

What's Up, Doc?

Implications of Electronic Healthcare on the Physician-Patient Relationship and the Physician's Network

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Abstract:

This paper focuses on the introduction of an interoperable nationwide eHealth platform in Estonia and its effects on the physician-patient relationship as well as on the physician's broader network. The research is built around a single case of Estonia where the sample consists of three major hospitals on the forefront of the implementation process. A framework of propositions is established based on previous research as well as theoretical concepts. The results indicate that the physician-patient relationship will be mainly negatively affected as physicians perceive negative implications on the future quality, efficiency, and safety of healthcare. The broader network will change in relation to enhanced mobility and shifts in persistent roles.

Keywords: eHealth, Estonia, physician-patient relationship, social networks, Electronic Patient Record, European Union

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LIST OF ABBREVIATIONS

B2C	Business to Consumer
EHR	Electronic Health Record
EU	European Union
ICT	Information and Communication Technology

1 INTRODUCTION

1.1 BACKGROUND AND PROBLEM FORMULATION

Healthcare systems in Europe and throughout the world will face major challenges in the upcoming years. Demographic changes, rising costs as well as a significant shortage in medical professionals will force governments to adapt public healthcare to be able to continuously provide people with high quality medical services (Enthoven & Vorhaus, 1997).

The proportion of citizens over 65 in Europe is expected to double by 2050 (European Commission Information Society and Media, 2006a). Consequently, an increasing number of people will exploit the existing medical resources. As the demand will exceed the supply, physicians will be forced to spend less time with patients and base their diagnoses on more superficial examinations, resulting in a qualitative suboptimal treatment outcome. To overcome these future challenges, the efficiency of medical operations throughout Europe has to be increased considerably (Hillestad et al., 2005).

The former development is further deteriorated by the constantly increasing costs in the healthcare sector (DePhillips III, 2007). As presently disease treatment is symptom-based, it entails high expenditures on the testing, diagnosing and treatment of already existing conditions. In order to overcome this, a shift from symptom-based disease treatment to preventive healthcare has to occur (European Commission Information Society and Media, 2006a).

These developments require and simultaneously favour the introduction of Information and Communication Technology (ICT) to the field of healthcare. Using ICT in healthcare¹ has great potential to not only enhance efficiency and hence reduce costs but also to alter the landscape of healthcare by offering better treatment options (Øvretveit et al., 2007). Therefore, ICT is widely considered as a potential solution for the abovementioned problems in this sector (Chaudhry et al., 2006). Consequently, in recent years several initiatives have been set up on the European Union (EU) level with the ultimate objectives to amongst others:

- grant access to care of highest quality to all EU citizens,
- offer safer healthcare, and
- improve the overall efficiency and efficacy of healthcare.

(European Commission Information Society and Media, 2006a)

There are voices of controversy concerning the advantages and disadvantages of eHealth. Supporters on the one hand praise the improved efficiency, better treatment possibilities and the more educated and informed patient. On the other hand, critics object to the de-personalization that ICT brings about as well as the potential security threat to the sensitive patient data when stored on a central database (Mechanic, 2008). Whether the advantages outweigh the disadvantages or vice versa has yet to be proven as there is currently a lack of significant empirical evidence. However, it is likely that the traditional physician-patient relationship will be affected in some way by the introduction of ICT (Kerleau & Pelletier-Fleu, 2002).

Estonia assumes a pioneer role by implementing eHealth on a nationwide level. This thesis will provide a snapshot view on the early adoption phase of this project. It is expected that a comprehensive integration of ICT into healthcare will bring about changes to the traditional way physicians and patients interact. In order to provide insights into such changes, this thesis will investigate how Estonian physicians expect the healthcare service provision to be altered in terms of quality, efficiency and safety. Although the physician-patient relationship forms the core dyad in the

¹ This also referred to as electronic- or eHealthcare. In this thesis, the term eHealth is used.

healthcare service, it cannot be discarded that physicians also engage in relationships with other actors in the overall treatment process. Therefore, it is also interesting to research how the broader network around the physician including the relations with nurses, relatives of patients and so forth, will be affected by the eHealth project.

The developments in Estonia are of great significance to the progressions of eHealth on the EU level as the performance of the pioneer project can shape future perceptions of eHealth in general.

1.2 PURPOSE OF STUDY

In light of the above, the purpose of this thesis is to investigate *how* the implementation of ICT affects the physician-patient relationship as well as the wider network around the physician.

More precisely, this thesis aims to give answers to the following research questions:

How is the doctor-patient relationship expected to be affected in terms of perceived quality, efficiency and safety (from a physician's point of view)?

How is the broader network of actors around the physician likely to be affected in terms of mobility and role shifting?

In order to answer the two research questions, the thesis will observe a point in Estonia's eHealth implementation process. Through qualitative on site research in Estonia with involved physicians and nurses, it will be possible to derive a case study centred on the two abovementioned research questions. With the subsequent analysis, it will be attempted to provide an in-depth understanding of how ICT can bring about changes in existing processes and networks. In addition, this case should give way to provide future implications to other EU countries. As such the thesis serves as an introduction to research on nationwide eHealth implementation projects.

1.3 COURSE OF INVESTIGATION

The structure of this thesis is as follows. In section 2, a short overview regarding the fundamentals is presented. This includes the definition of eHealth for the purpose of this thesis, as well as a brief overview of the developments in the EU and an introduction to the eHealth project in Estonia.

After having set the basis, the thesis continues with the theoretical section in paragraph 3. A comprehensive review of the existing literature on ICT in healthcare is presented, built on the concepts of quality, efficiency and safety of healthcare. The thesis continues by drawing on the social network theory in order to lay down a framework for deriving the propositions.

In paragraph 4 both the data collection method and the process itself are described. The thesis is largely based on semi-structured interviews with a pool of doctors and nurses in three different hospitals in Estonia. The data obtained is presented in paragraph 5 in the form of a case study.

The subsequent paragraph 6 includes the Analysis and Discussion of the empirics in the framework proposed in the Literature Review and Theoretical Findings. In paragraph 7, the Conclusion is presented including the implications proposed for the problems researched. This will also comprise the delimitations of this paper with propositions for further research.

2 FUNDAMENTALS

2.1 DEFINITION OF EHEALTH

There is no consensus among researchers and practitioners on the precise definition of eHealth. As eHealth is a relatively new and rapidly evolving field of research, many concepts, terms and applications are still in a state of flux (Car et al., 2008). In order to be consistent in what this thesis considers under eHealth, it was chosen to adopt the eHealth definition provided in the report for the institution ‘NHS Connecting for Health’ (Car et al., 2008). eHealth is:

“an emerging field of medical informatics, referring to the organisation and delivery of health services and information using the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a new way of working, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology” (Car et al., 2008, p. XV).

Although there are innumerable eHealth applications available, they can still be divided into three main categories of which data storing, management and sharing is what the current thesis mainly focuses on (Car et al., 2008). This includes the Electronic Health Record (EHR) which is an electronic version of the traditional paper-based patient medical record. In general, a patient’s health record is a systematic collection of documentation about one’s medical history. The data is inserted there not only by the physician but also by nurses as well as other health personal (Janols, 2008).

2.2 EHEALTH IN THE EUROPEAN UNION

The EU has set eHealth development across member countries as one of the priorities for the Union’s sustainable future development. The overall vision is to create a unified environment with a smooth medical information flow across member countries. The European Commission representative in ICT for Health, Octavian Purcarea concluded that *“the ultimate goal of eHealth interoperability is to enable access to a patient’s discharge summary and emergency data from any place in Europe, respecting data privacy and security”* (Stroetmann et al., 2007, p. 35).

According to the EU eHealth Action Plan, it will be possible to measure the impact of eHealth in terms of better access, better and more efficient services, and higher productivity all across the EU by 2010 (European Commission Information Society and Media, 2006a). By then, eHealth will have become commonplace for healthcare professionals, patients and citizens all around Europe (European Commission Information Society and Media, 2006b).

In many European countries, major developments in eHealth have taken place in recent years, which have placed the EU in the leading position in eHealth (European Commission Information Society and Media, 2006b). EHR have been utilised on different scales including both regional and local levels, (Stroetmann et al., 2007). However, these projects vary in breadth in terms of eHealth services implemented as well as scope concerning the medical institutions and patient groups involved (European Commission Information Society and Media, 2006b). For example, EHR have been commonplace for years in many European countries. However, most often each medical facility has adopted its own information sharing system. As these are in general incompatible, it severely limits the overall benefits for both, the healthcare consumer as well as medical personnel (European Commission Information Society and Media, 2006b). Examples can be found among countries, such as Sweden (Ministry of Health and Social Affairs, 2006), Finland (Raitoharju, 2007), United Kingdom (Car et al., 2008), Germany (Stroetmann & Lilischkis, 2007) and several others.

2.3 THE ESTONIAN HEALTHCARE SYSTEM AND ICT

Estonia re-established its independence after the collapse of the Soviet Union in 1991 and has been a member of the EU since 2004. The small country of 1.3 million inhabitants is closely connected to Finland and other Nordic countries historically, economically as well as culturally. The major challenges for healthcare in the future identified also apply to Estonia. The stable increasing birth rate has yet been unable to offset the mortality rate making population aging a serious concern for the future (Koppel et al., 2008).

The Estonian healthcare system is built around an infrastructure of primary care. Specialized care has increasingly concentrated to the outpatient settings. It is a public, solidarity-based service financed by social contributions. The steward of the healthcare system is the Ministry of Social Affairs that bears mainly a regulatory role and acts as the implementer of the overall health policy (Koppel et al., 2008).

The 2007 Euro Health Consumer Index (Health Consumer Powerhouse AB, 2007) gives an approximate picture of the Estonian healthcare system in comparison with the rest of Europe. This comparative patient centred index of national healthcare systems considers Estonia to offer the 12th best overall quality of care in Europe (Health Consumer Powerhouse AB, 2007).

Estonia is generally well advanced in the information society, with many benchmarking indicators significantly above the EU average. 90% of all households are connected to the Internet via broadband which is the third highest rate in the EU (Commission of the European Communities, 2008). The same applies to the use of internet services among citizens (Koppel et al., 2008). Overall, it seems that Estonia could be a reasonable choice for attempting to implement a comprehensive nationwide ICT solution for healthcare, as both the population covered is rather small and the general level of ICT usage is high.

As was said, ICT has deemed to be a sustainable solution to the challenge of lowering costs whilst improving the quality and accessibility of healthcare. The eHealth project collects the health information for all Estonians into one central database (European Commission Information Society and Media, 2007). The Estonian health information system project comprises of four main pillars: EHR, Digital Registrations, Digital Imaging and Digital Prescriptions (Koppel et al., 2008).² The current project is unprecedented in terms of covering a whole nation (European Commission Information Society and Media, 2007).

According to the interview conducted with the board member of the Estonian eHealth Foundation³, since the mid-1990s continuous investments have been made in ICT in Estonia leading different institutions to adopt separate in-house information systems. It became apparent that improving information exchange on a nationwide level would entail a centralised approach. As such the Ministry of Social Affairs initiated a project partially financed by the EU structural funds.

The planning process began in 2002 with discussions among major stakeholders as well as the construction of a sufficient legal environment to regulate delicate data handling (eHealth Expert, 2008). The Ministry of Social Affairs is officially in charge of the process. However the authorized processor is the Estonian eHealth Foundation founded by major hospitals and professional associations in 2005 (European Commission Information Society and Media, 2007). According to the eHealth Expert, the formation of the executive body with all the major interested counterparts was a unique approach and the determining factor for the successful participation of the main actors.

² The thesis will primarily focus on the Electronic Health Record (EHR)

³ From here on referred to as the “eHealth Expert”

eHealth Expert: *“This is a very important aspect which hasn’t been done in other EU countries. Instead it has been a local or central government initiative and then the hospitals won’t come along with it. You always have somebody that is against the process.”*

As a result, the eHealth Foundation agreed on the standards and classifications to be used, solving the problem of technological interoperability. Although the major actors all used separate systems, all systems together covered every variation exploited across Estonia. The standards are internationally recognised, thereby enabling to exchange medical data across countries in future (eHealth Expert, 2008).

The preparatory implementation period was designed for the years 2005-2008 (European Commission Information Society and Media, 2007). From the 1st of January, 2009 all medical institutions will have to start transmitting the information to the central platform. This does not entail exchanging existing in-house information systems but an adaption to be able to adhere to the data transmission requirements (eHealth Expert, 2008). It will include time critical data (chronic diseases, allergies and so forth) and information from the primary care physician (European Commission Information Society and Media, 2007). Moreover, the system shall include a link to medical images as well as inpatient discharge summaries. In future, the amount of information transmitted is expected to increase (eHealth Expert, 2008).

The database will be made available for patients and healthcare professionals nationwide as part of a larger state information system containing other public services. The citizen will be able to see data by authenticating himself⁴ through a personal ID-card. The latter will also be used by all medical personnel to digitally sign all documents transmitted. However, in order to enable patients to remain in control of their own medical information, they have the right to deny access to their data (eHealth Expert, 2008).

ICT projects in such a large scale require several important dimensions to be covered including the technological, organisational as well as legal frameworks. It has been the experience so far that the technological aspect takes a backseat as the organisational and social acceptance problems become more challenging (eHealth Expert, 2008).

Researcher: *“What have been the biggest challenges so far?”*

eHealth Expert: *“Gaining acceptance from the medical personnel without a doubt, they do see this as a breach to their private zone so to speak.”*

⁴ For matters of simplicity individuals will always be referred to in the male version, however representing both genders equally.

3 LITERATURE REVIEW AND THEORETICAL BACKGROUND

The contemporary nature of the topic is reflected in the derived research questions. The first question is based on the EU eHealth Action Plan and thus closely related to the latest developments in the area. A comprehensive overview of former literature is thereby a must to be able to draw on most recent findings supplemented by a theoretical framework. The second research question tackles the topic on an increasingly theoretical level. Hence it is first necessary to present the relevant theory which will be combined with current research in the field.

Due to the interrelatedness of previous research and the relevant theories they complement one another and are combined in one section. Nonetheless, in the first part the focus is on previous research and in the second part on the theoretical concept. Both parts will lead to propositions, which serve as a framework for the subsequent analysis.

3.1 THE PHYSICIAN-PATIENT RELATIONSHIP AS A B2C CONNECTION

“The fundamental interaction in healthcare is the one between patient and physician” (American Healthways, Inc., 2004, p. i). Healthcare is a service determined by the interaction of the provider and customer (Kasper et al., 2006; Ouschan et al., 2006). More specifically, it can be classified as an experience good, in which the patient’s function in the production is vital for the success of the service provision. In other words, the patient is the co-producer of healthcare services (Schneider & Ulrich, 2005; Kasper et al., 2006). The inherent knowledge-intensity brings about relative complexity and the need for a problem-solving activity. The service is provided by qualified experts with specific knowledge based on education, experience, and skills (Orava & Tuominen, 2002).

The physician-patient interaction can be generalised as a B2C relationship in which the physician represents the provider of the service which the consumer purchases. There are different types of relationships in the B2C setting which range in both scope and depth from single transactions to long-term relationships (Kasper et al., 2006). The latter type is what many aim for, as it offers additional value to both, the provider and the consumer with loyalty and trust emerging between the parties (McMullan & Gilmore, 2008; Heskett, 2002; Payne & Holt, 2001; Kasper et al., 2006). That applies well to healthcare where the service encounters are confidential and built upon relationships (Orava & Tuominen, 2002; Ouschan et al., 2006). Building relationships is an incremental process through the development of mutual goals and partner-specific adaptations as well as overall cooperative behaviour (Walter & Gemünden, 2000).

In the B2C context, the service encounter is paramount to the evolution of the relationship. After this ‘moment of truth’ (Kasper et al., 2006) each participant makes his own valuation, which in turn is decisive for its continuity. If the relationship’s ‘degree of appropriateness’ is sufficient to satisfy the needs of the customer involved, satisfactory quality is reached and the relationship will continue (Moliner et al., 2007)

Moliner et al. (2007) have constructed a model of perceived relationship quality in the B2C context which is made up of three key variables of customers’ satisfaction, commitment and trust with the supplier.

First, satisfaction with the supplier is important. It is a result of the comparison between the expectations and the actual performance. Satisfaction has also an affective component associated with positive emotions from the service encounter (Moliner et al., 2007). Moliner et al. (2007) further state that satisfaction is built up gradually throughout the course of a relationship and therefore influenced

by all aspects of the interaction. Platonova et al. (2008) report that a patient's satisfaction with his physician is an antecedent to loyalty and prevents voluntary switching between service providers.

Second, trust is the underlying element of a sustainable high-quality relationship (Moliner et al., 2007) which closely relates to both patient satisfaction and loyalty (Platonova et al., 2008). In healthcare, trust can be either unquestioned relying on physicians' superiority or based on open communication (Ouschan et al., 2006). The latter is essential for the quality of care since patients have to rely on their physicians to provide them with competent care, maintain confidentiality and act in their best interests (Berg, 2002; Mechanic, 2008).

As mentioned, trust formation is related to open communication. Orava and Tuominen (2002) confirm that in services like healthcare a high degree of customer uncertainty is often present. This can be minimised by social presence through general observations and asking insightful questions to determine participants' attitudes and perceptions (Körner & Zimmermann, 2000; Breen & Matusitz, 2007). The social presence theory concludes that when communication frequency is higher and increasingly delicate information is disclosed, relationships develop, resulting in increased trust between the parties (Breen & Matusitz, 2007; Hammer & Gudykunst, 1987).

