managing responsibility for patient drug lists. Category D is the most comprehensive level, comprising a broader way of understanding as it includes aspects of the other categories (A, B, C and E) as well as the patient perspective on drug therapy. In contrast, in category A GPs expressed a more restricted understanding, often excluding aspects from the above categories.

In category B, GPs focused mainly on their own prescriptions, especially for the elderly who take many different drugs. A huge responsibility was placed on younger and middle-aged patients to inform GPs about their drugs. GPs described a culture of passivity and lack of initiative when not asking the patients about what drugs they take. In A, GPs described a feeling of resignation due to increased responsibility for diseases they don’t feel competent to manage. In this category, patients were often described as passive. In category E, patients were seen as responsible for the information transfer between providers due to the lack of a complete database – a responsibility that GPs described the patients as having difficult managing.

In summary: The findings indicate that there is an information gap in patients’ current drug lists and communication problems between patient and physician, as well as internally between healthcare providers. An informant describes the problem of responsibility in the following quote:

*“Since there is no database, it’s difficult to place responsibility for all information on anyone. I can’t assume responsibility for what other physicians prescribe, and with all the current integrity rules I can’t even get information about what drugs a patient is using from National Corporation of Swedish Pharmacies (Apoteket). The way I see it, I simply can’t assume responsibility for prescriptions other than the ones I am writing. However, I need to consider earlier medications, make sure they don’t interact or turn out to be unsuitable together in any way”.*

## 6 DISCUSSION OF FINDINGS

Findings from the different settings of the emergency department and the primary healthcare centre indicate that the physicians:

- Mainly focus on improving their own prescribing decisions (II & IV);
- Interpret responsibility for current patient drug lists in different ways (I, II & IV);
- Lack strategies for communication between settings (II & IV);
- Use different communication strategies in the dialogue with the patient (III & IV); and
- Look for opportunities in their work to learn (II).

These findings indicate that there is a lack of a comprehensive approach to drug prescribing. The available literature provides no definition of comprehensive or holistic drug prescribing. I will therefore use the findings obtained from the physicians' understandings to describe what aspects might be included to support a comprehensive approach to drug prescribing (Figure 5).

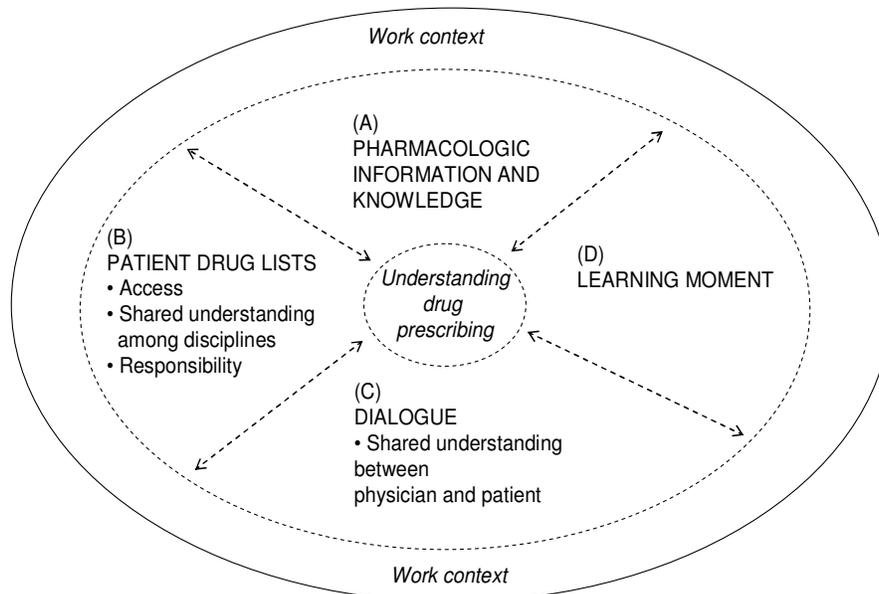


Figure 5 A model of different aspects that can affect physicians' drug prescribing.

The comprehensive approach focuses on different aspects from definitions of rational or good prescribing (Barber, 1995, Sjöqvist et al., 1997). As an example, one definition of rational prescribing says that after selecting a suitable drug, the physician should consider the compatibility between the selected drug and other drugs being given (Sjöqvist et al., 1997). Figure 5 explores some of the obstacles affecting the ability of physicians to act according to this rationality when prescribing drugs. In this way, the comprehensive model of drug prescribing encompasses aspects of collaboration and shared understandings between physicians from different disciplines and the patient in respect of a prescribed drug(s). In this comprehensive approach, drug prescribing can best be understood as the product of a system of social interaction in sharing medical know-how in order to maximise effectiveness and minimise risks in drug prescribing.

