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Doctor at your Fingertips

An exploration of virtual patient-doctor interaction

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Doctor at your Fingertips: An exploration of virtual patient-doctor interaction

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ABSTRACT (MAX. 200 WORDS):

Healthcare, the fastest growing industry in the world, has throughout history sought to make use of the continuous advances in technology. Virtual visits is one of the latest advances, where physicians can remotely interact with patients via the use of smartphones. The aim of this study is to explore these benefits and challenges from the stakeholders' perspective and explore how virtual visits can further expand and become an integral part of healthcare. To achieve this aim, empirical data from semi-structured interviews conducted with informants from renowned telemedicine companies worldwide were analysed and insightful findings were found. Overall, virtual visits are perceived from stakeholders as twice more efficient than physical visits, despite facing some challenges mostly in terms of regulations. Virtual visits are expected to treat 75% of cases if they make full use of remote devices that can transmit patient data to physicians in real-time. The conditions that need to be considered for the success of these devices are explored in this research.

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1 Introduction

1.1 Background

The invention of computers has brought with it the possibility to transform life functions and change the ways all types of industrial activity run. Healthcare, being the biggest and fastest growing industry in the world (Fricker, Thümmeler & Gavras, 2015), has always sought to make the best use of the various technologies available to in a run more efficient manner. The digitalization of healthcare has come a long way since the 1960s which saw the use of main-frame computers to support administrative functions in hospitals and clinics (Grandia, 2014). It was the widespread use of mobile technology and wireless networks, along with the reliance on information and communication technology (ICT) in the 1990s (Hurst, 2016) that caused a real change and gave the opportunity to patients to directly make use of digital health (Zundel, 1996).

The invention of telecommunications devices brought with them the opportunity to communicate with people in remote areas. The use of electronic communications and information technologies to provide clinical services when participants are at different locations is known as telemedicine (The American Telemedicine Association, 2006). While the history of telemedicine can be traced by some to the ancient Egyptians, Greeks, and Romans (Hurst, 2016) when scrolls and hieroglyphs were used to share health information, or to the middle ages when bonfires were used to exchange bubonic plague information across Europe, the exact date of the use of telemedicine is unknown (Zundel, 1996). The first breakthrough in telemedicine, however, can be traced to the invention of telecommunication devices that enabled the two-way transmission of data (Hurst, 2016). In the 1900s, physicians were amongst the first people to use telephones to exchange health data. Radio communication was also used during World War I to transfer medical information (Zundel, 1996). The introduction of the television, a medium that allowed for the sense of sight to be used along with that of sound further enhanced the capabilities of telemedicine. Video communication for medical purposes was first used between Nebraska Psychiatric Institute and the Norfolk State hospital in 1964 (Zundel, 1996). For the three decades that followed, NASA had a crucial role in the development of telemedicine by using satellite technology (Hurst, 2016). Initially, NASA used telemedicine to monitor the health of astronauts in space (R. Bashshur & Lovett, 1977). However, NASA later decided to use satellite technology to make a contribution to telemedicine to provide health care to a remote population with their STARPAHC (Space Technology Applied to Rural Papago Advanced Health Care) project (Freiburger, Holcomb, & Piper, 2007). While at one stage, NASA was at the forefront of the evolution of telemedicine, and contributed a lot, a new breakthrough was required. The technology used for telemedicine in this era was both large and costly and was mainly controlled by NASA (Rashid Bashshur & Shannon, 2009). It was with the 1990s, and the breakthrough of the internet (Ferguson, 1997; Powell, Darvell, & Gray, 2003) that telemedicine entered a new era in which its diffusion reached common people and gave them the opportunity to finally reap the benefits of telemedicine (Hurst, 2016).