The third important aspect determining the quality of the relationship is commitment entailing a long-term perspective towards the relationship (Moliner et al., 2007). It is considered the highest qualitative level of a relationship between parties. However, commitment can be based on either positive satisfaction gained from previous interactions or negative costs associated with abandoning the interaction. If a more suitable alternative arises, relationships based on negative commitment will cease to exist (Moliner et al., 2007).

Traditionally B2C markets have been mainly supplier driven, however recently there has been a shift of power towards the consumer (Körner & Zimmermann, 2000). Körner & Zimmermann (2000) further propose that due to increased market transparency customers are able to act more opportunistically. Similarly, the physician-patient relationship has also traditionally been based on a paternalistic model, assuming physician authority (Dolgin, 2005). However, due to recent changes in healthcare the traditional paternalistic relationship is being replaced by one where patients increasingly see themselves as consumers of healthcare similar to commercial marketplaces (Dolgin, 2005; Mechanic, 2008; Ouschan et al., 2006; American Healthways, Inc., 2004). Changes in culture, treatment options, patients' educational levels and the availability of medical information have helped to transform the traditional physician-patient relationship into a more equal interaction between parties (Mechanic, 2008; Ouschan et al., 2006; Waegemann, 2007a). Although paternalistic models in healthcare are still present in many places, they lack the legitimacy and authority of earlier decades (Mechanic, 2008).

In general, this is seen as a positive trend that brings about benefits for all sides. Ouschan et al. (2006) report that consumer participation in healthcare results in both, reduced healthcare costs as well as improved healthcare outcomes. These empowered patients are also found to lead innovation and efficiency in healthcare (American Healthways, Inc., 2004). Waegemann (2007a) and Mechanic (2008), however, argue that having to deal with more informed and active patients can be cumbersome for physicians who have to justify their treatment decisions, something that consumes additional time during the service encounter.

3.2 THE PHYSICIAN-PATIENT RELATIONSHIP AND ICT

There exists an abundance of not only literature but also real life cases concerning the effects of ICT on B2C relationships. Some of the more common examples would be electronic banking, shopping

online or online service centres. ICT can bring about the alteration of a whole business model, for example the cases of Amazon, eBay, and Apple iTunes. Those companies have experienced productivity as well as profitability gains from IT investments. In healthcare, however, this process has been lagging behind (Hillestad et al., 2005). Moreover, cases from Australia, USA, and several EU countries have reported failures of ICT adoption and implementation, mainly due to various socio-cultural factors (Hendy et al., 2005).

One could presume that a large alteration to the healthcare system might have an effect on the core of the service, the physician-patient relationship. The literature, however, does not pose a univocal opinion on this subject. One way of looking at the new technologies is as merely a tool that enhances the relationship but essentially does not change it (Future Healthcare, 2008). However, the majority of literature argues that disruptive ICT innovations influence the established patterns of action bringing about a more complex change (Beckerman, 2007b; Berg, 2002; Ford et al., 2006; Car et al., 2008).

As the Estonian eHealth project is in the beginning of its adoption period, physicians have not yet had the chance to use the new system for an extended period of time. Moreover, they at present have not experienced the possibility of accessing country-wide data. Thereby, most of the opinions concerning the new form of working are based on perceptions rather than extensive usage experience. Perceptions are *“thinking concepts and structures behind activities and resource allocations”* (Holmlund & Strandvik, 1999, p. 686). In other words perceptions are what drive our actions and choices, which therefore also influence our interactions with other participants. Therefore, physicians’ subjective perceptions about the eHealth project and its effects on the quality, safety and efficiency of care will transcend into their work patterns and relationships with their patients, subsequently having an effect on them.

According to the European Commission’s new strategic framework, in the forthcoming years, the EU will transform the healthcare landscape through ICT implementation reaching new levels in quality, safety and efficiency of care (European Commission Information Society and Media, 2006a).⁵ The research focuses on how the physician-patient relationship could be affected as a result of physicians’ perceptions on these aspects at a very early stage of a nationwide eHealth project adoption.

However, existing literature mainly focuses on reporting findings on eHealth platforms already in practice or EHR implementation within an institution. There is no information available about perceptions on nationwide interoperable eHealth platforms in the early stage of adoption. Therefore the following section includes the empirical results of small-scale interventions as well as the physicians’ perceptions during the implementation process.

3.2.1 THE EFFECT ON QUALITY

Literature provides contradictory evidence of how ICT implementation is perceived to affect the quality of healthcare. While several researchers (Delpierre et al., 2004; Mitchell & Sullivan, 2001; Darr et al., 2003; Kalle, 2008; Snyder et al., 2005; Beckerman, 2007a) find physicians to have positive perceptions towards EHR in relation to the quality of care, Lærum et al. (2003) report that physicians believe the quality to diminish.

There is no internationally agreed definition of healthcare quality but certain dimensions of care are prevalent in various definitions. It was chosen to refer to healthcare quality through customer satisfaction identified by previous research (e.g. Moliner et al., 2007). Healthcare quality can be then connected to Emanuel and Dubler’s (1995) framework of an ideal physician-patient relationship. The

⁵ Accessibility and efficacy were also mentioned as goals but will be excluded as not to complicate the case study construction and get thicker information on a narrower set of determinants.

so-called 'six-C's framework' consists of choice, competence, communication, compassion, continuity and (no) conflict of interest (Emanuel & Dubler, 1995).⁶

Choice is related to the concept of patient empowerment through being able to choose one's physician as well as treatment alternatives (Emanuel & Dubler, 1995). As was mentioned above, eHealth platforms in general enable patient empowerment through providing patients access to their own medical information, thereby making them more competent in discussing their condition and treatment (Berg, 2002; Ford et al., 2006; Kalle, 2008; Mechanic, 2008; Ouschan et al., 2006). The literature further argues that the more empowered and informed the patient, the more it is possible to tailor the best possible treatment through cooperative decision making and engaging in mutual partnerships (Kalle, 2008; Ford et al. 2006; Ouschan et al., 2006). These notions are mainly based on expectations rather than quantified results. One could also presume that since patient information will be available across the nation from every healthcare facility, the patient will be increasingly able to choose where to receive treatment since there is less information asymmetry across institutions and physicians (Berg, 2002).

Based on the findings above, proposition number 1a is derived:

Proposition 1a: Quality is perceived to be positively affected since patients become more empowered and equal partners in the physician-patient relationship.

Competence encompasses both medical and technological dimensions. The introduction of ICT probably does not affect one's already acquired medical knowledge and experience. Still, some literature suggests that physicians perceive EHR to facilitate research collaborations among colleagues (Darr et al., 2003).

However, a physician's technological competence can directly and indirectly affect perceptions of quality changes to healthcare. Direct impact relates to one's physical abilities and skills to operate computers and the EHR program. Any new technology needs additional technical competence in order to utilise it, which physicians often do not sufficiently possess (Berg, 2002; Shekelle et al., 2006; Mitchell & Sullivan, 2001). Beckerman (2007b) goes as far as to say that EHR may change the ease of solving a problem. The indirect effect is related to one's overall familiarity with ICT. The results here are somewhat mixed. Delpierre et al. (2004) find that physicians with previous experience in working with computers have a better perception of EHR but Lærum et al. (2003) do not find any differences in satisfaction levels whether a physician has been previously using paper-based medical records or not. Therefore, it cannot be clearly determined how physicians will perceive the eHealth platform in relation to their technological competence. However, it can be expected that competence relates to additional time commitments needed to develop new skills, affecting the perceptions towards efficiency.

Communication is a critical part of the physician-patient relationship. Good communication entails listening and understanding the patient, clearly explaining the aspects of his condition, and offering advice. This facilitates the formation of a strong bond as well as prevents misunderstandings and disputes (Emanuel & Dubler, 1995). Therefore, physicians' perceptions on future changes in communication have the potential to actually influence the relationship itself. Communication relates closely to the concept of compassion, otherwise defined as the physician's ability to express empathy towards the patient and his concerns (Emanuel & Dubler, 1995). It is through physical interaction that the physician is expected to express his compassion to the patient (Berg, 2002).

⁶ '(No) conflict of interest' shall be excluded as irrelevant in the current case since it has been originally designed for the case of managed care.

One of the main settings of communication between the physician and the patient is the consultation process. Literature (Delpierre et al., 2004; Johnson et al., 2005; Mitchell & Sullivan, 2001; Beckerman, 2007a; L  rum et al., 2003) suggests that physicians perceive ICT as a physical barrier in the healthcare encounter, which can have a negative impact on the physician-patient relationship by taking time away from the direct interaction with the patient. More specifically since physicians have to type rather than write data, it may affect patients' perceptions about helpfulness and partnership (Johnson et al., 2005) or take over the physician's role (Mitchell & Sullivan, 2001). Physicians are reportedly less able to clearly explain issues during an encounter due to an increased sense of urgency (Johnson et al., 2005).

Based on the findings above, proposition number 1b is derived:

Proposition 1b: *Quality is perceived to be negatively affected since ICT takes time away from the interaction with the patient.*

Another dimension in an ideal physician-patient relationship is continuity. This includes both, the fact that a relationship should endure over time as well as that it takes significant time investments to develop an ideal physician-patient relationship (Emanuel & Dubler, 1995). Berg (2002) building on this framework, interprets continuity through the potential benefit of facilitating peer-to-peer interaction among physicians. Kalle (2008) argues that there is a lack of communication between primary and secondary care physicians which can lead to incorrect treatment decisions. The dissemination of important patient information among professionals is one of the main qualitative advantages according to medical personnel. By having better access to information, physicians perceive to have a better knowledge on the patient's medical history which in turn improves the quality of care (Mechanic, 2008; Darr et al., 2003; Delpierre et al., 2004; Kalle, 2008; Snyder et al., 2005; Logan, 2005; Shekelle et al., 2006).

Based on the findings above, proposition number 1c is derived:

Proposition 1c: *Quality is perceived to be positively affected since ICT facilitates peer interaction and dissemination of relevant patient information.*

In conclusion, effects on quality are multifaceted, which further translates to the physician-patient relationship. On the one hand, the interaction is hindered due to the inclusion of ICT in the process. On the other hand, the eventual treatment might improve, eliciting a positive effect on the relationship. In the light of the dual effect, the main proposition shall conclude that:

Proposition 1: *The physician-patient relationship is expected to be both, positively and negatively affected due to dual effect on quality with the implementation of an eHealth platform.*

3.2.2 THE EFFECT ON EFFICIENCY

The quality of healthcare is closely related to the concept of efficiency (Car et al., 2008) which can be expressed through various dimensions. In economics, efficiency is seen as the extent to which resources are allocated across activities in a manner that maximizes the value they are intended to produce (Deardorff's Glossary of International Economics, 2000, 2001).

Physicians perceive eHealth platforms and EHR to increase their workloads (Winkelman et al., 2005; Delpierre et al., 2004). In contrast, Chaudry et al. (2006) and Delpierre et al. (2004) report studies exhibiting decreases in documentation-related nursing time due to the streamlining of workflow. The other major notion of time inefficiency relates to physicians believing that learning and becoming acquainted with the new program and work processes requires additional time commitments which are

not readily available (Mitchell & Sullivan, 2001; Ilvonen, 2006; Chaudry et al., 2006; Audet et al., 2004; L  rum et al., 2003; Shekelle et al., 2006). This relates back to the dimension of competence, connecting perceptive quality with efficiency. Chaudry et al. (2006) find that the need for additional time resources decreases as physicians become more acquainted with the system. Still, the efficiency of making skilled physicians input data into the EHR demanding extra time and little specific knowledge is questionable (Snyder et al., 2005). Some literature also suggests a significant perception that the time to make a medical decision increases due to additional information available (Shapiro et al., 2007).

Based on the findings above, proposition number 2a is derived:

Proposition 2a: Efficiency is perceived to be negatively affected (especially in the beginning) due to the additional time commitments needed to learn and use the new eHealth platform.

In relation to another major resource in healthcare, costs, eHealth platforms are perceived to be beneficial. A study conducted amongst emergency physicians reveals a general perception that EHR improves efficiency in reducing costs for healthcare through which in the end the patients shall benefit. One of main sources for efficiency increase involves the reduction of health services utilisation, especially radiology and laboratory testing (Shapiro et al., 2007; Chaudry et al., 2006). The other source of cost efficiency should come from reduced double and triple documentation (Beckerman, 2007b; Shekelle et al., 2006).

Based on the findings above, proposition number 2b is derived:

Proposition 2b: Efficiency is perceived to be positively affected due to the savings on healthcare costs through the reduction various double-work.

However, it can be argued that cost of care is a somewhat distant concept for the patient in the solidarity-based healthcare system. The resources saved are in the hands of the healthcare management, making the potential benefit to the patient harder to predict. Therefore, it has an indirect effect on the physician-patient relationship through the potential improvement of healthcare services in the long run. This leads to the conclusive proposition on the effect of efficiency on physician-patient relationship:

Proposition 2: The physician-patient relationship is anticipated to be negatively affected due to the overall negative effect on efficiency with the implementation of an eHealth platform.

3.2.3 THE EFFECT ON SAFETY

Finally the physician-patient relationship is related to the safety of healthcare (European Commission Information Society and Media, 2006a). It is generally understood that a safety incident is any unintended or unexpected incident which could potentially harm one or more patients (Car et al., 2008). Literature shows some evidence on EHR implementation resulting in the reduction of medical errors, for example adverse drug events (Chaudry et al., 2006; Shapiro et al., 2007). However, these results report empirical findings, rather than physicians' perceptions. Since direct evidence on perception is limited, this dimension is not relevant for the proposition.

The concept of healthcare safety also includes the confidentiality of delicate personal information, which becomes especially relevant with the inclusion of ICT and cyberspace. Also expressed through data privacy, this refers to the individual's ability to protect information about him (Attaran & VanLaar, 1999). This has two dimensions inherent. First, literature concludes that physicians perceive a loss in privacy of patients' delicate information especially when it is accessible to the whole of the

medical community (Waegemann, 2007b; Darr et al., 2003; Delpierre et al., 2004; Logan, 2005; Ilvonen, 2006).

Second, physicians perceive a risk in their medical decisions being increasingly available for others to review, thereby losing their professional privacy (Delpierre et al., 2004; Logan, 2005). More specifically, physicians are concerned with patients misunderstanding their notations in EHR (Winkelman et al., 2005). This has to do with the potential threat of litigation (Shekelle et al., 2006). Physicians express notions stating that “*my treatment decision can be later used against me*” (translated from Kalle, 2008). In contrast, Darr et al. (2003) report findings where physicians believed that the existence of systematic documentation on each patient will be an asset in their case during litigation.

The majority of findings lead to proposition number 3a:

Proposition 3a: Safety is perceived to be negatively affected, due to the risk of compromising delicate patient data as well as fear of litigation.

In conclusion, physicians’ negative perceptions about healthcare safety are expected to influence their respective relationships with patients. The situation is complicated since patients can play the role of both, “victims” and “prosecutors” in physicians’ perceptions of healthcare safety. As a conclusive effect, the relationship serves to suffer under the confusion of roles in the process which leads to the final proposition:

Proposition 3: The Physician-patient relationship is anticipated to be negatively affected due to the overall negative effect on safety with the implementation of an eHealth platform.

3.3 NETWORK THEORIES

In order to obtain a better understanding of the physician, his actions, surroundings as well as all the different influences that he is exposed to, a network perspective is assumed. Through the latter the general network of physicians is described. After clarifying the common contents and assumptions of network theories in general, the Social Network Theory and its implications for the focus of this study are examined. Moreover, it will be depicted how the introduction of ICT might change the persistent network on a theoretical level.

3.3.1 SHARED ASSUMPTIONS OF NETWORK THEORIES

There are many different definitions of the term ‘network’ but the common denominator states that a network always consists of actors or nodes and relations (Boudourides, 2002). The definition of Knoke and Kuklinski (1982) is applied here, who regard a network as a certain type of relation linking a defined set of individuals, objects or events. Naturally, different types of relations constitute different types of networks.

In general, attributes and relationships play a major role when analysing a network. Attributes refer to the intrinsic characteristics of people, objects and events in a network. The people, objects and events can engage in relations with each other, that is to say they form relationships. As opposed to attributes, relationships are not intrinsic but rather an “*emergent property of the connection between units of observation*” (Knoke & Kuklinsk, 1982, p. 18). Further, relationships are often context-specific and change immediately when an individual moves out of a certain context. In order to analyze a network the two approaches need to be applied simultaneously instead of exclusively. For example, relational measures capture evolving properties of social systems that cannot be assessed by simply adding up the attributes of each individual actor.

The network perspective is found to be most appropriate for the study at hand, as physicians continuously engage into relationships with not only patients but also with fellow physicians, nurses and other actors in the healthcare system (Enthoven & Vorhaus, 1997). These relationships are considered to be of a long-term nature and involve a considerable amount of direct communication on a daily basis.

Figure 1 depicts the micro network of a physician working in a hospital. In terms of physicians' networks this thesis will always refer to this basic model.