In Figure 2 (see Background section), one can see the numerous factors at different levels in society that influence physicians' prescribing behaviour. However, it is not known from the findings of the present thesis how these factors interrelate with those aspects described in Figure 5. Nevertheless, we can see how the different aspects in Figure 5 vary depending on the physicians' work context and their personal understanding. Figure 5 illustrates those contextual features in work assignments that influence how ERs and GPs interpret the different aspects of drug prescribing, especially with regard to managing patient drug lists. The GPs also demonstrated how, despite similar external circumstances, they understood drug prescribing and responsibility in different ways. This indicates that their personal understanding has an important influence on drug prescribing. The work context and a physician's personal understanding are thus considered to have an impact on physicians' behaviour in drug prescribing.

In order to adopt a comprehensive approach in prescribing, physicians need, among other things: (A) access to adequate pharmacologic information and knowledge about drugs (I & III); (B) access to information about current patient drug lists (I-IV); a shared understanding between different disciplines about patient drug treatment (II & IV), and awareness of responsibility for patient drug lists (I, II & IV); (C) a shared understanding between the physician and the patient about the prescribed drug (III); and (D) how physicians use opportunities to learn in their work (II).

Is the issue of a comprehensive approach to drug prescribing an idealistic, unrealistic theoretical issue? I do not believe so. It might require a change not only among some physicians and patients' understandings of drug prescribing/use, but also of how we can benefit from technological solutions. However, let us start with a discussion, based on Figure 5, about what obstacles and possibilities physicians face in adopting a comprehensive approach to drug prescribing. This is then followed by a presentation of suggestions of measures that can be taken to improve practice.

## 6.1 Obstacles to or possibilities for adopting a comprehensive approach to drug prescribing

### 6.1.1 (A) *Pharmacologic information and knowledge about drugs*

It is apparent that the pharmacologic evidence for a drug is the basis on which the physician performs safe and effective drug prescribing (I & III). The ERs and GPs described how they wanted solid evidence for prescribing a drug. This is provided when a drug is well documented and recommended in guidelines issued by experts. Reliable information that underpins everyday prescribing decisions is hard to find (Maxwell, 2005). GPs described how difficulties arose when a drug was indicated for a preventive treatment (III) where the evidence for a drug was not obvious due to local, and sometimes fragmentary, consensus among experts.

In most countries there are thousands of drugs in the national registry. It is therefore a challenge for the physician to remain focused on prescribing a limited number of essential drugs, thereby simplifying drug selection and dosage, both of which are prerequisites for personalised and safe drug therapy (Sjöqvist et al., 2002). Both GPs and ERs were restrictive in using new drugs. New drugs might have unpleasant side effects, making prescribing uncertain for both the patient and physician (I & III). The ERs indicated that it is a matter of safety to be familiar with the drug, and that the most important factors when choosing a drug are personal experience and knowledge. This knowledge simplifies the checking of drug interaction, dosage and choice of drug package size, which are considered important factors when prescribing. In this case, a computerised drug prescribing support system might be useful to help the physicians filter and find the most appropriate information (Teich et al., 2000, Bobb et al., 2004, Sjöborg et al., 2007).

### 6.1.2 (B) *Current patient drug lists – access to information, shared understandings among physicians and responsibility*

Resolving the aims of maximizing effectiveness and minimizing risks in drug prescribing (Barber, 1995), or of selecting a suitable drug in consideration of compatibility with other drugs being taken by the patient (Sjöqvist et al., 1997), requires physicians to have access to current patient drug lists (I-IV). These lists can be described as a tool to help physicians safeguard against potential DDIs and other drug-related problems when prescribing (Gustafsson et al., 2003). When physicians do not have access to this information they are forced to focus on improving the quality of their own prescribing decision, and do not adopt a comprehensive approach in drug prescribing. When physicians lack information about all the drugs prescribed to a patient, the risk of potential hazards for the individual patient increases (Howard et al., 2008).

The present findings address the fact that the practice of how physicians interpret responsibility for patient drug lists differs between settings and among GPs. ERs (I-II) described how they wanted access to the drug list to make a safe and quick diagnosis. Information about a patient's current drugs gives ERs indirect knowledge of the patient's state of health, and is considered to be a prerequisite for the optimum treatment of the patient. In this way, the drug list could be seen as a tool helping ERs in their specific context of "here and now". They did not want access to the list to make corrections due to the lack of follow-up of the patient's treatment. When they

discovered a drug-related problem, they had to hospitalise the patient or send a referral to the GP.