Coupled with widespread accessibility to internet, mobile devices would then enable patients to communicate visually with physicians from afar (Hurst, 2016). This led to a new term, i.e. mHealth. mHealth was first defined in 2003 as “emerging mobile communications and network technologies for healthcare systems” (Istepanian & Lacal, 2004). At the start of the 21st century, physicians could use mobile devices to download lab results, medical records, medical images, and drug information. Patients could also, to some extent, use their mobile devices for monitoring purposes (Silva, Rodrigues, de la Torre Díez, López-Coronado, & Saleem, 2015). The evolution of mobile phones to smartphones with applications that use sensors capable of performing scientific measurements (Ozcan, 2014) promised even greater things. This meant that mobile devices had evolved to possess powerful sensors along with advanced communication technologies that would enable them to deliver crucial health interventions (Kakkar, Sarma, & Medhi, 2018). A survey conducted in 2015 showed that 58% of US smartphone owners have downloaded at least one fitness or health app (Krebs & Duncan, 2015). Another survey among medical school students conducted in 2011 showed that over 80% of the students used mHealth applications (Wallace, Clark, & White, 2012). These percentages taken years ago have definitely increased as the number of health applications has doubled since 2015 and more than 200 health applications are being added daily (IQVIA, 2017). This evolution in mobile devices gave physicians the possibility not only to have access to patient information, but also the prospect of remote patient monitoring and remote diagnostic services (Gleason, 2015). With telemedicine applications, patients can now schedule virtual visits with their physicians and receive their diagnosis and prescriptions remotely (Hurst, 2016).

According to statistics from the American Medical Association and Wellness council of America, as cited by Healthcare Business & Technology (2016), 75% of patient encounters with physicians could be done remotely over the phone or video. Statistics such as these show that a lot of money and time can be saved by virtual patient-physician visits (Kahn, 2015). The evolution of smartphones and their capabilities to aid in the delivery of health interventions have led to the implementation of a number of telemedicine apps used by patients worldwide to communicate with physicians virtually (Vandelanotte et al., 2016). These applications do not only make use of the advanced features that the average smartphone provides nowadays such as high-resolution cameras, powerful sensors, measurement of physical activities, and assessing sleep patterns, but they can also connect to external hardware devices that monitor physiological signals and transmit this data to their physicians virtually (Luxton et al. 2011). The dissemination of these smartphones also gives an opportunity to people living in rural communities to seek physician consultations that would have been difficult to obtain otherwise (Breen & Matusitz, 2010). Many of the telemedicine apps allow patients to get consultation from physicians and possibly diagnosis for the treatment of certain diseases such as allergies, fevers, flues, stomachaches, to name only a few (eVisit, 2018). There is also talk about the use of telemedicine to diagnose and monitor more chronic diseases such as diabetes and heart problems (Klonoff, 2009). With 7 million patients using telemedicine worldwide (Statista, 2019) and 71% of healthcare providers using telemedicine tools (Beaton, 2017), besides the constant technological advancements, telemedicine in general and virtual visits in particular are expected to improve.

1.2 Problem Area and Research Question

Despite vast literature on how virtual visits are perceived from the patients' viewpoint, there is only one study that explores virtual visits from the perspective of different stakeholders of telemedicine companies (Rexha & Telemo-Nilsson, 2016). However, when the aforementioned study was conducted, virtual visits were in their early stages and not completely diffused. Furthermore, the study focuses on telemedicine companies in Sweden. Therefore, a more updated and inclusive study is required. Other studies that explore virtual visits from the perspective of stakeholders of telemedicine companies were not found. However, according to Länsisalmi et al. (2006), when studying new phenomenon in healthcare it is important to consider the perspective of different stakeholders, in order to fully understand the current state of the phenomenon and the future opportunities. Moreover, research on video consultation, one of the main methods in which virtual visits are carried, is sparse (Greenhalgh et al. 2016), hence, Atherton et al. (2018) call for research on all the forms of virtual visits.

One of the main stakeholders of virtual visits is the physicians themselves (Malvey & Slovinsky, 2015). However, existing literature does not fully explore how they perceive virtual visits (Randhawa et al. 2018). Different studies have called for further research on when virtual visits are most effective (Kahn, 2015; Atherton et al., 2018; Deloitte, 2018; PwC, 2016) and for whom (Atherton et al. 2018; PwC, 2016). Other studies have also called for more research on the future possibilities of video consultation, one of the forms of virtual visits (Johansson, Lindberg, & Söderberg, 2014b). Furthermore, a review of the available literature showed only one article that delves into future opportunities that would help in augmenting virtual visits (PwC, 2016). However, there is no study that talks about the conditions or requirements that need to be considered in order for virtual visits to make use of their opportunities and hence to augment.