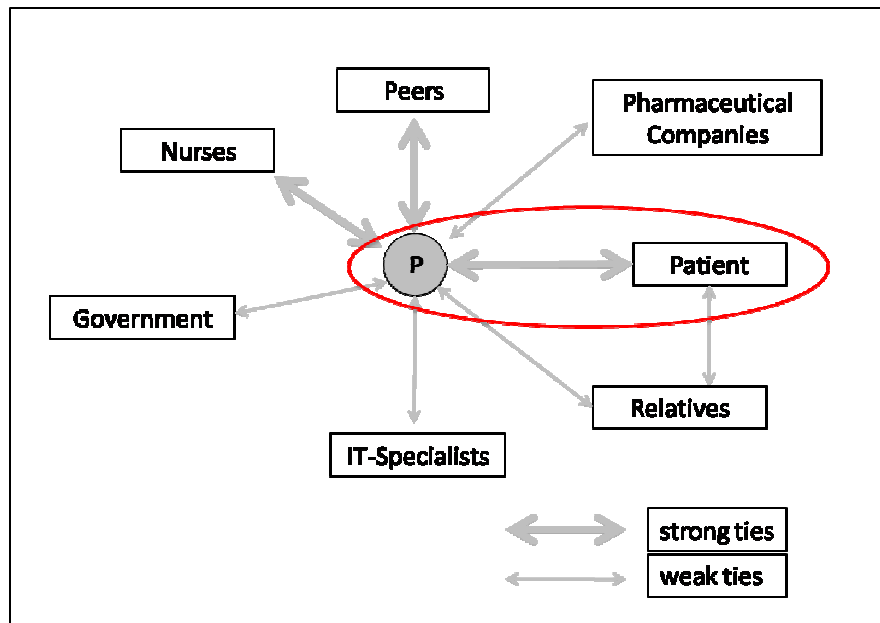


Figure 1: A physician's micro network in a hospital. (Developed according to the findings of DiPalma, 2004; Ellingson, 2002).⁷

3.3.2 SOCIAL NETWORK THEORY

Within economic literature an atomistic perspective is usually taken on. According to this, an individual acts without being influenced by other individuals in his surroundings, events, attitudes or behavioural patterns. In other words, the social context the actor is embedded in is ignored (Papanikos, 1998). The social network perspective assumes the contrary. It is based on two central assumptions: First, an actor or generally an individual participates in a social system or environment and secondly that individual is influenced in his decision, attitudes, beliefs and behaviours by other actors in that system (Knoke & Kuklinsk, 1982). Social environment in turn can be expressed as patterns or regularities in relationships among interacting units (Wasserman & Faust, 1994).

Another term often mentioned in literature in relation to social networks is 'social capital'. According to Deardorff's Glossary of International Economics (2000, 2001) social capital refers to networks of relationships among individuals, firms, and institutions in a society, together with associated norms of behaviour, trust, and cooperation that enable a society to function effectively. These two concepts are often described together and complement each other.

The social network in this thesis evolves, similar to the one described by Smoreda and Thomas (2001), around one centred individual. Here the centre of the network is clearly the physician who is connected to various actors (see figure 1). Interactions between these actors result from mutual

⁷ The term 'pharmaceutical companies' comprises all industry-related actors in the physician's network.

exchange of resources in the specific social and cultural contexts they are living and communicating in (Boudourides, 2002). Each type of resource exchange, whether informational or material, constitutes a social network relation and through maintaining this relation, actors create a tie. The strength of a tie may range from weak to strong, depending on the quantity, quality and frequency of the exchanges (Marsden & Campbell, 1984).

Granovetter (1973), who is widely respected for his research on tie strength, suggests four different indicators to measure ties. According to him it is time spent in the relationship, the level of intensity as well as intimacy and the reciprocal services that determine a relationship (Granovetter, 1973). In an attempt to make those four concepts more tangible Marsden and Campbell (1984) specified and investigated them further. The time spent in a relationship is subdivided into frequency and duration of the interactions that constitute the relationship (Marsden & Campbell, 1984). Intensity they aim to approximate by applying the concept of closeness.⁸ Intimacy and reciprocal services are transcribed by mutual confiding as well as the extent to which both actors in the relationship provide each other with emotional support (Marsden & Campbell, 1984).

With some actors, namely the nurses, peers and the patients, the physician is more regularly and intensively involved than with others (DiPalma, 2004). This can be attributed to the fact that he interacts and communicates with them on a daily basis, thereby spending more time with each of them, which strengthens the respective ties (Granovetter, 1973). Thus, the subsequent relational ties with those three groups are stronger than with the other network actors with whom the physician interacts less (see figure 1). Nonetheless, it is important to have a balance between loose and strong ties as different ties facilitate different types of resource exchanges vital for maintaining the network (Fenton et al., 2001). Granovetter (1983) even further emphasizes the importance of weak ties in his article ‘The strength of weak ties: a network theory revisited’. He states that weak ties are essential for a network to access new information. The amount of new information exchanged among actors connected by strong ties is rather limited as most information is already known. Weak ties, however, function as bridges to other networks and hence supply the network with new information (Granovetter, 1983). Representatives of governmental healthcare institutions, pharmaceutical companies as well as IT-specialists are connected to physicians through weak ties due to the less frequent interaction patterns. In short, it is important for the physician to have a balanced network with weak as well as strong ties to guarantee a constant flow of information.

3.4 INTRODUCTION OF ICT TO SOCIAL NETWORKS

Watzlawick’s (1967) well-known statement “*One cannot communicate*” sums up why it is important to assume a network perspective when studying the impact and introduction of ICT (p. 83). Communication does not take place in isolation. Thus, the introduction of ICT into the physician’s network and the changes it brings about can only be studied when considering the network as a whole.

A persistent network is constantly altered by its actors and their existing relations. Some changes can be of minor scope, for example when the strength of a tie or relation alters, and others can be of bigger impact, for example when a new key actor is introduced or a new technology enters the network (Harrison et al., 2007). Studies have shown that the introduction of EHR on a single clinic level has caused a severe disruption in the persistent socio-technical interactions (Harrison et al., 2007; van der Meijden et al., 2000). Among the many reported implications that ICT introduction brings to the network, this thesis focuses on the aspects of mobility and role shifting, as they are frequently mentioned in the literature regarding healthcare networks (e.g. Williams, 2004; Walsh, 2004; Van der

⁸ In this study closeness is assumed to be physical closeness, as no further indication was given on how closeness is actually constituted.

Meijden et al., 2000). Further, after having gathered the empirics, it became apparent that these aspects were of importance to the interviewees as well. However, a proper analysis of the information expects the presence of a theoretical framework.

3.4.1 MOBILITY IN SOCIAL NETWORKS

The term mobility refers to the ability to move around or to be mobile (Stough, 2003). In this paper the definition is used in a more transferred sense, referring to the extent to which a network actor is mobile not only in physical but also virtual terms. Arguably, virtual mobility constitutes the ability to send and access information, an exchange that takes place among the different actors in a network. In general, ICT plays an important role in relation to mobility as it enables improved communication and knowledge exchange thereby broadening and deepening social networks (Stough, 2003). Further, as Williams (2004) finds when aggregating several studies on ICT introduction in communities, strong as well as weak ties are enhanced as soon as ICT is introduced in a network. Strong ties equate to bonding and weak ties to bridging social capital. Ultimately, as ICT facilitates connections between social networks (through weak ties) as well as deepens the relations within the network itself (through strong ties), mobility is enhanced.

In the physician's network prior to ICT introduction, mobility of the actors is limited by geographical constraints. This applies to the current case as the healthcare service structure in Europe is rather fragmented (European Commission Information Society and Media, 2006a). Further, existing ICT systems are incompatible, as actors are connected only within a single practice or department. Physicians are still able to communicate with others in the network through face-to-face interaction or via mediums, such as telephone and e-mail. However, as this communication lacks standardization, the information exchanged can be biased or incomplete, influenced by one's subjective perceptions and emotions (Walsh, 2004). For example, if a physician consults his peer over the telephone, the parties might miss out on important details or misinterpret certain information. This is less likely to happen if the colleague can retrieve the standardized information from the platform, typed in by the responsible physician (van der Meijden et al., 2000). Moreover, several physicians and nurses can simultaneously access the same data and consult each other in order to come up with the best possible treatment (Kerleau & Pelletier-Fleu, 2002). At the same time the patient is able to access his data when- and wherever there is an Internet connection. Therefore, overall communication is improved and general accessibility increased.

To sum up, network mobility as one of the major goals of the EU eHealth initiative (Ministry of Health and Social Affairs, 2006) will be increased through the implantation of ICT in the healthcare network.

Based on the findings above, the following proposition is derived:

Proposition 4: Due to the fact that communication, collaboration and accessibility in the physician's network are enhanced, the persistent ties, weak or strong, will be enforced and mobility in the network is likely to augment.

3.4.2 ROLE SHIFTS IN SOCIAL NETWORKS

Insights on role shifts in the healthcare network promoted through ICT can be gained by looking at other fields of research. For example, it is widely expressed in research on eLearning that the introduction of ICT into a persistent network constellation can change existing roles (e.g. Cohen & Nycz, 2006; Turvey, 2005). Turvey (2005), for example, investigates the consequences of introducing ICT into a network of students studying in a virtual classroom. With the introduction of ICT as the learning medium, the traditional roles of a teacher and a student shift. The teacher still assumes the

leading role but as he no longer remains the only source of information with unquestionable knowledge, he also takes on the role of a learner. The student's role also changes. He is rendered more equal in comparison to the traditional face-to-face learning and with increased opportunities for student-led learning (Turvey, 2005).

Both eLearning and eHealth share certain characteristics that allow for transferring the prior findings to the field of eHealth. First, in both cases face-to-face constitutes the traditional interaction pattern. The introduction of ICT changes this pattern, as communication can now take place through the computer at almost any place and point in time. Further, in the traditional constellation the main source of information is the teacher and the doctor, respectively. Through ICT the access to information broadens extensively as several different sources are simultaneously available (Turvey, 2005). The described phenomena on the one hand enforce the student's and patient's position by rendering them more knowledgeable and equal, and on the other hand threaten the traditionally omniscient and impeccable position of teachers and physicians (Johnson, 2007; Lupton, 1997).

This development concerning patients and physicians is supported by already existing literature on the shift of roles in clinics and practices as a consequence of the replacement of paper based medical records by electronic records. Walsh (2004) describes the evolution of a knowledgeable patient who faces the physician on almost equal grounds. Van der Meijden et al. (2000) go one step further and include nurses into the equation. Due to the proceduralising of certain tasks nurses can take on more responsibilities that used to be performed by physicians. Vice versa physicians take on more administrative tasks from the nurses, such as drug order entry, as it is more time-efficient to do this directly during a consultation instead of telling the nurse to do it afterwards (van der Meijden et al., 2000).

Based on the literature findings described above, the following proposition is suggested:

Proposition 5: With the introduction of ICT the roles of physicians, patients and nurses in the network are expected to shift in terms of knowledge, tasks and responsibilities.

3.5 LITERARY AND THEORETICAL KEY FINDINGS

This section summarizes the relevant existing literature as well as the theoretical concepts described in order to establish a foundation for answering the two research questions. For recollecting purposes the research questions are presented again:

- 1. How is the doctor-patient relationship expected to be affected in terms of perceived quality, efficiency and safety (from a physician's point of view)?*

First, the physician-patient relationship has been presented and described through B2C relational characteristics. By investigating in how far the concepts of quality, efficiency and safety are affected through ICT implementation, it has been possible to hypothesize on the expected effects on the physician-patient relationship.

The second research question investigates the effects from a more theoretical angle:

- 2. How is the broader network of actors around the physician likely to be affected in terms of mobility and role shifting?*

To establish a framework and hypothesize on the perceived effects of ICT on the broader network of the physician, a network perspective has been assumed. Thus, an introduction to network theory in general and social networks in particular has been given, which has set the basis for investigating the aspects of mobility and role shifting in networks through ICT implementation.

The two broader questions have been considered in the light of previous research and have led to propositions, which represent a framework for the presentation of the empirical results and the analysis. The theoretical concepts used and a summary of the central findings in previous research are depicted in table 1.

Theoretical Concepts	Key Messages	Key Scholars
The Physician-Patient Relationship		
Framework - Perceived Quality of B2C Relationships	The Perceived quality depends on customer's: • Satisfaction • Commitment • Trust	Moliner et al. (2007)
Framework - Ideal Physician-Patient Relationship	The 5C's of an ideal relationship ⁹ : • Choice • Competence • Communication/Compassion • Continuity	Emanuel & Dubler (1995)
Effects of ICT on Quality	ICT brings about patient empowerment better cooperation between parties quality will improve Computer is a barrier in the consultation process and takes up time resources less direct interaction with the patient quality will diminish Better access to patient's medical information better diagnosis quality will improve	Mitchell & Sullivan, 2001 Johnson et al., 2005 Darr et al., 2003 Shekelle et al., 2006
Effects of ICT on Efficiency	Learning new skills requires additional time resources efficiency will diminish ICT brings reduction in double-testing and double-work efficiency will improve	Shekelle et al., 2006 Mitchell & Sullivan, 2001 Shapiro et al. 2007
Effects of ICT on Safety	Patients' privacy will suffer when delicate information can be more easily accessed safety will diminish Physician's professional privacy will suffer as patients gain access to the data safety will diminish	Darr et al. (2003) Delpierre et al. (2004)
Social Networks		
Social Network Theory	Networks consist of actors and ties which range from weak to strong depending on time spent in a relationship, the level of intensity as well as intimacy and the reciprocal services that determine a relationship	Granovetter, 1973 and 1983 Marsden and Campbell, 1984
ICT in Social Networks	Introduction of ICT can disrupt the persistent socio-technical interactions in a network	Harrison et al., 2007 van der Meijden et al., 2000
Concept of Mobility	Through better communication & knowledge exchange, networks are deepened and broadened hence mobility is increased Lack of standardization in communication favours bias & subjectivity of information ICT reduces this	Van der Meijden et al., 2000 Walsh, 2004 Stough, 2003
Concept of Role-Shifting	Evolution of empowered patient Increase in tasks of nurses and physicians	Van der Meijden et al., 2000 Walsh, 2004

Table 1: Overview and summary of theoretical concepts and previous research.

⁹ Adapted from the 6 C's framework

4 METHODS

4.1 METHOD CHOICE

The nature of the subject favours qualitative research methods as an in-depth and detailed study is required. Qualitative methods usually produce a wealth of detailed information about a small number of people and cases (Patton, 2002). The latter enables to capture varying experiences and perspectives as opposed to a quantitative study, which requires the use of standardized measures as the results need to fit into a limited number of predefined response categories (Yin, 2003).

According to Yin (2003) one should look at the following three categories in order to be able to choose the most appropriate research strategy:

- a. the nature of the research question,
- b. whether the relevant behavioural events can be manipulated, and
- c. whether the focus lies on a contemporary or a historical event.

In this case the two posed research question guiding this paper are of the *how*-format. *How*-questions serve to obtain a deeper understanding of the underlying processes of a particular event and deal with operational links needing to be traced over time rather than mere frequencies (Yin, 2003). Further, the relevant behavioural events studied, namely the relationship and the network development of a physician, could not be manipulated by the researchers. Lastly, the research focus is clearly on a contemporary event. Considering the above in relation to the three categories mentioned the case study method is seen as the most appropriate research strategy (Yin, 2003).

Within the different categories of case studies that Yin (2003) defined the case presented is of exploratory nature as an intervention occurs – the introduction of ICT – which does not have a clear, single set of outcomes. It is often the case that these studies do not have underlying propositions, but rather a purpose which nonetheless guides the research (Yin, 2003). This current case study, however, works with propositions to provide the research with necessary guiding. Since the field studied is rather broad and the introduction of ICT can impact the physician-patient relationship and the physician's network on different levels, it would be beyond the scope of this thesis to investigate them all. Hence, in order to remain focused it has become necessary to establish certain guidelines or criteria in the form of propositions.

An in-depth investigation was deemed important which is one reason for opting for a single case study design. Further, as the ICT system is implemented nationwide and every hospital will be working with standardised EHR, this study adopts a representative function, one of Yin's (2003) rationales for a single case study. In the process of determining the unit of analysis, more than one relevant choice emerged. Due to the two formulated research questions, not only is the physician-patient relationship investigated, but also the broader network of the physicians in the Estonian hospital setting is taken into consideration. The existence of multiple units of analysis creates subunits within the single case study, which renders this an embedded case design (Yin, 2003).

In summary, this thesis employs an explorative, single embedded case design in order to best capture the necessary depth of this study as well as its representative nature and multiple units of analysis.

4.2 DATA COLLECTION

4.2.1 SUBJECT CHOICE

The interviews were conducted in the two biggest cities in Estonia, Tartu and Tallinn. Hospitals in Estonia can be classified in a hierarchy, with regional hospitals at the highest level followed by central

hospitals. The higher the position the more varied and specific are the services provided. One of the three regional hospitals serving approximately 500,000 people is Tartu University Hospital that covers all specialized services for the southern part of Estonia. Tallinn Paediatric Hospital is the regional specialist care facility for children living in north and west Estonia (Koppel et al., 2008). East Tallinn Central Hospital is one of the four central hospitals servicing approximately 200,000 people in Tallinn and Harju County (Koppel et al., 2008).