From the GPs' perspective (IV), it seems as if they had an expectation that a joint database of all drugs prescribed to a patient will solve the problem of information access and responsibility for patient drug lists. This, in turn, raises the question of the likelihood of such a scenario. For example, GPs also stated that their responsibility has increased over time as limited hospital resources have resulted in an increased number of patients with complicated conditions in primary care. The GPs consequently felt an imposed responsibility from previous prescribers for drugs for which they lack the competence to manage. This indicates that it is not only a question of making current patient drug lists accessible to physicians, but also of collaboration and shared understanding about patients' drug treatment.

Furthermore, the regulations stipulate that each physician is responsible for his/her prescription and that there it is no one single healthcare professional who is responsible for the current drug list (SOSFS/2000:1). Does this regulation influence physicians' ways of understanding drug prescribing? Based on the results in this thesis, I have no answer to that question. This raises a hypothetical question: if no healthcare professionals have overall responsibility for patient drug lists, then is it the patient themselves who has overall responsibility? According to the available literature, it seems that patient safety might be jeopardised when a patient is prescribed drugs by different healthcare providers (Pronovost et al., 2003, Howard et al., 2008) as patients have difficulty in managing their own drug treatment (Sleath et al., 1999). This is a well-documented phenomenon, especially among elderly people using many drugs (Ulfvarson, 2004, Spinewine et al., 2005).

One part of the problem with the existing information gaps in current patient drug lists is that physicians fail to communicate changes in the patients' drug lists when patients are transferred between settings (Studies II & IV). Communication problems among providers seem to be a common threat to patient safety in the whole industrialised world (Tamblyn et al., 2003, Chiang, 2008, Howard et al., 2008).

### *6.1.3 (C) Dialogue – shared understandings between physician and patient about the prescribed drug*

Findings from Study III indicate how the GPs focused on three different communication strategies to inform the patient why a drug treatment is necessary or why the condition does not need drug treatment. The strategies used were as follows:

- 1) The physician related to the patient as an active person (subject) with a focus on strengthening the patient's understanding of why a certain drug therapy is needed (patient-centred approach). The physicians described how they were trying to strengthen patients' responsibility in drug use. This was done by listening, giving advice and discussing the treatment with the patient. From the perspective of physician, the patient should be able to learn more and thus gain a more comprehensive understanding about their own treatment. In this way, the physician takes into account both the biomedical perspective and the lifeworld of the patient (Roter, 2000, Barry et al., 2001, Belcher et al., 2006).

2) The physician related to the patient as a passive person (object) who should be taught in a passive manner why they should be treated (paternalistic approach). The available literature describes how the paternalistic approach is criticised for its narrow view, which excludes the patient's perspective (Roter, 2000). In contrast, however, a minority of patients preferred a passive role, especially those who were seriously ill and patients with impaired cognition (Edwards et al., 2001, Cassell et al., 2001). This explains how the patient perceived their role. But how are the physicians thinking behind this explanation? I could find no explanation or description in the available literature of how and why the physicians were thinking in the perspective of the paternalistic way. What I found in the relevant literature were the common descriptions of how physicians transfer the information to which they have access by means of one-way communication to the patient – information transfer from the physician to the patient in a more doctor-centred approach (van den Brink-Muinen et al., 2003). But why are the physicians thinking in this direction? When re-reading the transcripts, it seems that in this way of understanding GPs are strongly connected to the biomedical paradigm, and have difficulty understanding the patient perspective. The physicians want to cure the patient's illness, and are therefore trying "to sell the best treatment" to which they have access.

3) The physician "practiced medicine" and refrained from prescribing for a condition for which a drug is not necessary. This was done by attempting to persuade the patient with arguments from the biomedical approach (consumerism approach). This strategy might be interpreted as consumerism, or a perspective in which the patient has more "power" than the physician (Emanuel and Emanuel, 1992). The patient has the "power" of knowing what drug they want – a view he/she has often obtained from the mass media. This way of working was described as time-consuming due to the conflicting interest between GP and patient. The GPs often tried to follow the patient's agenda. However, in this way they need to safeguard their clinical competence of being a skilful physician and refrain from prescribing a drug for a condition that does not require a drug. This requires that the patient be aware of the arguments of the biomedical approach – a perspective that is not always evident for the patient. In this way, the GPs are trying to turn patients' understanding from consumerism to an informed decision based on knowledge. In this way of working, physicians practice medicine by developing their communication skills in the encounter. When the physicians fail, there is a risk that they become passive and assume a more limited role in the decision-making (Emanuel and Emanuel, 1992, Roter, 2000).