In order to address the identified knowledge problems, the following two questions have been formulated:

- How are virtual visits perceived by stakeholders of telemedicine companies?
- How can virtual visits be augmented in order to become an integral part of healthcare?

1.3 Purpose

The purpose of this study is to explore how virtual visits are perceived by stakeholders of telemedicine companies. This study also intends to explore future opportunities that could augment virtual visits in order to become an integral part of healthcare. The knowledge contribution of the study is to provide insight into the evolution of virtual visits since its inception, perceived benefits and challenges accompanied with virtual visits from the perspective of different stakeholders, and what stakeholders need to consider in the near future to ensure that virtual visits are ameliorated.

1.4 Delimitation

This thesis will focus on exploring virtual visits from the point of view of stakeholders within telemedicine companies. These stakeholders can be grouped into three main categories: users, technology, and business. To explore the user perspective, the research will focus on the physicians rather than the patients since physicians are considered to be the core driver of healthcare culture (Malvey & Slovinsky, 2015). Moreover, studying virtual visits from their perspective will give insight into the benefits as well as the challenges of virtual visits. Understanding the technologies that are used in virtual visits will be undertaken in this research through interviewing people in charge of innovation and technology to gain a deeper understanding of the tools and systems that are integrated within virtual visits to ensure a useful interaction between physician and patient. The business perspective, which can be viewed by interviewing founder, chief executives, and business developers, along with the technological perspective, will give us insight into what is required for virtual visits to become an integral part of healthcare.

2 Theoretical Background

To gain a thorough understanding of virtual visits, a thorough literature review about the subject combined with research on the available apps and services that these virtual visits provide was required. To achieve the former, a careful distinction between terms was of vital importance. It is to be noted that there is an abundance of terms with ambiguous meanings when it comes to digital health which makes finding research on virtual visits challenging. Therefore, exploring digital health in a broader context and defining the terms of digital health is crucial. After attempting to clear up the confusion on the different terms, exploring existing services and tools, and listing the benefits and challenges of virtual visits, the chapter is concluded with a theoretical framework to be used in the empirical part of the research to answer the research questions this study set out to answer.

2.1 Terms and Definitions

When it comes to research relating to digital healthcare, there is a problem with the ambiguity of terms. A number of terms such as telehealth, telemedicine, telecare, and mHealth are often used synonymously (Fricker, Thümmeler & Gavras, 2015). The terms telehealth and telemedicine are two terms that are at many times used interchangeably (Baumann & Scales, 2016) and hence cause some confusion amongst researchers as the distinction between both terms is not precise (Malvey & Slovinsky, 2015). Telehealth is seen by many researchers as an umbrella term, a term that encompasses a broader application of technologies (The American Telemedicine Association, 2006; Weinstein et al. 2014) as opposed to telemedicine, which focuses more on medical services provided at a distance to physicians (Weinstein et al. 2014) and was a popular term in the 1990s (Fong, Fong, & Li, 2010). The emergence of the term mHealth has also contributed to the decrease in the usage of the term ‘telemedicine’ as mobile tools have become an integral part of digital health (Hurst, 2016). The distinction, however, is again marginal with the term ‘mHealth’ being mapped to the term ‘telemedicine’ in the MEDLINE database (Hurst, 2016). This confusion in umbrella terms makes it difficult to classify ‘virtual visits’ (which can also be referred to as ‘remote visits’). The following definitions attest to the plethora of terms related to the subject:

eHealth: “a new term needed to describe the combined use of electronic communication and information technology in the healthcare sector...the use in the health sector of digital data – transmitted, stored and retrieved electronically – for clinical, educational and administrative purposes, both at the local site and at distance” (Mitchell, 1999, p.1)

telehealth: “a broader variety of clinical and nonclinical remote health care services-often provided by nurses-like patient education, help with medication adherence, and troubleshooting health issues” (Nelson, 2017, p.17)

telemedicine: “the combination of information and communication technologies (ICT), multimedia, and computer networking technologies to deliver and support a wide range of medicine applications and services” (Fong et al., 2010, p.8)

mHealth: “the use of devices such as smartphones or tablets in the practice of medicine, and the downloading of health-related applications or ‘apps’ ... [to] help with the flow of information over a mobile network and ... improve communication, specifically between individuals and clinicians.” (Malvey & Slovensky, 2015, p.3)

telecare: “the use of alarms and sensors to monitor people’s movement, medication and the home environment at a distance” (Lynch, Glasby, & Robinson, 2019, p.2)

virtual visits: “clinical interactions in health care that do not involve the patient and provider being in the same room at the same time” (McGrail, Ahuja, & Leaver, 2017, p.2)