There are several reasons why the three hospitals have been chosen. First of all, their size and scope allows drawing valid conclusions for the whole country. Second, all three have already adopted the ICT system to a certain extent. As the research concerns the implementation phase of the eHealth project, this is an important prerequisite. In addition, all hospitals have been working with computers in some extent before the current eHealth platform. For example, in Tartu University Clinic, a previous program has been in place, however voluntary for physicians to use, resulting in low utility levels. The major change for most institutions has been the scope of the medical documentation that the eHealth platform entails. These institutions used to complete a basic discharge summary¹⁰ in the computer as it also served as a base document for funding. However, the majority of documentation that makes up a patient's health record is still paper-based. As an exception, in East Tallinn Central Hospital, an in-house EHR inpatient module has already been implemented since 2003, where physicians perform similar tasks as with the new program. Thereby the difference brought about with connecting to the eHealth platform entails only a minor adoption in the inpatient setting.

In relation to the eHealth project, several institutions have had to modify the existing system, except for East Tallinn Central Hospital that has only yet to implement the outpatient module (See Appendix 1). However, as the process is ongoing, the paper records are still present and composed parallel to the EHR. Therefore at present, in the majority of departments, health records are produced double, both on paper and in the computer program.

4.2.2 INTERVIEW SAMPLE

The research is focusing on three different departments within the institutions, namely paediatrics, orthopaedics and internal medicine in order to get a broader sample. This was further enhanced by interviewing representatives from the same type of department in two hospitals. An important justification for the selection is the fact that regional and central hospitals have both inpatient and outpatient care formats. To determine the potential effects of ICT on the physician-patient relationship, it has been important to interview doctors that also conduct outpatient consultations where the usage of ICT occurs simultaneously with the physician-patient interaction.

On the level of individual interviewees, the selection has been based on several criteria. To enhance reliability physicians and nurses with several years of work experience as well as a certain level of ICT familiarity have been chosen. One could think that in order to investigate the physician-patient relationship from the physician's point of view it would be best to only interview physicians. Yet, nurses have been included for two major reasons. First, their contribution is significant in answering the second research question since the broader network of the physician also includes nurses with whom the physician maintains strong ties. Secondly, nurses also have direct contact with the patient and use ICT, both in the inpatient and outpatient settings. Table 2 gives an overview of the characteristics of the sample.

¹⁰ Discharge summaries conclude what is inserted in the EHR and designed to transfer data between the inpatient and outpatient setting (Rao et al., 2005).

	Tartu University Hospital	Tallinn Paediatric Hospital	East Tallinn Central Hospital
Paediatrics	Paediatrician	Paediatrician	
	Paediatric Nurse	Paediatric Nurse	
Orthopaedics	Orthopaedic Surgeon		Orthopaedic Surgeon
	Orthopaedic Nurse		Orthopaedic Nurse
Internal Medicine	Internist		Internist
	Internal Medicine Nurse		Internal Medicine Nurse

Table 2: Overview of hospitals and departments of the interviewees.

In addition to the core sample, an interview has been conducted with a member of the board of the Estonian eHealth Foundation. Although not included in the sample, the data enriches the research with relevant information on the implementation process and a different perspective on matters.

4.2.3 CASE STUDY EVIDENCE

According to Yin (2003) the possible sources of evidence for doing case studies include among others documentation, interviews, direct and participant observations. The research mainly concentrates on interviews as one of the most important sources for case study information (Yin, 2003).

It is important to keep an open mind while doing field research as different issues or angles may always arise. Yin (2003) suggests questions of an open-ended nature, through which one can obtain facts, personal opinions and beliefs on a topic. Following upon Yin's suggestion the data collection is supported by an interview guide with room for conversational inputs (see Appendix 3). This has provided guidance for the researchers throughout the interview process but also has given the interviewees freedom to further elaborate on a specific issue or add new dimensions to existing topics.

Out of 13 interviews conducted, 12 form the core of the research design, with two specialists and nurses from three different departments in three different hospitals. The physicians interviewed are all senior level specialists with considerable work experience ranging from 17-35 years in their field of expertise. The nurses are on average around 20 years younger than physicians with work experience ranging from 4-21 years (see Appendix 2).

The interviews with nurses range from 25 minutes up to 50 minutes, the interviews with physicians approximately from 50 minutes to 90 minutes. All nurses as well as almost all physicians use ICT daily for both within as well as outside their work setting. Hence all participants are similar in their respect to computer usage. However, the scope of usage appears to be higher for younger professionals.

Further, since both researchers have been present at all interviews, one could always focus on the interview partner as the other could make observations of the surroundings and the processes, which form the third source of evidence, the direct observation. The observations are of casual nature but nonetheless insightful. As Yin (2003) already points out, especially if a case study deals with a new technology, observations of the technology at work are invaluable for comprehending the actual uses of it.

4.3 RESEARCH QUALITY

Yin (2003) suggests following up on four criteria in order to ensure the required quality of the research. Those are reliability, internal validity, external validity, and construct validity.

4.3.1 RELIABILITY

By checking for reliability one ensures that if the same case study was to be conducted again by a different researcher, he should obtain the same results and findings. If this is the case, errors and biases are reduced in a study (Yin, 2003).

Here, the reliability of the case study stems from the strict following of case study principles as suggested by Stuart et al. (2002). Every step of the process as well as the outcomes has been documented, which is why a certain level of reliability can be conceded to the study.

However, there are factors that could influence the reliability negatively and therefore should be taken into consideration. Firstly, all interviews have been conducted in Estonian and subsequently translated into English by one of the researchers. Clearly, this is not the most optimal way of researching, however deemed necessary in this case, since most interviewees do not feel comfortable answering in English. The potential threat with translation is to lose certain notions. However, the loss of data quality and depth would have been bigger, if one had insisted on conducting the interviews in English. Second, as the researcher conducting the interviews is a native Estonian, she might thus have been biased due to ethnocentrism. This threat has been accounted for by always having both researchers present while conducting the interviews. Further, both researchers separately have screened and analyzed the translated data to improve reliability.

In conclusion, reliability is a possible shortcoming of this study, which has been attempted to account for with various means in scope.

4.3.2 VALIDITY

In order to establish construct validity, Yin (2003) suggests using multiple sources of evidence. Literature also refers to this technique as data triangulation (Mathison, 1988). This technique has been followed by not only conducting in-depth interviews but also using documentation as well as direct observations. Clearly interviews are the predominant source of evidence, which could give room for criticism. However, if one considers the data triangulation example of Mathison (1988) then this proposition is fulfilled, as she suggests including more than one individual as a source to achieve sufficient validity. In addition, the sources have been reviewed and validated. In summary, construct validity is established for this thesis.

Internal validity is mainly a concern when applying explanatory case studies, which investigate the causal relationships of two events (Yin, 2003). This is not the case here. However, internal validity in a broader sense can also refer to the problem of making inferences in general (Yin, 2003). Every time an event cannot be directly observed the investigator infers. This can lead to bias and partially wrong conclusions. This problem has been tackled by letting both researchers independently analyze and interpret the data, a practice that is called investigator triangulation known to enhance internal validity (Mathison, 1988).

External validity refers to the extent to which a study's findings are representative beyond the existing case study (Yin, 2003). That is the most common criticism of the case study method in general in which sense this thesis is not above reproach, either. Yin (2003) explains this common criticism with a diverging understanding of the concept of generalization. Instead of looking for a representative case study, this thesis focuses on generalizing findings to a broader theory. Obviously the situations and experiences described in Estonia cannot be identical to those that will be present in other EU countries. However, the case at hand gives broader perspectives on the obstacles countries can face. In short, external validity is obviously restricted due to the nature of the study, but nonetheless useful lessons can be derived.

5 RESULTS

The empirical results will be presented as following. The first section sheds light on the case study setting which the researchers observed. This includes a brief description of each department and institution with characteristics specific to the field of medicine. Further, as the process of modifying existing information systems and joining the eHealth platform vary in each case, it will be accounted for.

The second section presents the empirical results in a case study format reflecting the propositions posed in section 3. The first research question was posed to inquire how the physician-patient relationship is expected to be affected through the implementation of the eHealth project through the perceptions of the medical personnel on quality, efficiency and safety of healthcare as identified by previous literature. The second research question dealing with the broader network around the physician is used as a basis for reflecting upon the perceptions on mobility and role shifting.

5.1 CASE STUDY SETTING

5.1.1 PAEDIATRICS

The paediatric setting is fairly unique since the patients are minors. This brings about a situation where the patient and their parents together form the counterpart to the doctor in the physician-patient relationship. This presupposes a very specific interaction type in which the clinical examination will be subjected to the immediate patient while most of the knowledge exchange will take place between the doctor and the parents.

It became obvious when observing the physicians in the interview process that the position entails a certain ability to interact with children. They expressed their opinions somewhat differently from others. Both physicians had very subtle manners, spoke in a calm but reassuring voice, and expressed their emotions with obvious sincerity. Their regular routine involved working in the inpatient setting with ward patients, interacting with nurses and fellow physicians. Once or twice a week they had outpatient consultations in cooperation with a nurse. The patients included both first time encounters as well as repeat visitors as the conditions demanded some follow-up care. Therefore, physicians were somewhat familiar with their patients and their parents, entailing a more intimate relation. The physicians stood apart from the rest of the sample by having on-call shifts in the emergency care entailing a completely different type of relationship since the patients were mostly first time visitors.

In both hospitals the EHR had been adopted the earliest of all the departments. In Tallinn, the physicians and nurses had been extensively using computers and the EHR in both the inpatient and outpatient setting for approximately a year. In Tartu, the paediatric clinic was one of the pilots for the new working modules, as the EHR was added to the work process in the spring of 2008. In terms of technology competence the physicians were rather similar, although neither of them was yet completely familiar with the comprehensive EHR.

5.1.2 INTERNAL MEDICINE

Internal medicine encompasses several areas of medical care of adults. The interviews were made in the fields of nephrology in Tartu and endocrinology in Tallinn. As both departments are non-surgical, physicians spend more time interacting with patients and consulting them. The majority of patients have chronic illnesses such as diabetes or kidney failure and thereby form a closer long-term relationship with their physicians whom they very often meet on a regular basis. There is no clear age segment within the patients as they range from people in their 20s to seniors. The regular workday for physicians included in-ward consultations and procedures (e.g. dialysis) throughout which the

physician was teaching the patient about the condition and how to ultimately manage the treatment himself. As the majority of patients were known, there was no traditional outpatient consultation as patients were casually invited to the ward to receive consultation.

The fact that the physicians spent more time interacting with their patients came across through the interview process. The physicians in these departments were very open to discussion as it seemed to be a rather big part of their professional lives. For example, in making sure that his points come across, the physician often used simple, real life examples to illustrate his course of thought. The physician was used to simplifying medical reasoning to make it understandable for the average patient without complicated medical terminology. Moreover, as physicians spent more time teaching the patient they were rather patient in manner.

In Tartu the new, more thorough EHR programs were put into use in the end of August in inpatient setting and a couple of weeks before the interview in the outpatient setting. Due to both the seniority of the physician in Tartu and his limited experience with EHR, the physicians' technology competence levels were different. He was not at all comfortable with the new software and found the training insufficient. In Tallinn the in-house program had been in place since 2003 which entailed only minor technical changes with the future interoperable system. The training given to the physician dealt with mere security issues related to the use of the ID card. She was also more favourable towards the EHR system and saw fewer controversies with the implementation.

5.1.3 ORTHOPAEDICS

Orthopaedics is a surgical department dealing with the diagnosis and treatment of various bone and joint disorders. The processes are very much designed around the surgery which takes up most of the physicians' time. The patients in general can be rather older as many of the conditions are related to the "wearing off" of joints. However, certain percentages of other age groups are also represented.

The characteristics of a physician-patient relationship in the orthopaedics setting dealt with the limited interaction between the patient and the physician who was replaced by other personnel such as nurses, care-takers and physiotherapists. The physician usually met the patient in the outpatient consultation process where the patient was examined, diagnosed and often put on the waiting list for the surgery. When the patient was admitted to the ward, prior to surgery he was received by nurses, and perhaps an intern to explain and answer all relevant questions. Post-operatively, the physician met the patient briefly during the morning visit around the ward, or when complications had arisen. The physician in Tallinn explained the situation:

"The patient needs to understand that our team is there to give him the service not me personally. [...] They expect me to be there at each step of the time but it doesn't work like that".

Both departments were ready to forward the discharge summaries to the nationwide eHealth platform by the end of October (2008). For Tallinn, the transition did not entail a major change in the technological solution, whereas, for Tartu, the former system was not utilised by physicians. This however, was less apparent in the physicians' perceptions as they both lacked experience with EHR. Since neither utilised the EHR in the outpatient setting and the one physician utilising the inpatient EHR did so to a limited extent as all the data was inserted by the department secretary based on the physicians' recording. This was said to be a common solution for better managing physicians' time.

5.2 THE CASE STUDY

5.2.1 QUALITY

PATIENT EMPOWERMENT

The physicians and nurses were asked to express their opinion in relation to the role of ICT solutions in increasing the knowledge of patients about their health condition, thereby making them more equal partners in the physician-patient relationship.

The physicians acknowledged that patient empowerment in general was important in achieving better treatment outcomes. According to one interviewee, patient knowledge had direct effect on the quality of care since it influenced patient's level of involvement in his treatment process.

Physician 5: *"A patient needs to be involved in the treatment process. It's not possible that a doctor just recites orders and prohibitions to him. [...] In general you can achieve a lot by educating the patient."*

However, several physicians and especially nurses also brought forward patients' knowledge levels as a major problem in present day healthcare. One nurse explained that people considered going to the doctor only as a last resort when it was very often too late. Increasingly among elderly patients, the traditional physician-patient relationship was well embedded which meant that patients considered themselves as mere decision subjects rather than cooperative partners.

Nurse 4: *"We increasingly keep telling our patients: 'You have to understand that WE operate on you but the rest depends on YOU.' [...] They need to understand that it's their health not mine."*

The empirical results were mixed as opinions largely could be divided in three different categories. The first segment considered the EU strategic goal not to be connected to the fact that patients could access their discharge summaries over the Internet. According to this group of interviewees, patient knowledge and empowerment depended on other aspects such as one's views on the world, mentality and general interest in their own health. The people that expressed interest in acquiring information about their conditions and treatment would do so with or without the interoperable platform.

Nurse 1: *"The idea that it enables the patient to think more about his health and lead a healthier life, I don't believe. This is still very individual."*

Another major reason why physicians had little faith in the accessibility of discharge summaries to have an effect on one's knowledge levels was the notion that the data presented there would have little value to the general public. They argued that in order to make something out of the data, one needed to look at things in dynamics as well as possess the ability to *"see the bigger picture"*. According to several interviewees this would require relevant knowledge as well as medical education.

Physician 3: *"We used to give patients their x-rays. Then they looked at them, flipped them around, and maybe even showed them to their relatives. I mean it's pointless, a complete waste of resources!"*

Nurses agreed with the physicians in this matter concluding that one thing would be the ability to access the relevant data but a completely another issue would be how one made any sense out of it.

Nurse 4: *"I tell all my patients who want to know absolutely everything about the operation: 'You know, they study 14 years to do these things, you cannot possibly know every little detail about it'"*

Moreover, some argued that it would make the patient more uncertain about their condition rather than improve their knowledge.

Physician 3: *“For example, you don’t want to see when somebody is working on the wing of the plane just before takeoff, albeit it being a very professional approach to the matter. It just creates fear and anxiety in you.”*

One physician considered patients using the possibility to access their discharge summaries as a signal of distrust on the patients’ side:

Physician 6: *“I don’t think they [the patients] will start using the Internet and looking up their EHR, I think they will trust the doctor.”*

Another physician went a step further in terms of potential effects on patient empowerment. According to her, the more information was made available to people the less people would bother to look up the relevant data:

Physician 1: *“I actually think there is a generation of people now who think a healthcare facility is like a bank office: I go in there, sit down, they offer me candy and then tell me everything.”*

The second opinion shared by several interviewees was one of limited optimism. According to them, patient empowerment would be an achievable goal through the interoperable platform. As one physician in orthopaedics put it:

Physician 4: *“Maybe if he sees that his haemoglobin is low that leads him to think that he needs to check it more often or inquire into the possible reasons”.*

However, the major limitation to achieving this goal in the recent future, according to the interviewees, would be the current patient demographics. More specifically patients’ age would be a determinant of their utilisation of the eHealth platform. Older generation aged 60-80 would not benefit from the project as they were unfamiliar with ICT. The latter was univocally expressed in the orthopaedic department:

Nurse 4: *“You really won’t change the older generation anymore. [...] For our patients it makes no difference, they are way too old.”*

Still, the interviewees had hopes for the future as younger patients would be taking advantage of such opportunities.

The third, rather small proportion of professionals expressed true belief in the achievement of the EU goals in relation to patient empowerment. According to the nurse in nephrology, the interoperable eHealth platform should increase the knowledge of patients, especially for chronic patients. She believed that *“quite many of the patients that have a chance to use a computer shall do that. This treatment is part of their daily lives; they have to care about it.”*

PHYSICIAN-PATIENT INTERACTION

All the physicians involved spent some days during the week in the outpatient consultation. Physicians had on average 20-30 minutes per patient. However, not all of them were presently inserting data into the EHR in their outpatient consultation. Those that did not have the experience were asked to speculate on how their consultation process would look like and evaluate the potential differences between the two states of action.