The different communication strategies underline the fact that it is important for physicians to be aware of their understanding of the patient-physician relationship and change it if necessary, depending on the situation (Kjellgren et al., 1998, Svensson et al., 2000, Roter, 2000, Barry et al., 2001). Findings from this thesis (III) and earlier research (Barry et al., 2001) indicate that physicians are able to switch communication strategies in different situations, suggesting that their behaviour might be open to change. This is very important since drug prescribing is considered to be one of the most important decisions in which patients can participate (Makoul et al., 1995). Previous research has described how chronic conditions are often a lifeworld issue for the patient (Barry et al., 2001, Veg, 2006). To obtain better care, it is important for physicians to take into account the patient's lifeworld (Holmström et al., 2003). If

physicians fail to do this or ignore the patient perspective, the communication might be misunderstood and result in the patient and the physician talking from different perspectives (Kjellgren et al., 1998, Barry et al., 2001).

#### *6.1.4 (D) Learning moment through work*

From Study I it became obvious that the ERs wanted to learn more clinical pharmacology by gaining access to the support system. This failed because the system was not designed to accommodate their clinical work. How can a support system be made more attractive and help physicians in their working environment and support their learning? The ERs described how learning should occur when there is a need for knowledge (II). In contradiction to other studies, which show how clinical learning is passive and teacher-centred (Larsson, 2004, Spinewine et al., 2005), the ERs actively sought learning moments in their work when time allowed. Signing their own notes in the electronic medical record was a way of receiving feedback on the treatment the physician had initiated. This moment was seen as a large part of their clinical education (in the case of patients admitted to the hospital). This self-initiated learning moment is a way for the physicians to reflect on their own actions. In this setting, the electronic medical record made this learning process possible.

## 6.2 Implications for practice – towards a comprehensive approach to drug prescribing

The question of responsibility for current patient drug lists and communication between settings is highly relevant in Sweden, since a new law (Prop.2007/08:126) was passed on July 1, 2008 allowing the sharing of information between databases. This implies that the transfer of patient-specific drug information between healthcare providers is likely to increase in the future. If implemented effectively, it would also allow physicians' rapid access to the current patient drug lists when patients are transferred between settings. Studies on interventions with medication reconciliation have shown them to be effective in reducing drug errors in the communication process between providers (Pronovost et al., 2003, Saufl, 2006, Kramer et al., 2007). This indicates that a database listing all the drugs prescribed for a patient is considered to enhance the safety aspects when prescribing drugs. However, is information sharing between healthcare providers enough to avoid potential hazards in drug prescribing? In this thesis we have seen how ERs and GPs understand the responsibility for patient current drug lists in different ways. These different ways indicate that this is not a simple question of information sharing in healthcare. Many questions arise: What will happen in the future when a harmonisation of laws and technical solutions make all prescribed drugs transparent to all physicians? Will technical solutions force physicians to think about prescribing in the same way? Are physicians from different disciplines, such as ERs and GPs, to be required to have the same responsibility for current patient drug lists? In theory, technical solutions should make a substantial difference, but the findings from this thesis, as well as earlier research (Howard et al., 2008, Chiang, 2008), indicate that in practice it is also necessary to further develop human communication.

To support physicians towards adopting a comprehensive approach to drug prescribing, there is, according to the findings in this thesis, a need for a parallel development in at least three areas. These areas are: 1) developing physicians' understandings of drug prescribing; 2) developing patients' understandings of drug use; and 3) developing technological solutions to facilitate a shared understanding between different physicians and patients' in drug prescribing/drug therapy.

### *6.2.1 Developing physicians' understandings of drug prescribing*

The findings in this thesis demonstrate how physicians vary in their thinking and understanding of drug prescribing. Variations were found between the different specialties of ERs (I-II) and GPs (III-IV), but also within the group of GPs. These different ways could be described as the physicians' work map<sup>1</sup> of what they focus on in prescribing. Understanding is the relationship between the person and the phenomenon under study. When the relationship to drug prescribing becomes more comprehensive, it indicates that the physicians have access to a larger work map. This means that physicians with less comprehensive understandings of drug prescribing will have a restricted repertoire of actions, whereas physicians with a more comprehensive understanding can choose between three or four ways when acting (III). When the physician is able to combine different views, it results in a richer understanding of, in this case, drug prescribing, and offers a greater variety of available ways of acting (Sandberg, 2000, Larsson, 2004).

According to a phenomenographic approach, deep learning often means changing or revising one's understanding of the phenomenon studied. In this respect, competence development requires a qualitative shift in the physicians' ways of understanding different aspects of drug prescribing. Is it possible to engage physicians in reflective conversation about patients' drug treatment and thereby gain a new understanding of the patient? Is it possible to reach a shared understanding between physicians from different disciplines about patient's drug treatment?