Thus, looking at the definitions, it is evident the eHealth is the umbrella term which encompasses all other terms. After that comes telehealth which is considered by many to be a broad term and can be a superset to telemedicine (Bashshur et al. 2011). Telecare, being a preventative health application can be classified within the scope of telehealth, but not telemedicine (van Dyk, 2014). mHealth focuses on the means of delivering health services, i.e. mobile technologies and can therefore be considered to be a tool used by eHealth, telehealth and telemedicine. Virtual visits, which are now being done through applications on smartphones can then be seen as a subcategory of mHealth along with other types of applications such as fitness and monitoring applications.

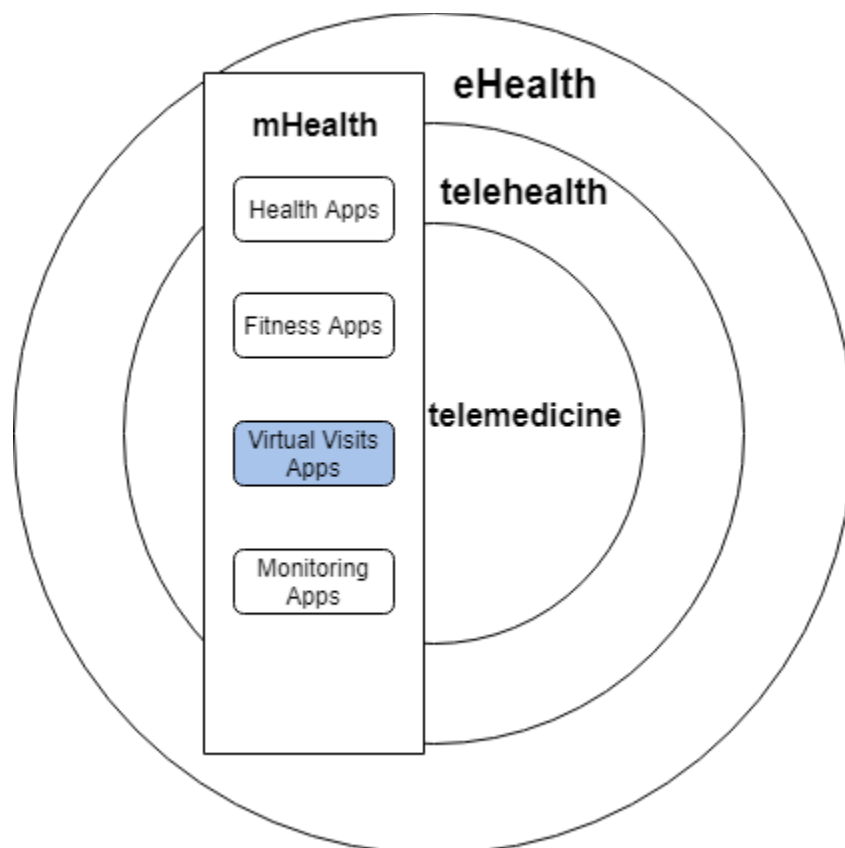


Figure 2.1: Defining the terms and concepts

2.2 Virtual Visits Novelty

Since the emergence of mobile applications and their widespread in 2010 (Hurst, 2016), telemedicine companies in the United States made use of the evolution in smartphone technologies to provide the service of virtual visits. According to Bhatia & Falk (2018), virtual visits have been publicly funded in British Columbia since 2012. Teladoc, founded in 2002, is one of the largest oldest telemedicine companies in the United States (Goodman, 2016). Teladoc offers virtual visits to its customers along with other companies such as HealthTap, AmWell, and Doctor on Demand. Following the American experience with virtual visits, many telemedicine start-ups in Europe started providing video consultation services such as Kry, which was founded in Stockholm in 2014 (Ram, 2018). Kry has been used along with traditional face-to-face visits in the region of Jonkoping since 2015 (PwC, 2016). Despite this surge in telemedicine applications in general, and virtual visits in particular, the digital care model is still considered to be in its start-up phase (Ekman, 2017). However, whether the concept itself is new or not remains to be a question in need of further research.