Both paediatricians agreed that the EHR as such took time away from face-to-face interactions with the patients. It became clear in the course of the interview that the physicians were struggling to work

with the EHR and examine the patient at the same time. They differed in their approaches to the outpatient consultation process. One physician attempted to divide the time between interacting with the patient and inserting necessary information in the EHR. She felt that the eye-contact in the relationship had diminished which was according to her foremost relevant for the patient.

Physician 1: *“I think the patient expects me to have time to look him in the eye”.*

However, the other paediatrician admitted to needing a close personal contact with the patient since it helped her to get a *“better sense of the patient”*. She said that she would get a better connection with the patient and his situation thereby being able to treat him better.

She did not like the fact that she needed to simultaneously operate the EHR while the patient *“just sits there doing nothing”*. As a result, she took time out of her regular work to complete the EHR after the consultation had ended altogether, thereby *“leaving the intern to cover for me in the ward”*. She also feared that the distance between the physician and the patient would increase in the future, which would distort the physician-patient relationship.

The internal medicine representative in Tallinn did not have a traditional outpatient consultation, whereas the patients that she consulted during the day were a mixture of in- and outpatients that came in for tests administered by the physician. The physician had not included the new EHR in the consultation process but did all the insertions later. She said: *“When the patient is here, I try not to write anything”*.

In Tartu the physician was currently working with the EHR and the patient parallel in the consultation process as it would otherwise take up too much time. The senior physician had an intern that was in charge of recording data in the EHR while he interacted with the patient. The senior physician acknowledged the importance of face-to-face interaction on patient satisfaction and overall quality of healthcare:

Physician 6: *“I’m really satisfied that I can talk to the patient all the time and you know, patients love that.”*

In orthopaedics EHR was not utilized in the outpatient setting. In both cases, the physicians used computer during the consultation process for retrieving x-rays from the interoperable database and in Tallinn also previous inpatient discharge summaries within the institution. Physicians already felt it to be a disruption to the consultation process:

Physician 4: *“Even now when I have to search for the x-ray, I put in the request and then quickly turn back to the patient to try and get his eye contact [...] this is extremely important, that is how you get a good relationship with your patient.”*

When asked how it would be like to work with the EHR in outpatient consultation the physician was convinced that it would be extremely unpleasant for the patient who would subsequently feel neglected. The physician illustrated the concept:

Physician 4: *“It seems that he [the physician] is in another world, he’s not listening to my story and my condition, the ache in my pinkie toe which is so important to me”*

Moreover, the physician brought forward the importance of merely listening to the patients’ concerns, and was convinced that it had a direct effect on improving their condition: *“in some cases, their health instantly improves you know”*.

The nurses expressed similar notions that both the nurses as well as doctors shall have less time to deal with the patient as the computer would take up more of their time. They expressed concern that

the new system would not benefit either side as the patient could not get proper contact with the physician.

PEER INTERACTION AND ACCESSIBILITY OF INFORMATION

The beneficial effect on peer interaction and better accessibility of relevant information was almost univocally pointed out by physicians and nurses. It was also one of the main benefits seen with the future interoperable platform.

In terms of the information accessibility, the effect was considered both in the inpatient as well as outpatient setting. In the inpatient setting, physicians believed that the system would benefit those incapable of giving out relevant information. Physicians as well as nurses believed that in future it would be possible to retrieve information about a patient more operatively which in the end would result in a better treatment outcome. The eHealth platform could be expected to be beneficial in the emergency care where it was especially important to know people's background.

Nurse 1: *"If I was a patient and brought randomly to a hospital somewhere and they actually have all the information about me, not that I go there as a clean slate and I have to start proving this and that."*

In short, the fact that information would travel everywhere with the patient was mentioned by several physicians as well as nurses as a strong qualitative improvement to healthcare in future.

Another setting where the accessibility of information was brought forward as a strong future benefit was the outpatient consultation. Internal care physicians emphasised the fact that it was increasingly important to know the medical history of chronically ill patients as the decisions made by previous physicians would have a direct effect on the internal medicine professional's treatment choices. As a result, it would have a direct effect on the quality of the overall treatment.

The majority of physicians and nurses agreed that the eHealth platform would provide the physician with a better knowledge of what treatment or testing the patient had received in other institutions:

Nurse 3: *"We shall know what happens before and after the hospital not like now when we only know what happens in the hospital."*

Physicians argued that they would be better able to optimise their time when they could easily get all the information about the patient's medical history. Moreover, since the data inserted was expected to be clearer and more concise than hand-written documentation, the work of doctors and nurses would be much easier.

Physician 3: *"[...] of course, the less writing there is the better since nobody understands written text. Now it's much clearer."*

Another physician brought out the fact that presently, patients were the primary source for retrieving the anamnesis. However, patients, especially elderly people very often forgot to mention their previous conditions or merely forgot that they took place altogether. This was very clearly expressed by a physician in internal medicine as: *"[...] the patient, no, the patient knows nothing!"*

In relation to the latter, some argued that the patient should not be expected to know his previous medical history in detail as this information was up to the professional medical personnel to retrieve. However, a good example of the alternative method of retrieving previous medical information was expressed by another physician:

Physician 5: *"If I need to get some information from the Tartu University Clinic, I always have the hardest time. It takes a lot of effort to call the department there and convince them of*

who I am and where do I call from and why do I need to have the patient's medical information. It's really not properly coordinated."

In this sense several physicians anticipated that through eHealth, they would be able to have a much quicker overview of the patient. This would be beneficial according to a paediatrician since: *"[...] the patient also gets the diagnosis quicker and it's much better for me as well to develop my line of reasoning."*

Peer interaction was also a major future benefit that both physicians and nurses expected to result from the interoperable platform. The interaction had not been expressed through an increase of direct communication with other physicians as much as an increase in the direct movement of information between professionals. Apparently a lot of information was lost because of the noise that was inevitably created. Interviewees especially brought out the interaction between the primary level general physicians and specialists.

Nurse 4: *"We assign a treatment for the patient and by the time he gets to the primary care doctor he has already forgotten half of it. He then takes some words out of context and just puts them in a sentence. For example, today this old lady asked me after her consultation with the physician: "So what is the doctor going to do to me again, is he going to replace my toes or...?""*

Some physicians saw a good opportunity in the future for getting feedback on the patients' ongoing care, particularly with chronic diseases. In addition, the nationwide eHealth platform was expected to increase peer supervision as mistakes would be increasingly visible and thereby could be dealt with.

Physician 4: *"It [eHealth platform] is a good thing when you have a good group of colleagues in the field. When there's somebody doing an awful job in some small hospital, you can react right away."*

5.2.2 EFFICIENCY

ADDITIONAL TIME COMMITMENTS

Although the interoperable eHealth platform was in general agreed to be a positive development, several physicians and nurses expressed concern on the physician-patient relationship in relation to the additional time commitments that the new system brought about.

The resource commitment was related to different dimensions. Some interviewees brought out that since all documentation was double, both in the electronic as well as paper based form, it would take double time to complete them both. As several believed, the paper would not disappear in the future. As a result, double work would remain a part of physicians' lives demanding additional time commitments. On the contrary, some believed that EHR would make the life easier for physicians in the future since writing takes up more time than typing. This however, was expressed mainly by a couple of physicians that had been using EHR for a longer period. In addition, they stood out from the others with more frequent computer usage outside the work setting.

The majority believed that the inclusion of ICT in the health service provision brought about a thorough change through the necessity to acquire new skills. The medical personnel would have less time to spend on patients as the computer would take up an increasing amount of one's time resources. The opinions of those that started using the comprehensive EHR program more recently did not significantly vary from that of the others. One senior physician expressed her challenges when adapting to the new program:

Physician 2: *“The real work began when we started using it [EHR], and then this and that button didn’t work. One EHR took an hour to complete; my eyes welled up when I had to deal with all that.”*

There was a difference in the opinions when asked to speculate on the future state of affairs. On one hand, some physicians believed that the additional time requirements would remain regardless, as the older generation of medical personnel would not be able to adapt completely.

Physician 6: *“The loss of time very likely stays, since somebody my age cannot type like somebody your age (pointing at the researcher).”*

On the other hand, the more general belief was that the additional time commitments needed would be only in the implementation phase. As people would get more used to the system, there would be little difference in the time it would take for completing a patient’s health record compared to the former model.

Physician 2: *“I try and talk with the patient real quick because all the other things take up so much time, [...] but I think it’ll get better.”*

Another physician agreed that the future would bring about an increase in efficiency only if the physician could work with the EHR as little as possible. He argued that if the majority of work was channelled to the medium level medical personnel (e.g. medical secretaries), the physicians would be able to consult more patients:

Physician 4: *“If the doctor could only think and give orders, then we could have one patient in every 10 minutes maybe, and turnover would go up, maybe do 4-5 operations a day.”*

In conclusion, the general notion was expressed that in future, the interoperable eHealth platform in combination with an extensive use of EHR in the healthcare provision process would entail a significant adaption on behalf of the medical personnel. In general, the additional time it would take to familiarise oneself with new technology was considered to be temporary.

COST SAVINGS

The empirical results in relation to potential cost savings as a result of the eHealth platform were rather limited. Only perhaps half the respondents expressed any opinion in relation to this subject. Since the respondents were not presented explicit questions concerning potential effects on the cost of care, the results are based on only the physicians and nurses that mentioned it.

The major positive effect on efficiency that several physicians anticipated was that achieved through reduction of double work. This entailed two inherent aspects. One was that patients would find the right physician for their condition more easily, eliminating the case where a patient would be directed from specialist to specialist without a solution. The other was related to the fact that since the discharge summaries also included test formerly made in other hospitals, the new platform would bring about a decrease in double testing.

Nurse 5: *“The primary care physician sends the patient to our consultation, but he has lost the piece of paper with the test results. Here we do the same tests for the same person again, complete nonsense!”*

However, one physician noted that since the quality levels of laboratories in Tallinn or Tartu as opposed to smaller regional hospitals differed, they very often redid the tests in the major hospitals.

Physician 1: *“We just don’t trust their results. If we think they should really look different, then we just redo them.”*

Finally, out of the respondents that mentioned costs in relation to efficiency, one opinion expressed was that it was unrealistic to expect any kind of resource optimisation from the interoperable platform. In short, out of the people mentioning cost factors only half expected a certain decline and others did not consider costs to be affected at all.

5.2.3 SAFETY

Safety was one of the most frequently mentioned aspects of the new eHealth platform. This was mentioned in relation to two broader areas. First, the increased risk of compromising delicate patient data was a commonly shared view among nurses, however, not with physicians. Mostly nurses expressed concern that unauthorised people would be able to hack into the database and expose peoples' health related information. One nurse that had been working with the in-house EHR since 2003 described a specific incident in their facility:

Nurse 4: "We've had a case here in this building when some employee looked at another employee's EHR, pregnancy I think, and it came out and she was politely asked to leave."

However, most nurses saw the threat coming from outside the hospital setting in the form of professional hackers. Some did reason that such a risk was equally present with paper-based records although the concluding notion was that patient safety would decrease in future due to increased exposure of health related data.

It was mentioned by both physicians and nurses that one of the major fears in adapting to the EHR, with or without the interoperable platform, was the fact that IT would fail to perform as expected. More specifically, IT related troubles, such as server breakdowns and data disappearing was frequently mentioned by the interviewees.

Physician 1: "When the server is down, the work stops completely. We have had that several times in the emergency consultation."

Secondly, a more profound opinion was voiced especially among physicians in terms of negative effects on physicians' safety. The idea most frequently raised was that giving patients' access to their medical information would bring about an increase in misunderstandings and uncertainty, up until litigation. One notion was that if patients increasingly looked at their discharge summaries, they would do so since they distrusted their physician.

Physician 3: "I don't like this unhealthy atmosphere, the constant suspicion, somebody is always looking."

In relation to the above, as patients would become increasingly interested in their medical information as a way of controlling the physicians' work, they would be unable to objectively evaluate the data. This would lead them to misinterpret the information which could be used to incriminate the physician.

Physician 6: "One thing is seeing your data and all the numbers and another thing is how you actually understand them. Medicine is very complicated, it is not for fun that you study 10-12 years to become a doctor."

Therefore, several physicians feared that the interoperable eHealth platform would increase the number of litigation cases in medicine as people would be able to trace back medical decisions for years as well as access information beyond their understanding. One physician speculated that the portal would result in an immense quantity of questions targeted at him from the patients. He expressed his attitude to the latter as following:

Physician 6: *“Then I will tell those patients: “I have better things to do. I treated you, if you’re not satisfied then sue me!”*

Some physicians did see the positive side of the matter in the fact that physicians would have to discipline themselves to produce higher quality material. To elaborate, as patient would start going over the data with a fine-toothed comb, physicians would have to pay closer attention to what they were typing. This in turn would increase the clarity of the discharge summaries.

However, when the interviewees were asked if they had any strong feelings in relation to their information being increasingly visible for the patients, the majority answered negatively. It appeared that the medical personnel did not believe the text they inserted would become under scrutiny per se since they had already been giving the patient similar information.

Thirdly, physicians rarely considered the reduction of adverse events as a potential result in including ICT in healthcare service provision. However, one physician did believe that critical information, such as allergies, would be more visible in the EHR. Still she concluded that the effect would be realised provided that the human aspect would not fail:

Physician 1: *“If they cannot be bothered to insert it [the information] in the county hospital, then there’s no effect.”*

However, the problem expressed by one physician actually proposed an increase of adverse events in the form of wrongful data being recorded in the EHR. This notion came through when the physician wanted to show the researchers an example EHR, for which he chose a personal acquaintance of his. When demonstrating all the previous discharge summaries that were available about the patient through the in-house program, it appeared that the patient had been wrongfully assigned a diagnosis. The mistake was apparent since it was a male patient with a gynaecological diagnosis, rather delicate in nature. The physician concluded:

Physician 3: *“This is a very characteristic example how you can really put your foot in it with eHealth. If you make a small mistake here it quickly turns into a big one. On paper this would never happen since you think when you write a diagnosis. This is just a click made incorrectly somewhere.”*

5.2.4 THE NETWORK

The results concerning the overall network around doctors and the potential effects that the implementation of an interoperable eHealth platform would bring forth were rather varied. The guiding questions used in the interviews were derived from the two propositions from the theoretical framework. However, often interviewees had already answered questions in the first part of the interview in which case the question was omitted.

First off, the interviewees were shown the image with the physician’s micro network in a hospital where they were asked to comment on the different actors represented in the network. In addition, physicians and nurses were asked to evaluate the construction of the network and if applicable pose alternatives to the proposed network.

All in all, the majority of interviewees agreed with the current network structure. Several nurses added that in their particular setting, dealing with either children or elderly patients, support actors, such as physiologists and social workers were sometimes present. Interviewees also highlighted the role of caretakers in the inpatient setting. One physician argued that caretakers, their attitude and skills played a big part in patients’ satisfaction with the overall service provision.

Physician 6: *“Every day the caretakers interact with patients, the quality of their behaviour is extremely important.”*

In addition, another physician brought out the role that media and patient organisations played in shaping patients’ perceptions of medical personnel as well as physicians’ interactions with their patients.

NETWORK MOBILITY

The physicians were asked to describe their interactions with the different actors to determine the strong and weak ties in their respective networks. However, nurses were asked to take the physicians’ perspective as to determine any potential differences with the interaction patterns from the central actor’s perspective and that of someone external.

In the paediatric and internal medicine settings the physicians and nurses identified the strongest ties with the patients and their families. The interesting fact that was brought out in paediatrics was that the physician rarely considered only the patient as a counterpart, but rather the patient and the parents formed one actor in the network. Both physicians concluded that they mainly exchanged relevant information with the parents, whereas the patient was the recipient of the treatment. The physician in the internal medicine setting brought out the need to teach the relatives of chronic patients that often initially needed help with their treatments. Still both nurses and doctors considered the primary relationship for the physician to be that with the patient.

In orthopaedics a characteristic difference compared to the other settings was that physicians did not consider their interactions with the patient as primary. Nonetheless, nurses still put the physician patient relationship first.

Physician 4: *“I think I interact much more with colleagues and nurses than with patients in the ward.”*

Physicians generally considered their most important ties to be with other colleagues and nurses. However there was a difference in these interactions. While with nurses, physicians communicated perhaps more often, they did so on a different knowledge-sharing level than with other physicians.

Physician 3: *“You ask for advice from colleagues but you interact with nurses on a simpler level, more everyday issues.”*

There was no univocal opinion about the importance of colleagues across the departments. Several physicians ranked colleagues as the second most important interaction in their profession. However, others disagreed. Since Tallinn Paediatric Hospital did not function as a teaching hospital, the doctors did not go on a joint round in the morning to discuss the patients’ conditions but rather *“did their own thing”*. However, the colleagues were still considered important since major treatment decisions were done collectively.

The third strong tie brought out was that with nurses that mainly carried out physicians’ tasks with the patient. However, nurses considered their relationship with physicians to be more important than that between a doctor and his colleagues.