Marton states that understanding or a way of experiencing something is not a mental representation or a cognitive structure. It is a way of being aware of something (Marton, 1981). It is clear that reflection is an essential part of experiential learning (Schön, 1987), but how should this reflection be done in practice? The available literature suggests different methods to help physicians reflect on their understandings. One method that has proved to be effective in developing physicians' communication skills in the physician-patient encounter is to video-record consultations and then let the physicians reflect on the outcome of these so-called stimulated recall sessions (Holmström and Rosenqvist, 2001). Another way is to let professionals reflect upon and discuss the empirical result from a phenomenographic study in repeated group discussions (Boström Lindberg, 2007). Furthermore, Balint group sessions are used as a method for competence development in which the physicians reflect, in particular, on the physician-patient encounter (Kjeldmand, 2006). Another way – not represented in the available literature – might be to test open meetings led by a clinical pharmacologist, where both patients and physicians discuss potential drug-related

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<sup>1</sup> Work map is used as a synonym for outcome space, see Figures 3 and 4 in Chapter 5.

problems. This method might support reciprocal thinking between professionals and patients.

A shift from one understanding to another could take place on a single occasion – a so called view-turn (Ahlberg, 2004). The intervention must be organised in such a way that when the physician begins to realise the limitations of his/her present way of understanding, another understanding is revealed by the outcome space as an alternative (Sandberg, 2000). By letting physicians reflect on their own and others' way of understanding, they will probably become conscious of contradictions in their own reasoning in drug prescribing and thereby become more open to alternative ideas (Marton and Booth, 1997, Marton and Pang, 1999).

A careful mapping of the different ways in which physicians understand drug prescribing may help reveal conditions that facilitate the transition from one way of understanding to a qualitative “better” understanding of drug prescribing. Thus, phenomenographic information about the different ways of understandings that physicians possess for prescribing may be of use to educators who are developing ways of helping physicians understand prescribing.

#### *6.2.2 Developing patients' understandings of drug use*

One common view among the ERs and GPs was that patients have a passive understanding of their drug treatment as they seldom remember what drugs they are taking (I & IV). An additional question, derived from these findings (IV), is whether the patients are aware that they need to take extensive responsibility for their own drug treatment, as they are strongly perceived as responsible for the distribution of drug information between care providers? I could find no research that answers this question. In contrast, however, there is an abundance of literature about patients' difficulty in remembering what drugs they are on (Sleath et al., 1999).

If we want patients to participate in drug prescribing decisions, we need to give them the tools to make involvement possible. It is difficult for the physician to go from “novice to expert” in drug prescribing. However, self-management programs have demonstrated how patients can be an expert on their own diseases, especially in chronic illness (Rosenqvist, 1995, Veg, 2006). In a diabetes educational program, professionals were trained to use interviews as an instrument to elicit patients' understanding of how they control blood glucose (Rosenqvist, 1995). The aim of the questions was to identify knowledge gaps in patients' understanding of blood glucose. When a patient realised that his/her understanding did not fit with his/her experiences, they started to ask questions. By promoting patient's own understandings, the program was able to produce new qualitatively different understandings to improve their diabetes control (Rosenqvist, 1995).

In the same way, patients who have a comprehensive understanding of their drug treatment are more likely to ask questions about the usefulness of being on a drug and drug-related questions (Epstein et al., 2007). When the patient asks questions, the physician's ability to correct misinformation increases, making prescribing decisions more judicious and informed. One approach to encouraging the patient to ask questions

might be to give them facts about the difficulties that physicians face in prescribing, i.e. the problem of information transfer and drug related-problems. A strategy in the U.S. has been to give the patients a factsheet containing 20 tips to help prevent medical errors (AHQR, 2009). The tips focus on communication between care provider and patient. This will help patients ensure that they have given the physician all the information that he/she made need to understand the patient's condition and treatment options. In addition, the patient could also receive guidance about how to check their own drug lists for potential DDIs and side effects on the Internet. This is information that they could bring to the consultation with their physician.

### *6.2.3 Developing technological solutions to facilitate a shared understanding between different physicians and patients in drug prescribing/drug therapy*

In 2001, the Institute of Medicine in the U.S. wrote: "Healthcare delivery has been relatively untouched by the revolution in information technology that has been transforming nearly every other aspect of society (...) The development and application of more sophisticated information systems is essential to enhance quality and improve efficiency" (IOM, 2001 (page 15-16)). The progress of information technology in healthcare has been slow because of the barriers to and risk in transferring patient-specific clinical information. Now that, in Sweden, we are legally (Prop.2007/08:126) able to share information across the patient's continuum of care, the next step is to develop software systems for use in clinical practice. Discussions still remain to be had with regard to questions of privacy and confidentiality, how the model of comprehensive drug prescribing can be used and, in particular, the issue of how responsibility for current patient drug lists should be defined (Figure 5).