A new idea is conceptualized as new knowledge that determines users' perceptions towards it (Rogers, 1983). Hence, a product, service or process is considered an innovation when it is perceived as "new" by its users (Rogers, 1983). According to Business Sweden (2018), virtual visits are changing the face of primary care and the way patients and physicians perceive healthcare. McGrail, Ahuja, & Leaver (2017) go further and consider virtual visits as a new model of access to primary care. Patients can communicate with their physicians on their smartphone at any time and from any where, without being physically present at the clinic (Ram, 2018). The perceived novelty of virtual visits is in line with Rogers' (1983) definition of innovation, hence virtual visits can be considered to be an innovation. Virtual visits are disrupting patient-physician interaction in terms of communication nature and content from physician-centered interaction to patient empowerment (Johansson, Lindberg, & Söderberg, 2014a; McGrail, Ahuja, & Leaver, 2017; Miller, 2002; PwC, 2016; Horner, 2018)

According to Länsisalmi et al. (2006), innovations in healthcare can be viewed as new services, new ways of working and/or new technologies. McGrail, Ahuja, & Leaver (2017) view virtual visits as a new means of interaction between patients and healthcare providers. Hence, they are seen as a new way of working of HCPs that requires well-functioning training (Johansson, Lindberg, & Söderberg, 2014b). On the other hand, (Greenhalgh et al. 2016) define virtual visits as new health services that are replacing physical visits through means of new technologies. Rexha & Telemo-Nilsson's (2016) findings show that virtual visits can be considered a new service due to the implication of an additional channel to get medical guidance and care.

2.3 Content

Virtual visits provided by telemedicine companies bring with them a variety of services. However, virtual visits are neither capable of diagnosing and treating all types of symptoms nor are they relevant for all types of patients (Johansson, Lindberg, & Söderberg, 2014a). Hence, it is important to identify not only the services that are provided in virtual visits, but also when (symptom types) and to whom these services are most suitable.

2.3.1 Services

The introduction of virtual visits, and the ability for patients to communicate with their physicians remotely brought with it many different services. Through virtual visits, patients can communicate with physicians for several purposes such as consultation, diagnosis, and the prescription of medication (Hurst, 2016). Patients have the possibility to use virtual visits as a preliminary step before having a face-to-face meeting with the physician or can use a virtual visit after physically meeting the physician as a useful follow up tool. Researchers currently disagree on whether the first meeting should be done in-person or virtually. In a study conducted to evaluate patients' experiences with virtual visits in rural areas, patients believed that meeting the physician virtually and receiving the diagnosis is a good first step (Johansson, Lindberg, & Söderberg, 2014a). In contrast with this view, Johansson, Lindberg, & Söderberg's (2014b) findings, showed that healthcare personnel believe that the first meeting of the patient with the physician should take place in a clinic with both the patient and physician physically present.

In Sweden, there are three main telemedicine companies that give people the opportunity to have virtual visits while at the same time offering different services (Business Sweden, 2018). Kry provides video consultation for patients (Kry, n.d), whereas Doctor24 initially starts with a chat service that could then go to video if needed (Doctor24, n.d). MinDoktor, on the other hand, offers a somewhat different service with patients filling out questionnaires about their symptoms first prior to contacting the physician through text, phone, or video (MinDoktor, n.d). An application which goes one step further is UK-based Babylon which provides treatment for patients based on AI symptom checkers (Ram, 2018).