The actors that the physicians considered least important correlated across all three settings. Both physicians as well as nurses agreed that pharmaceutical representatives, government institutions as well as IT-specialists had weak ties with physicians. The pharmaceutical company representatives were explicitly mentioned as the least relevant of the network actors presented. Physicians pointed out the importance of caretakers in the overall healthcare service process. Still, they considered caretakers

as weak ties as most physicians failed to even mention them when rating one's relational ties in the network.

In conclusion, physicians' strong ties in the micro network were formed with patients and their relatives, colleagues and nurses. In contrast, physicians had weak ties with government institutions, caretakers as well as IT-specialists. The pharmaceutical company representatives were said to have minimal contact with physicians.

The outcomes presented earlier suggest that the ICT platform is expected to enhance peer-to-peer communication through better exchange of information. Collaboration is reported to be facilitated through better peer supervision. However, physicians did not consider consulting their peers at a distance a potential benefit of the interoperable platform. The collaboration that was more often considered was indirect, through providing a colleague with high quality medical data and in this sense facilitating the work of the proceeding physician.

Still some interviewees brought out a notion that the face-to-face and via telephone interaction with colleagues would rather diminish and take a more virtual form. This concerned fellow physicians outside the immediate departments setting. However, the one physician seemed to consider it a negative rather than positive result.

Physician 2: *"I think the verbal and physical interaction will become less and less. Soon, I think we cannot emphatically interact with people anymore."*

With immediate fellows, physicians expect to have a similar relationship in the future.

Accessibility to the information was identified as a major benefit of the new interoperable platform and a significant change with the previous status quo. The accessibility was mentioned both in terms of physicians being able to access more and better quality information, as well as patients gaining better access to their information without geographical constraints. In the first aspect, as the information would move increasingly together with the patient, physicians would become less dependent in searching information from different locations. In relation to patients, they would be able to have the same information as before. However, gathering that information from various locations would not be necessary anymore.

ROLE SHIFTS IN NETWORKS

The interviewees were asked to speculate on whether the introduction of the interoperable eHealth platform would bring about a change in the existing roles of the actors within the physician's micro network.

The empirics brought forward an anticipated increase in physicians' workload. More specifically, some physicians believed that with the new comprehensive system, they would in the future be taking over tasks from other actors in the healthcare provision network. It was very well expressed by one interviewee:

Physician 1: *"I feel that I do a lot of registration and secretary work while I could be doing a lot more physician's work."*

In addition, the physician reported to be doing increasingly some of the tasks that used to be performed by the nurse, such as ordering tests through the EHR. Similarly nurses believed there to be an increase in the workload for both physicians as well as themselves. However, there were physicians who were convinced that the new system would render their jobs easier than before.

Some physicians believed that there would be no major shift in patients' knowledge since they had always had the right to access their paper-based records. According to several physicians, ICT would

not alter the network by rendering the patient a more equal counterpart in the interaction. According to the data reported earlier, patient empowerment was considered to be a likely result by some physicians while others doubted it.

The majority of physicians and nurses still believed that they would have face-to-face interaction with their patients as a primary source for taking the anamnesis rather than using the eHealth platform. However, there were those who believed that direct interaction with the patient would diminish which was seen to be negative foremost for the patient.

Physician 2: *“I shouldn’t really talk with the patient anymore, I just type the text and tell him “Just go and see it at home”.”*

However, some physicians believed that the relatives and family members of their patients would be more eager to use the new eHealth platform, thereby becoming more involved in the treatment process. This would mean that they would become more important for the physician as a source of information as well as an informed counterpart.

One major notion across physicians and nurses was the increasing role of IT-specialists in the network. After the implementation of ICT in the network their importance had increased for both physicians and nurses. The IT specialists had become a valuable source of information, that enabled medical personnel perform their core tasks better.

Physician 6: *“Since these computers are as they are, the IT specialists are the ones that regularly receive calls from me.”*

The interviewees did not think that the introduction of ICT in the form of the interoperable eHealth portal would affect their existing relations with pharmaceutical industry representatives. However, one physician brought out the increasing role of the Healthcare Fund that was more able to monitor the use of finances in healthcare.

Physician 3: *“They can check up on the doctors, see if things have been done how they want things to be done.”*

The physician could not evaluate this new role as either being positive or negative but just a difference to the former situation.

6 ANALYSIS AND DISCUSSION

The upcoming section is three-folded. In the first part the posed propositions are briefly considered through examining and combining the results. In the second part, the analysis goes further by combining the *how* and the *why* aspects of each research question. Thereby, it is aimed to achieve a more thorough understanding of the anticipated changes and their underlying causes. The third step takes the analysis even further by investigating the interrelatedness of the two research questions. In how far are the effects on the network and on the relationship connected or reciprocal? This will enable understanding of the impacts that the introduction of ICT can bring about on a more abstract level.

It was chosen to combine analysis and discussion into one section to be able to consequently discuss whatever the analysis brings forward and to streamline the structure of the thesis.

6.1 REFLECTIONS ON THE PROPOSITIONS

In relation to the first research question, the results give relevant insights into the dimensions of quality, efficiency and safety in healthcare. It is possible to derive sound conclusions and answer the formerly derived propositions.

According to the EU i2010 strategy as well as previous research, ICT in healthcare can empower citizens to become actively involved in managing their own health as well as improve the understandings of treatment processes (European Commission Information Society and Media, 2006a; Berg, 2002). The empirical results show both, positive and negative opinions in whether the new interoperable eHealth platform brings about an increase in patient empowerment. Though both extremes exist among the results, the majority believes empowerment to be achieved with a new, more computer savvy generation of patients. This leads to conclude that proposition 1a can be accepted but not without reservation.

The empirical results correlate with the notions expressed in previous literature that physicians perceive their direct interaction with patients to diminish with the implementation of the eHealth project (Delpierre et al., 2004; Mitchell & Sullivan, 2001). They consider the direct interaction to be an important component of patient satisfaction as concluded by Johnson et al. (2005), which can be connected to the quality of healthcare. Therefore proposition 1b can be accepted that quality is perceived to be negatively affected.

The interviewees expressed a strong notion that the ICT will provide better access to relevant patient information in the future. This relates to previous literature as physicians perceive better knowledge to influence the quality of their medical decisions and subsequently affect the quality of the treatment outcome (Mechanic, 2008; Darr et al., 2003; Delpierre et al., 2004; Shekelle et al., 2006). Kalle (2008) identified a lack of information flow between primary and secondary care physicians. Results agree with prior research that peer interaction is expected to increase through better flow of information but also add the dimensions of increased feedback and peer supervision. As these all contribute to the increase in healthcare quality, proposition 1c can be accepted.

The empirics correlate with the former research that the overall effect on quality will be both positive and negative with a direct consequence on the physician-patient relationship. Hence, proposition 1 can be accepted.

Proposition 1: The physician-patient relationship is expected to be both, positively and negatively affected due to dual effect on quality with the implementation of an eHealth platform

The empirical results confirm that the current phase in the implementation process demands increasingly additional time commitments from physicians. This relates to the notion put forth in prior research with respect to both, additional tasks and the need to learn to operate new technology (Shekelle et al., 2006; Mitchell & Sullivan, 2001). Although some expect them to be permanent, the majority agrees with Snyder et al. (2005) that as physicians become more acquainted with the new technology, it will demand less additional time. Therefore proposition 2a can be accepted.

Several reports concluded that eHealth solutions are expected to diminish healthcare costs through reduced double-work (Shekelle et al., 2006; Shapiro et al. 2007). However, empirics disagree as efficiency was not widely considered to be enhanced in the future through cost optimisation. As only a few interviewees mentioned any potential cost reductions, proposition 2b can be rejected.

In conclusion since the overall effect on the efficiency of healthcare is expected to be negative, proposition 2 can be accepted.

Proposition 2: The physician-patient relationship is anticipated to be negatively affected due to the overall negative effect on efficiency with the implementation of an eHealth platform.

In relation to safety, some interviewees expressed concern towards the decrease in patient safety as the delicate data becomes susceptible to outside malicious manipulation. This coincides with similar findings reported by for example Darr et al. (2003) and Delpierre et al. (2004). In addition the empirical results agree with prior research that physicians' personal safety will decrease due to an increased threat of litigation, as patients will be able to access data they cannot fully comprehend (Shekelle et al., 2006).

As a result, proposition 3a can be accepted which leads to the consecutive acceptance of proposition number 3.

Proposition 3: The physician-patient relationship is anticipated to be negatively affected due to the overall negative effect on safety with the implementation of an eHealth platform.

In relation to the second research question, the results indicate valid tendencies through which it is possible to address the posed propositions.

In terms of mobility the results show that physicians and nurses see themselves and the patient as the major and decisive actors in the network. Although there are contradictory answers on the enhancement of direct peer collaboration, which is not expected to increase a lot, it was commonly assumed by nurses as well as physicians that communication and accessibility are increased considerably through the introduction of ICT. This corresponds to the findings of Stough (2003). Accessing data from anywhere at any point of time is a realistic future scenario for all actors.

Hence, based on the findings mobility in the network will increase and proposition 4 can therefore be accepted.

Proposition 4: Due to the fact that communication, collaboration and accessibility in the physician's network are enhanced, the persistent ties, weak or strong, will be enforced and mobility in the network is likely to augment.

Concerning the aspect of role shifting the results show that both, physicians as well as nurses believe their workload to increase due to additional tasks that have to be performed. Although this is contradictory to the actual goal of implementing ICT, it is in line with the research of van der Meijden et al. (2000), who warn of unexpected time-consuming consequences when implementing EHR.

Even though the results on the enhanced knowledge level of the patient with the introduction of ICT are mixed, there is still a stronger tendency towards the belief of increased patient empowerment, as

research suggests as well (e.g. Lupton, 1997; van der Meijden, 2000; Turvey, 2005; Ouschan et al., 2006). Further, it is noticeable that physicians and nurses consider their responsibilities to stay unchanged, however think that the role of IT specialists will become much more important in the future.

In light of those findings, proposition 5 is accepted:

Proposition 5: With the introduction of ICT the roles of physicians, patients and nurses are expected to shift in terms of knowledge, tasks and responsibilities.

6.2 CAUSE AND EFFECT RELATIONSHIPS

6.2.1 THE PHYSICIAN-PATIENT RELATIONSHIP REVISITED

Here, the framework of an ideal physician-patient relationship derived by Emanuel & Dubler (1995) is broadened. Namely it is used to illustrate how the physician-patient relationship could likely be affected in the future through the dimensions of perceived quality, efficiency and safety. The aspects of each of the latter are derived from both, the prior research as well as empirical results. In addition, the framework of Moliner et al. (2007) on the perceived quality of a B2C relationship is brought out to describe the final effect on the quality of the relationship. The combined framework that underlies the following analysis is depicted in figure 2.

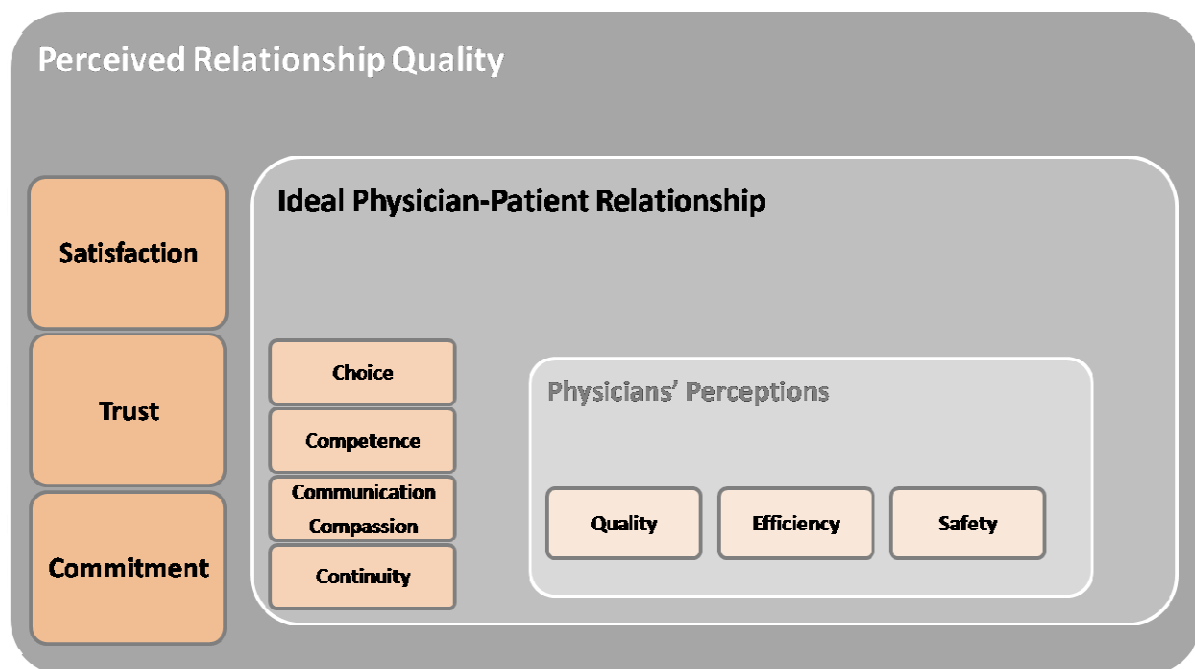


Figure 2: Combined framework on the physician-patient relationship (adapted from Moliner et al., 2007; Emanuel & Dubler, 1995; European Commission Information Society and Media, 2006a).

According to Emanuel and Dubler (1995) choice involves one's ability to choose between physicians, as well as treatment facilities and alternatives. As became evident from the results, the eHealth platform is believed to enable patient's medical information to travel anywhere with him. This renders different physicians' knowledge of the patient's medical history equal which further facilitates choice, since the physicians can be then evaluated on the basis of other relevant criteria. As patients become aware of the interoperability of their medical information, they will be able to act more opportunistically in the relationship. This will be the result when the relationship has been based on what Moliner et al. (2007) constitute negative cognitive commitment. Empirics give way to conclude

that a specific segment of patients shall in fact take advantage of their more equal position to search for alternatives. This correlates with Lupton's (1997) views on patient consumerism.

Patients that choose their care providers in this manner can be considered empowered (Ouschan et al., 2006). A knowledgeable patient is expressed by physicians as paramount to the quality of healthcare. However, the achievement of such is not feasible merely through the eHealth platform but as a continuous effort starting early in one's life. In this sense the physician-patient relationship will be altered only for those patients utilising the new opportunity. For them, through better treatment outcomes, patient satisfaction will increase enhancing the subsequent relationship (Moliner et al., 2007).

The dimension of choice can be expanded to include the patients' possibility to disclose medical information to whomever they see necessary, derived from the empirics. With the new system, the patient is able to completely close his medical data from everyone. This however, is believed to have an adverse effect on the efficiency of healthcare, diminishing the quality of the treatment outcome assigned with incomplete information. As can be concluded from the empirics it will have a negative effect on the trust between parties in the relationship thereby reducing the quality of the relationship (Moliner et al., 2007) and weakening the bond between the physician and the patient. As the interaction is likely to suffer further, it leads to a more superficial relationship.

In conclusion, the physician-patient relationship will be altered through greater empowerment only partially, whereby the patient will become a more equal partner in the process. However, patients' choice in limiting the disclosure of information will have an adverse effect on the relationship.

Competence refers to the knowledge and skills of the physician. In addition, Emanuel and Dubler (1995) relate competence to the physicians' ability to realise his limits and therefore consult his peers.

Since new technology brings about challenges to the physician's daily work, he needs to learn new skills in operating the system. This requires additional time commitments as one increasingly works with the comprehensive EHR. The eHealth project is expected to influence the physicians' time management by demanding a larger portion of the resource to reach the same outcome. For example, in order to discharge the patient, one now needs to complete a series of different tasks as opposed to before. As physicians have different levels of technology competence, the process is expected to vary in time. In short, efficiency is likely to diminish in the beginning of the usage period as the same processes take more time to be completed.

However, physicians believe that the eHealth platform shall allow a quicker overview of the patient, therefore improving the diagnosis process. Moreover, the platform is expected to streamline some work processes thereby diminishing the time needed per patient. In short, the speed of reaching treatment outcomes will diminish in the beginning, although it will be improved in the longer run. With the latter in mind, patients' satisfaction with the service shall initially decrease, eventually stabilising at a constant.

Competence in the relationship is also affected by the doctor's ability to receive the most relevant, high quality information through the interoperable healthcare system, which then has a direct effect on the outcome of the treatment. This is related to the concept of having the skills to retrieve the information, thereby the ability to adapt to new technology. Further, the quality of the information attained is also relevant. Therefore, the effect to the treatment outcome will depend on peers' ability to operate the system and insert correct and clearly formulated information into the system.

The empirics conclude that physicians have difficulties with inserting clear and relevant data into the system which would benefit the quality of the end result. As the system has not yet become

interoperable, data retrieval cannot be judged. However, since empirics show a lack in computer skills among physicians, the quality of care is expected to be influenced. Moreover, adverse events can take place as wrongful information is inserted out of insufficient skills.

In short, the existing skills of a physician to both attain and insert data will influence the treatment outcome and subsequently patient's satisfaction with the quality of care. The latter will affect the further continuity and development of the relationship and patient's ability to trust the physician (Moliner et al., 2007; Platonova, 2008). In this case the effect is presumed to be negative.