In Sweden, there is an ongoing discussion and various pilot projects on how to develop models of sharing patient-specific drug information among healthcare providers. In the national strategy for e-Health (Socialdepartementet, 2006) the vision is to create supporting IT systems through which healthcare professionals, the national corporation of Swedish pharmacies and patients share the same information. The patient's position and active participation is emphasised in the development process. However, little is known about the interaction between physicians and computer systems (Wears and Berg, 2005) and the possibilities and problems that may occur when current patient drug lists are available to physicians in their decision-making. Findings from this thesis indicate the importance of technological development, such as computerised drug prescribing support systems and electronic medical record systems, being constructed so that it facilitates a consensus of understandings both between different professionals about a patient's drug treatment and between physician and patient. Furthermore, the systems must be adapted to the clinical work of different specialities by taking contextual factors into consideration, but still facilitate patient-centred care across episodes of illness. Future software systems and information technology, with chat forums, e-mail etc., could play a central role in developing both physicians and patients' understanding and learning in drug prescribing/drug therapy.

## 7 DISCUSSION OF METHODS

To achieve the aims of this thesis, qualitative methods were used to provide new dimensions to research in drug prescribing. Qualitative studies may help in understanding physicians' thoughts and behaviour. In this chapter I discuss the trustworthiness of the methods used.

### 7.1 Are the findings trustworthy?

In the present studies, all data were collected by means of semi-structured interviews or FGDs. Do the interviews reflect the ways the physicians act while drug prescribing? The relation between the physicians' ways of understanding and their actual behaviour has not been established in this thesis. Nevertheless, a relationship could be anticipated between what people say and do (Giorgi, 1989). One way to increase the validity between "saying and doing" is to ask questions that reflect the informants' ways of acting. In the phenomenographic studies (III-IV) the focus of the interview questions was to obtain a thorough description of the physicians' experiences. By letting the physicians describe and give examples from their own practice I have gained certain insight into their experiences, and the link between "saying and doing" increases. Study II has a different aim: to gain insight into the group's collective view of the patient drug treatment. This means that the FGDs were characterised more by a discussion between the informants. To increase the validity, and to obtain rich data, a moderator with considerable experience as a physician as well as in the interview technique, conducted the FGDs. Retrospectively, in Study I it should have been possible, and might even have been better, to use an open-ended questionnaire. In these interview sessions I did not probe for any depth in the informants' answer.

There are different sources from which we may gain an understanding of how people conceive of, understand, perceive or view various aspects of the world. In this thesis, my interest was in the informant's thinking and experience in prescribing. What questions are asked and how they are asked is a highly important aspect of all methods. For the present purposes, open-ended questions were used in order to let the informant choose the dimension of the questions that they wanted to answer.

All data were collected before starting the analysis, i.e., no iterative or theoretical sampling strategy was intended to be used. Furthermore, in a phenomenographic approach (III and IV) it is not possible to use an iterative sampling strategy until the later stages of a cyclical process of data collection (Alexandersson, 1994). Instead, sampling should be designed to capture diversity in a well-structured sample. According to earlier experiences in phenomenographic research, 20 informants is usually enough to capture the variation in ways of understanding a phenomenon (Stålsby Lundborg et al., 1999, Sandberg, 2000). This sample size would be sufficiently comprehensive in both breadth and depth to support variations of understandings of the phenomenon under study.

In the analysis of all studies, at least three researchers read the transcripts independently and then compared the findings, and re-read the transcripts many times to reach a negotiated consensus about the findings. The process of analysis and the findings in this thesis have been presented for other researchers at regular meetings and seminars. Discussing the findings with researchers from the same and other disciplines was a way for me not only to deal with my preconceptions, but also to validate the findings. Another way of validating the findings is to let the informants reflect on them (Mays

and Pope, 1995). In Study I, the findings were presented in a group meeting at the ED to obtain the informants' validation as to whether the findings were understandable in the clinical setting where they were collected. In this case, the informants confirmed the findings. In Study II, the analysis was presented to two physicians working at the ED but who did not participate in the interviews. The physicians recognised the informants' way of thinking. These reactions were taken as a further validation of the data.