2.3.2 Symptoms

Existing literature does not provide clear evidence about when virtual visits are most effective (Atherton et al. 2018; Deloitte, 2018; Johansson, Lindberg, & Söderberg, 2014a; Kahn, 2015; PWC, 2016). One of the most popular types of diagnosis that can be performed virtually is dermatologic diagnosis, i.e. skin diseases. These seem to receive a unified agreement among researchers (Ekman, 2017; Johansson, Lindberg, & Söderberg, 2014a; Johansson, Lindberg, & Söderberg, 2014b; PWC, 2016;). Besides supporting virtual consultations in dermatology, that virtual consultations are used in ophthalmology, cardiology, and psychiatry (Johansson, Lindberg, & Söderberg, 2014b). However, not all diagnosis can be done virtually (Atherton et al. 2018; Johansson, Lindberg, & Söderberg, 2014b; Rexha & Telemo-Nilsson, 2016). Virtual visits can be used for straightforward visits (Atherton et al. 2018). This is also supported by the survey conducted by Deloitte (2018), where 35% of respondents agreed that virtual visits are most suitable for non-critical or emergent conditions. Situations that require taking samples for lab tests or physical examination are not suitable for virtual visits (Accenture, 2015; Randhawa et al. 2018). However, there are future prospects that aim at expanding diagnosis types that are suitable for virtual visits (See section 2.6).

2.3.3 Patient Types

It is also of vital importance to understand the type of patients that are best served by virtual visits as many studies have called for (Atherton et al. 2018; PwC, 2016). According to a patient survey and observational study conducted by McGrail, Ahuja, & Leaver (2017), younger

patients are more likely to seek virtual visits. This is understandable since younger patients are supposed to adapt easier and quicker to innovative technologies. The success of the virtual visit depends also on the type and severity of illness (Epstein et al. 2005). According to a qualitative pilot study conducted by Randhawa et al. (2018) to evaluate views of general practitioners on virtual visits, the results are contradictory. Some of the respondents believe that virtual visits are not appropriate for mentally ill patients whereas other believe otherwise (Randhawa et al. 2018). Patients with disabilities like blindness, deafness, limitations in movement and the elderly would be most interested in virtual visits under appropriate and facilitating conditions (Atherton et al. 2018; Kahn, 2015). One thing many researchers agree on is that patients living in remote and rural areas benefit from this service due to the unavailability of healthcare providers in their areas (Bhatia & Falk, 2018; Johansson, Lindberg, & Söderberg, 2014a; Johansson, Lindberg, & Söderberg, 2014b; Kahn, 2015; PwC, 2016; Randhawa et al., 2018).

2.4 Perceived Benefits

2.4.1 Accessibility

Most of the articles that focus on exploring virtual visits agree that the main benefit is accessibility, especially for people who live in rural areas or people with disabilities who have difficulties in visiting a clinic (Kahn, 2015; Rexha & Telemo-Nilsson, 2016; PwC, 2016; Johansson, Lindberg, & Söderberg, 2014a). (Shah et al. 2018) advocate that virtual visits bring improvement in accessibility which in turn leads to limiting healthcare consumption. According to Shah et al. (2018), 29% of virtual visits replaced physical visits, whereas 71% represented new utilization. The potential of virtual visits to avoid the unnecessary use of healthcare resources is also acknowledged by (Husebø & Storm, 2014; Johansson, Lindberg, & Söderberg, 2014a; PwC, 2016). Hence, virtual visits give certain patients access to a new healthcare service while also lifting off some of the load off clinics and emergency rooms, thereby giving people who really need to be examined physically more accessibility.

2.4.2 Cost

Furthermore, the economic cost of virtual visits is known to be less compared to face-to-face visits... *“it’s \$40 or \$50 per visit, about half the cost of an in-person visit.”* (Godman, 2016). Kahn (2015), (Dixon & Stahl, 2008), and PwC (2016) explain this reduction in costs with the elimination of travel expenses and missed days of work from patients as a significant opportunity cost. The reduction of costs is also supported by other studies (McGrail, Ahuja, & Leaver, 2017; Rexha & Telemo-Nilsson, 2016;). In line with these studies, Ekman’s (2017) comparison of digital and physical primary care in Sweden concludes that the total economic cost of a virtual visit is 1960 SEK compared to 3348 SEK for a traditional face-to-face visit. This is because virtual visits use fewer resources (Ekman, 2017). Ekman further predicts that cost savings of 1-10 billion SEK per year should virtual visits expand. This prediction is also supported by PwC (2015) stating that the Swedish healthcare system could save 1.2 billion SEK per year if virtual visits expanded at a ratio of 1/10 in relation to the total number of primary care visits. However, the issue has been the subject of debate recently. In a pilot study conducted by Randhawa et al. (2018), some of the general practitioners believed that on the

long run, the financial benefits of virtual visits will outweigh their initial costs, whereas others disagreed by stating that virtual visits would not save money (Randhawa et al. 2018).