Competence can be related to the fact that patient's data is also available through the eHealth platform for him to evaluate. In such physicians perceive a decrease in trust in the relationship. One particular belief is that those patients have a clear malicious agenda against doctors. However, the majority do not consider their personal insertions to become under scrutiny per se but rather mistakes to become increasingly evident and documented, which leads to diminished professional security in the relationship. As a result, physicians are likely to become both more careful in their insertions and medical work or start viewing the patient as a potential "prosecutor", thereby distancing themselves from the relationship. The consecutive effect to the overall physician-patient relationship is negative as trust suffers from the more superficial relationship leading to an adverse effect (Moliner et al., 2007).

It is interesting to speculate why increased vulnerability of delicate patient data did not cross the mind of any physician that was interviewed. The reason might lie in how the nurses expressed themselves. More specifically, all the nurses that brought forward the decreased safety put themselves in the place of the patient when expressing the thought. In this sense, nurses might be closer to patients through interaction and can therefore take on their perspective better than physicians.

In conclusion, it can be presumed that the overall potential effect on the physicians-patient relationship through competence will be negative in the short run but with potential for higher efficiency in the long run. On one hand, better treatment outcomes should strengthen the bond through higher perceived quality of care and overall improvement of health. On the other hand, diminished trust, effective commitment and increased distance between parties leads to a more superficial relationship (Moliner et al., 2007).

Communication/Compassion entails listening, understanding and showing empathy to the patient's concerns (Emanuel & Dubler, 1995). This interaction is considered to only be achieved through direct face-to-face interaction. As adapting to new technology diminishes the time spent on communicating with the patient, empirics suggest that the patient will subsequently feel neglected. This, in turn will result in the weakening of trust as well as patient's commitment (Moliner et al., 2007). Therefore, through a decrease in the perceived quality of the relationship, an adverse effect on the physician-patient relationship can be observed.

What is more, according to empirical results, direct health improvements can be reached by enhancing communication. In addition, some physicians consider direct patient interaction to be important in developing the best diagnosis. Therefore, it can be concluded that there is a potential adverse effect on the final treatment outcome potentially affecting patient's satisfaction with the service encounter and the perceived quality of the existing physician-patient relationship (Moliner et al., 2007).

Communication/compassion also comprises explaining all the relevant information to the patient as well as offering advice. In this sense the physician strengthens the bond with the patient mitigating any risks of misunderstandings and litigation (Emanuel & Dubler, 1995). Therefore it could be argued that physicians engaged in more frequent and rich communication with their patients should have a

diminished risk of litigation. Relating to prior, less communication in a relationship then can increase the risk of misunderstanding the information gathered from the interoperable platform which in turn leads to diminished professional safety in the relationship. Perceived lack of safety can hinder the development of the relationship, since physicians will be more choosing in what to expose to the patient as well as alter their communication patterns. In short, the relationship will be negatively affected as less intimate details will be disclosed and the relationship becomes more superficial.

In conclusion, less communication and compassion is expected to have an adverse effect on both trust as well as patient satisfaction, thereby diminishing the overall perceived quality of the relationship (Moliner et al., 2007).

Continuity refers to sustaining the relationships with the patient over time (Emanuel & Dubler, 1995) as well as continuous peer interaction (Berg, 2002). Developing trusting relationships entails a significant time commitment from both the patient and the physician (Emanuel & Dubler, 1995). The case study has brought about notions where physicians' time is increasingly taken away from building a continuous relationship. However, the time is put into ensuring better overall care for the patient through better availability of information, which then can be translated into better treatment outcomes. The latter could outweigh the negative effect on direct communication, however, through the empirical results it can be concluded that face-to-face interaction is considered superior to any other forms of communication in healthcare. In such, the continuity of the physician-patient relationship can be expected to suffer, at least in the implementation phase of the eHealth project where additional time commitments are demanded.

Emanuel and Dubler (1995) argue that relationships that endure over time can be more efficient in terms of the treatment outcome since the physician has substantially more information about the patient from previous encounters. The eHealth platform is expected to alter the relationship by reducing the information asymmetry between physicians in different hospitals as was discussed through the dimension of choice.

Empirics have brought about an additional dimension of continuity relating it to the concept of ICT reliability. This can be defined as the constant and reliable functioning of technology that enables actors to provide the healthcare service. One of the main perceptions towards ICT has been the fear of technological failure. Physicians argue that such adverse events bring about a halt in the service provision with a subsequent negative effect on the quality of the service. In this sense, continuity of the process is altered with a subsequent decrease in patient satisfaction and relationship quality (Moliner et al., 2007).

Continuity is related to the concept of peer interaction which entails constant flow of information between physicians that is expected to benefit from the implementation of the eHealth platform. This leads to enhanced quality of care which has a subsequent positive effect on the patient satisfaction with the existing relationship (Moliner et al., 2007).

In conclusion, the potential effect on the physician-patient relationship is multi-faceted but mostly negative. Several aspects influence the relationship, some of which are of more temporary nature, such as the additional time commitments related to learning the new system. Others have the potential to permanently affect the way healthcare is provided in the future, for example reduced safety.

6.2.2 THE REVISED PHYSICIAN NETWORK

Before it is investigated how and why the broader network is affected, it has to be analyzed in how far the network proposed in section 3.3.1 is applicable to the respective departments.

The results suggest that in the paediatric departments the network takes on a slightly different shape, especially in terms of strong and weak ties. Due to the fact that patients are children, the physicians view their main counterparts to be the parents. The actual patient, the child, is rather a mere treatment receiver. The frequent interaction and communication with the parents hence constitutes another strong tie in the paediatrician's network as the time spent in the relationship increases (Granovetter, 1973). As Granovetter (1973) further argues tie strength is also enhanced by increased intimacy, which is the case here as parents and paediatricians discuss profound matters. These ties are not accounted for in the standard model. Nonetheless, the tie connecting paediatrician and child is strong, too as the physical closeness supports the intensity of the relationship (Marsden & Campbell, 1984).

The network of the orthopaedics also looks a little different from the one depicted. As was stated, for orthopaedists the interaction with nurses and peers is superior to the actual interaction with the patient, which is why they are connected to the patients with weaker ties than in other departments. The reason for that is the nature of the disease. More specifically, in orthopaedics surgery is most often the choice of treatment. However, this diagnosis can be reached through less extensive pre-surgical testing or prior supervision of the condition. In the outpatient setting, the physician examines the patient, listens to his concerns, but often relies more on the x-ray and MRI scans as the basis for diagnosis. As the physician presents the patient the treatment options, there is little room for extensive discussions. Hence, less communication and less personal interaction take place which consequently leads to weaker ties as Granovetter (1973) states. Empirics showed that the physicians were more result- than process-oriented which is reflected in the more superficial, transactional relationship. However, even though the tie is weaker than usual, all interviewees in orthopaedics accounted for the fact that the patient is vital to the network as without patient, none of the other ties and actors in the network would be necessary and hence the network would not exist.

In case of the internal medicine the network is similar to the one depicted in figure 1 where the physician-patient relationship constitutes the strongest entity and the centre around which everything else revolves. This is again due to the nature of the diseases treated. As the dominant conditions are chronic, the patients are long-term 'customers' of the physician. Moreover, since the conditions involve constant treatment as well teaching the patient, the interaction becomes more intimate. Hence, often patients have been in contact with the same physician for years and built up trust in the relationship (Moliner et al., 2007). According to Granovetter's (1973) definition the present intimacy in this relationship as well as the closeness and the time spent together constitute a strong tie.

For all departments the ties with pharmaceutical companies are doubtlessly the weakest. The reason is that the hospitals use tender-based sourcing by a centralized administrative department. Therefore, pharmaceutical representatives have little use in targeting the physicians as they have limited influence in determining the purchase of a certain drug. Considering this very limited interaction pattern these ties are negligible and hence absent (Granovetter, 1973).

An interesting notion came up when several nurses across different departments proposed a new actor, the caretaker, to the network to whom they attribute great importance. Due to the fact that the caretaker spends several hours per day with the patient and knows his psychological status very well, his role is imperative to the success and quality of the treatment. It is noteworthy that most physicians, however, did not even mention the caretaker in terms of important relations within the network. The reasons for that are probably the mental as well as physical distance between the physician and caretaker. Contact barely exists as the caretaker receives his orders from the nurse and seldom interacts directly with the physician. Thus, here a distinction has to be made whether the network was described by a nurse or by a physician. Nurses consider the caretaker to be vital to the network. The closeness between him and the patient and the time he devotes constitute a strong tie between them

according to most nurses interviewed (Granovetter, 1973). As the results show in the physician's case the tie can rather be classified as being absent because it exists but the interaction is not worth any further mentioning (Granovetter, 1973).

The basic notion that the results give away is that with the introduction of ICT, the persistent network changes. Actors, such as IT specialists who used to be of only minor significance to the functioning of the network and used to be connected by weak ties with the physician, gain in importance. This phenomenon can be viewed throughout all departments. Their increased importance can be attributed to the fact that the project is still in the implementation phase and hence system malfunctions take place quite often (the researchers could actually observe this case during one of the interviews), which is when an IT specialist is needed. Moreover, as the physicians and nurses need time to acquire new skills in operating the system, they constantly require support and advice from the IT specialists. This translates into more intensified transaction patterns as the interaction frequency increases. The tie will grow stronger between the physician and the respective IT specialist, yet most likely it will not become a classic strong tie as intimacy and intensity of this relationship are questionable (Granovetter, 1973). Further, this situation is likely to change over time as with growing familiarity with the system the amount of new information the IT-specialist possesses is diminished and as with the lack of intimacy in the relationship, the tie will become weaker once again (Granovetter, 1973).

A big concern to the interviewees was how the introduction of the system changes the persistent roles and tasks in the network. As presented in the results, the interviewees see their roles shifting and their workloads augmenting as they take on more administrative tasks requiring additional time investments. The reasons for that are two folded. On the one hand the increase in workload and time commitments is most likely a temporary phenomenon as people need time to adapt to changes and get acquainted with new ways of working (Chaudry et al., 2006). After the implementation phase the picture might be reversed and a reduction in working time could occur. On the other hand the roles of physicians and nurses, the shift is of a more permanent nature. The introduction of ICT requires them to take on new tasks which are considered to be outside the traditional job description. Eventually the existing job descriptions will be altered towards one that accounts for ICT usage in the physician's setting. Working and communicating with the computer will increasingly be a common day-to-day activity for them. This development is in line with the shifts in roles, responsibilities and workload as Walsh (2004) portrayed in his article.

The findings with respect to the patient's role were interesting as they were contradictory to a certain extent. Most interviewees were in consensus about the fact that the eHealth platform in theory offers an enhancement of the patient's knowledge and hence were in line with the research in that area (e.g. van der Meijden, 2000; Berg, 2002; Ouschan et al., 2006). However, although most of the nurses and physicians explicitly expressed the necessity for this development to take place they did not see it as a very realistic goal. Most often the relatively old age as well as passivity among patients is why they are believed to not take on the responsibility and take interest in their health status. Why does the majority of patients not seize the chance to alter their role and meet the physician on more equal grounds? To analyze this notion, one has to distinguish between older generation patients and younger ones. As expressed by the interviewees, older people seldom overcome the cognitive barrier and learn the usage of ICT. If someone of senior age has never heard or made use of the internet, it is very unlikely that the person will take advantage of the eHealth portal. What plays a bigger role, however, is their attitude. Manifested through tradition and history, for certain people a physician represents a kind of omniscient authority whose actions do not need to be questioned (Lupton 1997, Mechanic, 2008). This perception is also related to the present attitude of not wanting to deal with anything disease-related themselves. Patients acknowledge the physician as the specialist and consequently

expect him to do his work as not having to bother with anything (e.g. tracking one's blood pressure and adapting one's behaviour).

The younger generation, however, is more acquainted with the use of ICT and more knowledgeable about the potential sources of information. Yet as empirics suggest, the majority does not seize the possibilities offered. One can speculate on the potential reasons for these interesting results. This phenomenon can be related to the perception of a physician's work as a service provision. In the so-called service economy, these patients expect everything to be catered to their needs, be it indirectly. They pay taxes, hence have a right to demand the physician's effort at any point in time for any kind of discomfort, as minor as it may be. Hence, they simply do not see the necessity of engaging with the system since the physician is always present to give out all the necessary information. This is what Lupton (1997) describes as well by referring to this phenomenon as 'consumerism'.

Nonetheless, there still exists a minority of patients who probably will actively use the platform according to the interviewees. The contradiction lies now with the medical personnel. Even though a patient who is interested in his own health is what they consider a necessity for improved quality of health they generally dislike those who try to shift their roles to become more of a partner than a patient (also compare Lupton, 1997). To elaborate, in the physicians' perceptions those patients absorb a lot of information, of various qualities and subsequently feel knowledgeable enough to question the physicians' work and claim a stake in the decision-making process. Whether they possess the potential to do so or not is not as important as the fact that physicians feel their authority threatened.

In summary, although the potential to actually alter the role of the patient and render him more knowledgeable and equal exists, it is not seized. This is the case, on the one hand due to the passiveness and unwillingness of many patients and on the other hand because physicians either consciously or subconsciously do not encourage them to. Therefore, the eHealth platform has a potential to shift roles towards a more equal relationship only if patients are proactive in taking advantage of the opportunities. Further, if physicians truly acknowledge the potential of an empowered patient as a reduction to their ultimate workload, they may not resent the loss of authority and embrace the new role as a discussion partner rather than a superior teacher.

6.3 THE NETWORK AND THE RELATIONSHIP – AN INTEGRATED VIEW

The last step of the analysis aims to combine the two research questions and investigate how the findings of each affect the other and hence achieve an integrated view. In order to be able to follow it better, the visualization of the consolidation can be seen in figure 3 (see next page). It is based on the standard network discussed in the theoretical overview but also incorporates all differences mentioned by the interviewees. Further, it centres the physician-patient relationship in order to account for the first research question and the underlying concepts of quality, efficiency and safety. The introduction of ICT is visualized to account for the perceptive changes on the relationship and the network as a whole.

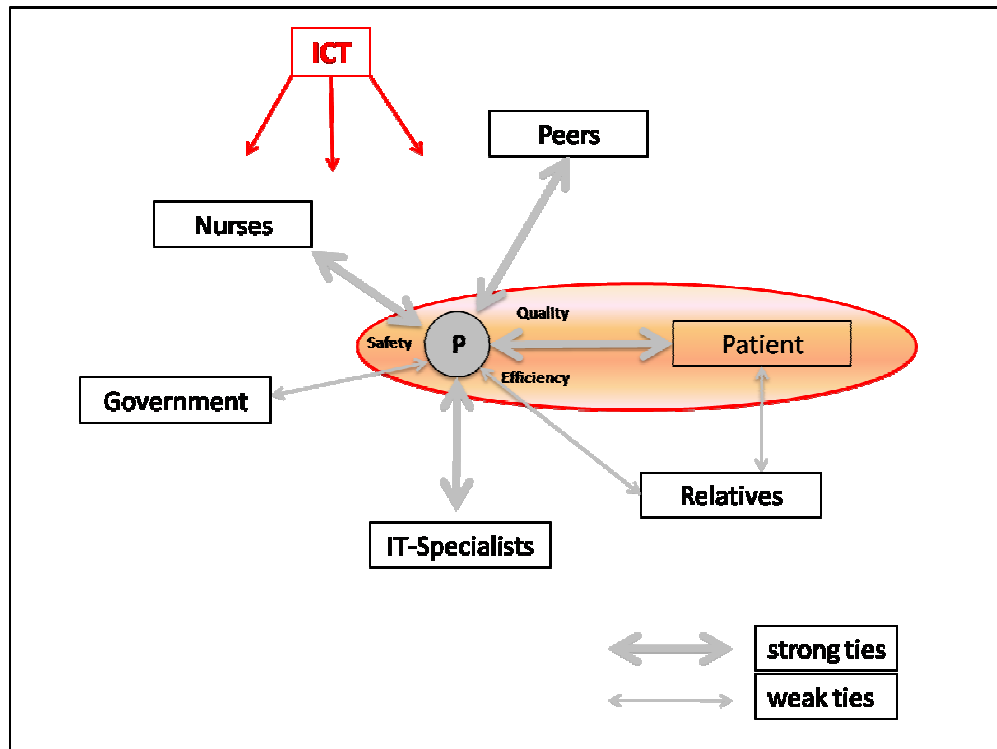


Figure 3: The revised physician network combined with the aspects of the physician-patient relationship.

There exists an interesting course of events that stem from the introduction of ICT into the healthcare service provision. When investigating the mutual effects of the relationship and the network, it becomes visible that the physician without purpose strengthens his tie with the IT-specialist due to his unfamiliarity with and the novelty of the system. The physician interacts with the IT-specialist more often and hence devotes additional time resources to the relationship, which, following Granovetter (1973) consequently enhances it. As more time will be spent on learning to operate the new process, it will be done so by taking time away from another function. Empirics suggest that physicians attempt to divide their time between the EHR and the patient. Moreover, often system problems appear during a consultation bringing up additional problems. Therefore, the time spent with the IT-specialists is at the expense of the patient, diminishing the face-to-face communication between physician and patient (Emanuel & Dubler, 1995). Hence, the tie that connects the physician and the patient loosens up as less time is invested and the informational resource exchange decreases (Granovetter, 1973). The patient may feel insufficiently consulted by the physician as less emphatic and intimate communication will have previously taken place (Emanuel & Dubler, 1995). In order to compensate for this, he will attempt to address another actor in the service process.