I used quotes from the interviews to illustrate the findings. These quotes were selected as representative of the particular ways of experiencing and understanding drug prescribing, but no single quote can fully represent a category. One informant may be represented with several quotes from a single interview because they are particularly illustrative and express a view on a certain issue, but this view was also shared by other informants (Potts et al., 2003).

All of the studies comprised a mix of specialists and trainees (ERs = 18 trainees and 3 specialists, GPs = 3 trainees and 17 specialists). In analysing and comparing data, it is important to take into consideration the differences in experiences in the groups. As an example, in the phenomenographic Study III, it seems that experiences in work do not always correlate to a broader way of understanding. When looking at the group of GPs, there was no development towards a more comprehensive understanding over the years of drug prescribing. Those GPs who spoke about aspects of the most comprehensive way of minimising unnecessary drug prescribing were GPs with limited experience (Table 3, original Study III). In a phenomenographic study with anaesthetists it was found that specialists and trainees' ways of understanding work were similar (Larsson, 2004). The differences consisted in the trainees' expressing the categories in a much less distinct way. In the present thesis, a more in-depth comparison of the groups of trainees and specialists is not possible as the samples are too small.

Who should conduct the interviews? In Study III, some aspects of drug prescribing were not discussed in the interviews, such as the important role of dosing according to type and intensity of disease. Do the answers reflect the physicians' knowledge gaps? Or did my own background affect the informants' answers? If a clinical pharmacologist had conducted the interviews, would the answers have been different? In this study, three broad questions were used (see Chapter 4). The informants were free to choose what dimension was important for them in prescribing. Based on their answers, I probed further by asking for examples from their experience. However, this is not just a question of the interviewer's background. The interviewer must not only have knowledge of the topic under study, but must also be trained in the technique of interviewing. According to Marton (Marton, 2001), another researcher working independently with the same data would not arrive at the same set of categories, as this is related to the discovery process. But once the categories are found and described it is reasonable to expect transferability to other settings or groups (Marton, 2001).

Are these descriptions of ERs and GPs understandable, reasonable and recognisable in other clinical settings? In theory, we know that variation exists in understanding of all phenomena (Marton, 1981). In this thesis, I have mapped the GPs' understandings. The different categories found (III-IV) bear similarities to those described in the available literature. Furthermore, had I used the phenomenographic approach among the ERs, it is likely that I would have found different ways of understanding drug prescribing, and a different work map compared with the GPs.

## 8 CONCLUSIONS

The overall findings demonstrate how physicians vary in their thinking and understanding of drug prescribing. Variations were found between different specialties, i.e. ERs and GPs, but also within the group of GPs. This variation has consequences for how physicians manage responsibility for current patient drug lists, how healthcare providers communicate with one another and for the dialogue between physicians and patients.

- ERs expressed a need for more pharmacological training and support in their work with patients' drug treatment. To make the computerised drug prescribing support system useful in practice, they wanted access to the current patient drug lists.
- ERs do not want access to the current patient drug list for making corrections to patients' drugs, but rather to help them make the diagnosis more quickly and safely. The lack of follow-up forces physicians to refrain from making changes to the drug regime.
- GPs demonstrated how they understood drug prescribing in five ways. The various ways of understandings had different foci: the biomedical aspects, the patient and society. Each GP had access to more than one view, but none encompassed all five.
- GPs reported five approaches to managing responsibility for current patient drug lists. These ranged from their being totally responsible for all drugs prescribed to a patient, to a description of passivity and lack of initiative by not asking patients about what drugs they take.

## 9 FUTURE RESEARCH

As I was trying to answer the research question in this thesis, several new questions evolved. Further research is needed in the following areas:

- Physicians might have multiple understandings of drug prescribing that are not necessarily consistent with the understandings held by clinical pharmacologists (the educators in clinical pharmacology). In order to have any effect, a teaching method must be developed in relation to the specific phenomenon taught. To determine the effectiveness of particular teaching methods it is necessary to specify the kind of learning and understanding a teaching method is designed to bring about. What do the educators think physicians should be taught in the question of drug prescribing? This requires empirical mapping as to what and how clinical pharmacologists understand teaching and drug prescribing.
- To test the validity of the findings and to be able to create consensus regarding the responsibility for current patient drug lists, we first need to understand how physicians from different medical specialties understand drug prescribing. This could be done by means of a questionnaire. The formulation of question areas should be: how the different specialists (emergency medicine, general practice, internal medicine, psychiatry, orthopaedics, cardiology, etc.) understand responsibility for current patient drug lists, and who they think should have overall responsibility for the lists.
- ERs demonstrated that they lack a strategy to manage potential drug-related problems. If we take drug-related problems seriously, we need to test a new way of working in the ED. One way might be to have some “back office” system into which ERs put patients’ medical records and let a clinical pharmacologist investigate the drug list.