2.4.3 Time

Although Husebø & Storm (2014) conclude that there is a lack of evidence on cost savings, their case study on nurses showed that virtual visits have 60%-time reduction compared to physical ones. Based on the results of their study on 30 patients that used both types of visits, Dixon & Stahl (2008) confirm that virtual visits are time-effective. PwC's (2016) findings show that 400 GP hours were saved in a pilot study conducted in the UK with 130,000 patients who were provided access for consultations through digital means for six months. A study conducted with general practitioners showed their agreement with the fact that virtual visits improve their accessibility to see the patient, without needing to drive to their home, thereby saving time confirms this benefit (Randhawa et al. 2018). Similar findings could be found in studies conducted in Sweden. Ekman (2017), for instance, stated that a face to face visit lasts approximately 24 minutes, whereas a virtual visit lasts 15 minutes. This occurs because the volume of medical records is less in virtual visits compared to physical visits. The fact that doctors have health information on the patient beforehand with enough time to analyse it is also a significant factor in reduced time (Accenture, 2015; Liu et al. 2007).

2.4.4 Quality of Care

According to PwC (2016), virtual visits reduce patients' mortality rate which is a clear indication of enhancing the quality of care. In line with this, Johansson, Lindberg, & Söderberg's (2014b) study on physicians' perspectives about video consultations in rural areas acknowledges that virtual consultations improve the quality of care. Dixon & Stahl's (2008) findings, on the other hand, show that quality of care in virtual visits is satisfactory but there is no significant difference in quality with physical visits from the physicians' perspective.

Kahn (2015) believes that the aforementioned benefits and any others are theoretical and far from reality. One of the goals of this study is to confirm these benefits through interviews with different stakeholders within telemedicine and explore any other benefits of virtual visits.

2.5 Perceived Challenges

2.5.1 Technological

Technological challenges are often discussed amongst physicians and decision makers when comparing between physical and virtual visits. The basis of virtual interactions is the communication technologies that allowed to have them in the first place (Istepanian & Lacal, 2004). Thus, one of the initial constraints to the use of virtual interactions, especially in rural areas, was the possession of an adequate telecommunications infrastructure (Puskin, 1995). While telecommunications have seen a rapid evolution, with its technologies rapidly spreading, there are still places around the world that may suffer from poor infrastructure which in turn can have an effect on the quality of remote visits.

Other technological challenges have to do with technologies that are currently available in smartphones that help physicians make a diagnosis. Earlier problems with technology such as poor video and sound quality could have hindered diagnosis (Careau, Vincent and Noreau, 2008; Varkey et al. 2008). This concern, however, may have been addressed recently with the evolution of smartphones and their ability to provide high resolution video and sound quality. A study conducted by Aoki, Pereira and Matayoshi (2019) showed that for eyelid tumors, images taken by a smartphone camera were equivalent and as accurate for diagnosis as those taken by a conventional digital camera. On the other hand, concerns relating to the failure of technologies have been noted by researchers (Barry et al. 2003; Johansson, Lindberg and Söderberg, 2014b; Baumann and Scales, 2016). Not only are there concerns on the technology failing or encountering a certain problem, but questions have often been raised around the accuracy of the sensors in smartphones when making diagnosis. A study to calculate the accuracy of smartphone applications in assessing melanoma risk found that 3 out of the 4 smartphone applications used in the survey provided incorrect classifications (Wolf et al. 2013). Jarvis-Selinger et al. (2008) have noted a lack of confidence in the utility of ICT tools by staff. A survey conducted by Koivunen, Niemi & Hupli (2015) showed that nursing professionals noted no clear instructions on the use of the technology that was provided to them and inadequate IT support.

2.5.2 Behavioural

The behavioural aspect deals with how physicians perceive this new method of interacting with patients and the challenges they face when using this method. One of the main challenges that physicians that use virtual visits face is that they empower patients thereby undermining the role of the physician. It is noteworthy that the relationship between patient and physician along with physicians' authoritative power over the years is threatened by new technologies such as virtual visits (Malvey & Slovensky, 2015).