Results indicate here that the importance of the nurse as a counterpart in interacting with the patient increases considerably. She compensates for the patient's lack of information and the physician's dedicated time. So the tie that connects the nurse and the patient is consequently strengthened (Granovetter, 1973). However, this is not able to completely compensate for the loosening up of the tie connecting the patient and the physician as expressed by nurse 4: *"there exists something special between a physician and a patient that we need to emphasise"*.

Due to the incomplete compensation the patient will over time become more dissatisfied with the healthcare service. Dissatisfaction, as described earlier, directly and negatively affects the perceived quality of the relationship between the physician and the patient (Moliner et al., 2007). A patient that constantly feels mistreated is a threat to the continuity of the relationship, as the mobility gained

through ICT (Emanuel & Dubler, 1995) will enable him to leave and engage into a new physician-patient relationship. The network can thus be disrupted.

The cause and effect relationships show the reciprocal effects and the interrelation of the two research questions. The network is altered as ICT is introduced and the physician is forced due to a lack of knowledge to seek new information through enforcing weak ties (Granovetter, 1983). However, he strengthens his relations with IT-specialists on the expense of the relation with the patient. The role shifts that take place consequently interfere with the core dyad in healthcare, the physician-patient relationship. It is critical to note that although the initial process has little to do with the patient, the direct result is a decrease in patient satisfaction and subsequent quality of the core relationship which brings about a negative effect on the service quality.

It has to be borne in mind, however, that the results which indicate these cause and effect relationships were obtained through a snapshot view within the implementation phase. Once the users of the system are more acquainted with the new processes and the technology, the problem will diminish as the IT-specialists will not be able to offer the physician much more relevant new knowledge. When the relationship presents less cognitive value to the physician (Moliner et al., 2007) the tie will become weak once more and the time can be refocused on the patient. Nonetheless, it is a development that can have major impacts in the short-term and hence requires consideration.

It is likely that an implementation process of this scale and scope can last years until the technology is embedded in the healthcare process and becomes a natural part of physicians work routine. Therefore, a risk remains that the quality of service the patients are accustomed to will suffer for a significant period of time. This will not only have a detrimental effect in Estonia, but the consequences extrapolated to a larger population in the EU can pose a threat to existing healthcare systems.

7 CONCLUSION

7.1 CONCLUSIVE REMARKS

Healthcare is facing severe challenges in the 21st century not only in Europe but across the world. More specifically, EU citizens are increasingly aging, thereby demanding more frequent care with increasing expectations for treatment quality and outcome. The latter is a factor in the continuously rising healthcare costs which put pressure on securing sustainable, high quality healthcare for the future.

ICT has been considered as a potential alleviation to the major problems in healthcare. The EU has voiced a strategy to bring about a diffusion of eHealth solutions to improve the overall quality, efficiency as well as safety of healthcare. However, including sophisticated technology to the service based on face-to-face interaction is bound to bring about substantial alterations to the traditional physician-patient relationship. Moreover, as innovation is often disruptive, the broader network of actors around the core dyad is likely to be affected changing the face of the healthcare provision. These should be accounted for as not to achieve a suboptimal outcome to what is attempted.

The research was built around a single case of Estonia where the sample consisted of three major hospitals on the forefront of the implementation. The data was collected through in-depth interviews with both physicians and nurses in three different departments.

The results and the subsequent analysis served to answer the two research questions posed.

How is the doctor-patient relationship expected to be affected in terms of perceived quality, efficiency and safety (from a physician's point of view)?

The results have shown that the physician-patient relationship will be mainly negatively affected as physicians perceive negative implications on the future quality, efficiency, and safety of healthcare through the implementation of the nationwide eHealth platform. However, physicians and nurses express an overall positive notion towards new technology implementation in healthcare with the advanced movement of information as a major benefit for the patient and the quality of care.

In terms of the broader network of the physician, the ICT inclusion will bring about a change.

How is the broader network of actors around the physician likely to be affected in terms of mobility and role shifting?

The analysis of the physician's network showed that mobility of actors within the network will be changed through the inclusion of the virtual platform. Further, the roles of physicians, nurses as well as IT specialists will be shifted as the technology is added to the network.

The interesting finding concerns the general controversy in the changing role of the patient. On the one hand he has the potential to become empowered on the other hand some of the results have brought about a lack of willingness to do so. Only through an integrated effort can patients become more equal partners in the healthcare process that goes beyond making information available to a general change in attitude and values towards one's health. Further, physicians should be encouraged to facilitate the process of empowerment as at present the development of a more knowledgeable patient is neither sufficiently facilitated nor desired by physicians.

In summary, the two issues, the physician-patient relationship as well as the other actors forming the healthcare service shall be affected by the introduction of a nationwide eHealth project. The change will be multi-faceted and varies with respect to the relationships inherent in the process of delivering

care. However, whether the expectations will be realised or will they change in the course of the process are yet to be witnessed. It can be expected that some negative findings are likely to become obsolete over time.

7.2 IMPLICATIONS AND CONTRIBUTIONS OF STUDY

7.2.1 CONTRIBUTIONS TO THEORY

Estonia is the first EU member state to attempt to implement a nationwide eHealth solution connecting both patients and the healthcare industry through an interoperable platform for information exchange. The contribution of this thesis relates to the uniqueness of the situation observed in Estonia, thereby contributing to the rather meek selection of former research in the area of early phase ICT implementation in healthcare.

The main theoretical contribution concerns an integrated relational and network approach to the effects of ICT implementation on the traditional healthcare service model. This proposes that potential effects should be regarded throughout the course of time within the network of relevant actors that can bring about disruptions to the network.

The results reflected notions both concurrent with former research as well new interesting dimensions of the research questions, such as the role of caretakers and the perceptual unimportance of cost savings in relation to EHR. Further the thesis relies on the most contemporary and practical objectives on quality, efficiency and safety of healthcare that serve to provide practitioners with critical aspects regarding the fulfilment of the EU i2010 goals.

As the researchers have discovered, there is a significant gap in the former research in relation to the implications that physicians' perceptions have on the physician-patient relationship. It is evident that cognitive factors concerning both physicians and other actors in the network have not been sufficiently researched. This can impose a threat to the success of future eHealth projects in other countries.

7.2.2 DIRECT IMPLICATIONS FOR THE ESTONIAN HEALTHCARE SYSTEM

In light of the presented results and the conducted analysis, it is also possible to derive direct implications for the Estonian healthcare system in general and the current eHealth project in particular.

The first implication relates to the physician's perceptions of the implementation process of ICT. As shown, the physician's perceptions on how ICT will change the prevalent system are likely to change his relationship with the patient. The cognitive barriers and inherent prejudices that might exist in relation to the new technology can bring about lasting impairments to the physician-patient relationship. This is an important insight and should be acknowledged for by the Estonian eHealth project executives in form of continuous involvement of the physicians as well as extensive training throughout all phases of the project.

Another implication which should be considered is the effect on the patient. A decline of the healthcare service provision and the resulting dissatisfaction can lead to a disruption of the network by the patient. This could possibly be avoided if the patient was more involved and more informed concerning the implementation and the upsides of the system. Hence, the Estonian healthcare institution should utilise public relations and marketing methods to increase positive attitudes among patients to consequently support the implementation process.

In summary, it is decisive not to underestimate the significance of the human factor in such change processes as it is vital for the successful implementation and usage of ICT. Visualizing the benefits for every single party involved from very early on is paramount to secure support from all actors and to ensure continuous cooperation.

7.2.3 IMPLICATIONS ON EU-LEVEL

Relating back to the pioneer role Estonia assumes, the results of this paper can be of significant value to EU countries deciding to implement nationwide eHealth platforms in the future. In this sense, the Estonian pilot project has a signalling effect for the rest of Europe. In reality, other EU countries follow the process taking place in Estonia relatively closely. Moreover, Estonia's project representatives continuously share their experience and the status of the process on international eHealth conferences. Although the significance of success cannot be underestimated, the consequences of failing serve to considerably take back the developments of nationwide eHealth solutions and the subsequent efforts to develop union-wide interoperability.

eHealth Expert: *"If we fail, this is a very strong message for the others: even in such a small country they cannot make things happen."*

The results indicate the critical role of the implementation phase to the overall success of the project. Thus, it is advisable for subsequent projects to sufficiently plan and design the implementation process to ensure its smooth proceeding. More precisely, a certain level of data safety should be established as well as sufficiently communicated to the actors. In addition, the concerned technology should work without major flaws to diminish the already disruptive nature of the implementation process. Finally, all relevant actors should be involved in the process, exemplified by the Estonian eHealth Foundation, the responsible executive force for the implementation. Through this foundation the very important link to practitioners could be drawn.

A voiced concern related to the implementation in Estonia was the perceived insufficient training. Hence, countries which yet have to implement ICT should focus on designing appropriate training sessions for all involved actors to ensure better understanding and cooperation. This also includes follow-up trainings to make sure all actors are comfortable with the system.

In terms of the core goal of the EU action plan, the educated and informed patient, the results indicate that this is more of an aspiration than reality. At least in the near future a partner-like patient is not expected to evolve. Hence, potential successors should rather focus on a more integrated approach when it comes to patient empowerment. This relates to changing the traditional perceptions of healthcare to one of mutual cooperation between physicians and patients through various communicative mediums.

In summary, it can be derived that the ultimate EU goal to have a union-wide interoperable ICT platform is a farfetched vision. The underlying processes are extremely complicated and require careful and intensive preparations, even on a small scale, such as in Estonia. Among others, cultural aspects, such as language barriers can become unexpected obstacles and can render the whole project ineffective if not properly taken into consideration.

7.3 LIMITATIONS OF STUDY

It has to be borne in mind that this study and its empirical results are subject to certain limitations.

The choice of research methods carries certain drawbacks as pointed out earlier. The generalizability of the results is limited due to the inherent design of case studies. Nonetheless, this method proved to be the right one considering the nature of the results.

In addition, the concern of the representative character of one single country observed can be raised. The results could be very specific and attributed to the country's unique characteristics which would reduce the study's value for subsequent projects. Yet, as many results correlate strongly with findings of previous literature, this is not believed to be a major issue.

Regarding the sample, 12 interviews form the basis of the study. Although the outcomes are significant and lead to certain contributions, a broader sample would have been beneficial to enhance clarity. It was focused on the three biggest hospitals in Estonia in order to obtain a representative picture of the situation. However, due to their size and importance, the hospitals are also best prepared for a transition of that scope. Therefore, it would have been interesting to investigate the challenges and problems a more local hospital faces having both, less resources as well as less prior experience with ICT.

Further, other actors, such as primary care physicians or IT specialists, could have been interviewed as well to incorporate other viewpoints. This is related to the fact that the patients' perceptions were factored out completely. Insights on their attitudes towards the new system would have contributed to the analysis and outcome. However, this was out of scope of this study due to the limited resources available.

7.4 FUTURE RESEARCH

In the course of this study various research gaps became apparent which should be addressed in the future.

In the beginning of this study it was considered to incorporate the concept of value to gain insights on how the introduction of ICT creates additional value in the network. The aspect of value creation was disregarded, however, when it became apparent that the results were not significant enough and too controversial to make a contribution. Further research here would be beneficial as despite all the obstacles, most interviewees remained optimistic and emphasised the rise of great benefits in the future. This indicates that eHealth as such has big potential and follow-up studies at a later point in time would reveal the level of that potential realized. In relation to the above, currently empirical evidence in terms of nationwide eHealth projects is lacking, the thesis serves to pave the way for more longitudinal studies. These would enable to follow the relevant processes over time.

Significant additional insights on the current project in Estonia could be gained through research on the patients' perceptions and attitudes towards eHealth. This would also lead to a more encompassing picture regarding the effects on the physician-patient relationship.

An interesting notion that this study revealed is related to the question of why the younger generation of patients do not choose to seize the opportunities the information society offers them. Further research could clarify whether the prevalent traditional view of healthcare conflicts and contradicts the concept of patient empowerment through ICT.

As was mentioned above, perceptual implications on the physician-patient relationship are not sufficiently researched thereby representing an opportunity for future studies.

Another broad area for future research will emerge once other EU countries will have implemented ICT. It will then be interesting to compare those results to Estonia and the findings of this study to spot differences and similarities. Further, it will be possible to examine which share of the problems prevalent can be attributed to existing cultural barriers.

All in all, this field offers countless possibilities to further conduct research due to its novelty and its importance for overcoming the problems in healthcare in the future.

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8.2 INTERVIEWS

Physician 1 – paediatrician, Tallinn Paediatric Hospital (03.11.2008)

Physician 2 – paediatrician, Tartu University Clinic, Paediatric Clinic (06.11.2008)

Physician 3 – orthopaedist, East Tallinn Central Hospital (04.11.2008)

Physician 4 – orthopaedist, Tartu University Clinic (08.11.2008)

Physician 5 – internist, East Tallinn Central Hospital (07.11.2008)

Physician 6 – internist, Tartu University Clinic (05.11.2008)

Nurse 1 – paediatrics, Tallinn Paediatric Hospital (03.11.2008)

Nurse 2 – paediatrics, Tartu University Clinic, Paediatric Clinic (06.11.2008)

Nurse 3 – orthopaedics, Tartu University Clinic (05.11.2008)

Nurse 4 – orthopaedics, East Tallinn Central Hospital (04.11.2008)

Nurse 5 – internal medicine, East Tallinn Central Hospital (04.11.2008)

Nurse 6 – internal medicine, Tartu University Clinic (06.11.2008)

eHealth Expert – Member of Board, The Estonian eHealth Foundation (07.11.2008)

9 APPENDICES

APPENDIX 1: THE MEDICAL INSTITUTIONS RESEARCHED

Table 3: Implementation of EHR in hospitals according to nurses and physicians interviews

Hospital	Sub Institution	EHR usage in inpatient care (since...)	Previous system used	EHR usage in outpatient care (since...)	Previous system used
Tallinn Paediatric Hospital	N/A	11/2007	Not utilised	11/2007	Not utilised
East Tallinn Central Hospital	Department of Orthopaedics	10/2008	Yes, In-house 2003	No	N/A
	Department of Internal Medicine	10/2008	Yes, In-house 2003	10/2008	Personal 1995
Tartu University Clinic	Department of Orthopaedics	10/2008	Discharge Summaries 1997/ no EHR	No	N/A
	Paediatric Clinic	03/2008	Discharge Summaries 1997 / no EHR	04/2008	Not utilised
	Department of Internal Medicine	08/2008	EHR without Treatment Diary 2002	10/2008	Not utilised

APPENDIX 2: THE RESEARCH SAMPLE

Table 4: Summary of the physicians interviewed

Department		Gender	Age	Work experience	Head of Department	ICT usage
Paediatrics	Physician 1	Female	53	27	No	5 days a week
	Physician 2	Female	60	35	No	daily
Orthopaedics	Physician 3	Male	44	20	Yes	daily
	Physician 4	Male	55	29	Yes	daily
Internal Med.	Physician 5	Female	43	17	No	daily
	Physician 6	Male	61	35	Yes	5 days a week

Table 5: Summary of the nurses interviewed.

Department		Gender	Age	Work experience	ICT usage
Paediatrics	Nurse 1	Female	44	21	daily
	Nurse 2	Female	27	4	daily
Orthopaedics	Nurse 3	Female	36	17	daily
	Nurse 4	Female	32	12	daily
Internal Med.	Nurse 5	Female	39	18	daily
	Nurse 6	Female	26	6	daily

APPENDIX 3: THE INTERVIEW GUIDE

Interview Guide Physicians and Nurses

Demographics

Age:

Position:

Hospital:

Work Experience in total and in current position:

ICT Experience

1. How often do you use ICT in general?
2. To what extent do you use it in your work setting? What exactly do you do when you use ICT?
3. Does your department use the EHR as part of the Estonian eHealth program? If yes, to which extent?
4. What kind of training have you received on the usage of EHR? How did the training look like and do you feel it was sufficient? Why/ Why not?
5. Do you feel comfortable using the new system? Why?
6. Describe your normal workday, please.
7. How do you interact with a patient?
8. What do you think is the overall effect of the implementation of ICT on healthcare in Estonia?

Efficiency

9. What will change in general in terms of overall healthcare efficiency?
10. How will ICT in general affect your daily work?
11. What are (potential) positive and negative influences on your work processes?

Quality

12. How do you think will the eHealth project affect your communication patterns with the patients?
13. How do you feel about the increased exposure, i.e. the accessibility of your input from both, other physicians and patients?
14. One goal of the EU is to have more educated and better-informed patients through ICT. Do you believe in this target? If yes, do you perceive it to be a positive development and if no, why not?

Safety

15. How do you perceive the effect of ICT on patients' safety?
16. How do you feel about the availability of information to other counterparts?
17. Give a general outlook on how ICT might affect your relationship with your patients?

The Network

18. Given this present network, are there actors that specifically influence your work?

19. How would you rate the interactions with those actors in giving care to a patient and how frequent do you interact with each one of them?
20. Do you think the introduction of ICT is going to change any of the interactions?
21. Do you think any roles in this network are going to change in terms of tasks, workload, responsibility and/or authority?
22. In your opinion what is the long-term overall effect of the eHealth project on public healthcare systems?