## 10 SUMMARY IN SWEDISH

*Bakgrund:* Läkemedel är en av de viktigaste behandlingsmetoderna inom sjukvården. Den medicinska utvecklingen har medfört att det idag finns läkemedel för sjukdomar och tillstånd som tidigare saknade behandling. En negativ effekt av detta är att läkemedelsrelaterade problem, framförallt interaktioner och biverkningar, kan leda till lidande och minskad livskvalitet för patienten samt ökade kostnader för samhället. Att förstå hur läkare tänker när de förskriver läkemedel är viktigt för att nå kunskap om var problem kan uppstå och vad vi kan göra åt dessa. Läkemedelsförskrivning är något som alla läkare har gemensamt men som kan se olika ut beroende på specialitet och erfarenhet. I denna avhandling ges exempel på hur akutläkare och allmänläkare kan uppfatta läkemedelsförskrivning.

*Syfte och metod:* Det övergripande syftet med avhandlingen var att undersöka hur läkare uppfattar läkemedelsförskrivning. Mer specifikt studerades: (I) akutläkares syn på möjligheter och hinder vid användningen av ett datoriserat beslutsstöd vid läkemedelsförskrivning, (II) akutläkares syn på patientens läkemedelsbehandling, (III) allmänläkares uppfattning av läkemedelsförskrivning, samt (IV) allmänläkares uppfattning av vem som är ansvarig för patientens läkemedelslista med läkemedel förskrivna från samtliga vårdgivare och hur detta ansvar hanteras. All data samlades in via enskilda intervjuer (I, III & IV) samt i fokusgruppsdiskussioner (II). Data analyserades med hjälp av kvalitativa metoder, såsom tematisk analys och fenomenografisk metod.

*Resultat:* Läkarnas uppfattning av läkemedelsförskrivning varierade mellan akutläkare och allmänläkare, men även inom gruppen allmänläkare. (I) Akutläkarna upplevde ett ökat behov av farmakologisk information i arbetet. För att kunna utföra en säker läkemedelsförskrivning önskade de tillgång till patientens läkemedelslista. (II) Akutläkarna fokuserade främst på patientens akuta tillstånd. Potentiella läkemedelsrelaterade problem lämnades till nästa vårdgivare. Avsaknaden av uppföljning av patientens tillstånd gjorde att läkarna inte kunde göra några ändringar i patientens medicinering. Läkarna önskade tillgång till läkemedelslistan för att kunna ställa den akuta diagnosen säkrare och snabbare. (III) Allmänläkare uppfattade läkemedelsförskrivning utifrån fem olika synsätt: 1) förskriva säkra välbeprövade läkemedel, 2) övertyga patienten om den mest effektiva behandlingen, 3) ta hänsyn till patientens livssituation, 4) använda sitt omdöme och sin kliniska skicklighet för att minimera onödig förskrivning och 5) förskriva läkemedel som är billiga för samhället och som bryts ner i miljön. (IV) Allmänläkarna uppfattade fem olika synsätt av vem som är ansvarig för patientens läkemedelslista och hur detta ansvar hanteras: 1) att läkaren övertar ansvaret från annan förskrivare, 2) att läkaren är ansvarig för den egna förskrivningen, 3) att läkaren är ansvarig för samtliga förskrivningar, 4) att patienten och läkaren har olika men delat ansvar och 5) att patienten är ansvarig för att distribuera information mellan vårdgivare.

*Sammanfattning/slutsats:* Vem som är ansvarig för patientens läkemedelslista och hur man kommunicerar information mellan vårdgivare behöver tydliggöras. I Sverige trädde en ny lag i kraft 2008 som tillåter patientspecifik informationsöverföring mellan databaser. Denna avhandling visar att akutläkare och allmänläkare förstår ansvaret för patientens läkemedelslista på olika sätt. Dessa olika synsätt indikerar att det inte enbart räcker med att överföra information mellan vårdgivare för att förstå frågan om läkemedelsrelaterade problem. För att uppnå ett helhetsperspektiv på läkemedelsförskrivning krävs en parallell utveckling inom tre olika områden: 1) reflektion för att öka läkares kompetens i läkemedelsförskrivning, 2) öka patientens förståelse för sin egen läkemedelsbehandling och 3) utveckla tekniska lösningar så att de stödjer en samsyn mellan olika specialiteter kring patientens läkemedelsbehandling samt mellan läkaren och patienten i förskrivningen/behandlingen.

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