Physicians have also previously shown dissatisfaction with virtual visits for reasons relating to communication barriers between them and patients when not physically present. In a study comparing virtual visits and physical visits conducted by Liu et al. (2007), physicians felt that virtual visits were inferior to physical visits when it came to their ability to express empathy towards the patients.

2.5.3 External

When exploring virtual visits and the challenges associated with them, external factors relating to legislation and regulations can be considered to be a barrier in need of overcoming. In this respect, strict regulations are imposed by governments to ensure the quality of health services and to protect both patients and physicians from malpractice (Hurst, 2016). In the United States for example, the FDA has regulations regarding any hardware or software that contributes to telemedicine (U.S. Food and Drug Administration, 2015). Legislation challenges also include the difference in laws between different states and countries. Concerns regarding cross-state licensing are always raised and are considered to be one of the greatest challenges that impede the expansion of virtual visits (Breen & Matusitz, 2010; Kahn, 2015).

EU countries vary with regards to state regulations. Germany is a case in point. To start with, Germany is an example of a country that can be considered far behind leading countries in

telemedicine due to its strict regulations (Schröder & Telgheder, 2017). Traditionally, German laws have always been strict when it came to telemedicine with bans on treating patients via telemedicine applications (OsborneClark, 2017a). Physicians could only provide treatment virtually if they had seen the patient physically at least once. However, in recent years, regulations in Germany have been relaxed and physicians can now provide treatment without a prior meeting with the patient (OsborneClark, 2018b). However, there are still obstacles in German law such as prescribing pharmaceuticals remotely. Another law preventing the widespread use of virtual visits in Germany is a prohibition on advertising telemedicine services (OsborneClark, 2018b).

Another external challenge is incentivizing physicians (Malvey & Slovensky, 2015). Physicians have historically shown resistance to adopting new technologies or methods of doing things until being reimbursed. An example of this is a noticeable change in the adoption of electronic health records after physicians were subsidized by governments (Malvey & Slovensky, 2015).

With technology evolving rapidly, regulations do not have the pace to keep up with the changes and the possibilities that can be achieved with technological innovations (Kahn, 2015). This can lead to a halt in services and innovations that could further augment virtual visits but are impossible to implement from a regulatory perspective.

2.6 Future Opportunities

Statistics concerning virtual visits show that they are rapidly growing. It is predicted that by the year 2020, virtual visits will see a 700% increase compared to the year of 2014 (Horner, 2018). Several scientific articles have called for studies that focus on improvements or future opportunities of virtual visits (Atherton, et al. 2018; Johansson, Lindberg, & Söderberg, 2014a; Johansson, Lindberg, & Söderberg, 2014b; PwC, 2016). However, after a systematic review of the available literature, only one article focuses on the opportunities virtual visits can provide in the future (PwC, 2016). Literature related to virtual visits mostly aims at making the comparison between virtual visits and physical visits by estimating the effects of the former on healthcare. For healthcare to undergo the digital transformation required to improve, the industry needs to take full advantage of initiatives like virtual visits (PwC, 2016). Hence, understanding the opportunities for virtual visits is important.

2.6.1 Customization

Customization in the sense of tailoring virtual care solutions to each patient, is identified as a future opportunity (PwC, 2016). The use of digital tools to diagnose and tailor the treatment necessary to the patients' needs is an important part of the e-health vision for 2025 (eHälsomyndigheten, 2017).

2.6.2 Remote real-time devices

The introduction of remote real-time devices may augment virtual visits. This entails using devices in coordination with smartphones to send data to physicians to aid in diagnosis (PwC,

2016). Examples of this are urinalysis tests done using a device attached to the smartphone and checking for ear infections by using another medical device that would also be integrated into the phone (PwC, 2016). In a survey conducted by PwC (2016), physicians were asked whether it was possible to diagnose diseases based on information provided in real-time from the patient with measurement devices and sent wirelessly to the physician. Specifically, when asked about having an echocardiogram device at home, the results were that 23% of them agreed that this was very possible, whereas 15% believed it was possible to measure an ear infection through a medical device attached to the smartphone (PwC, 2016). It is noteworthy that this study was conducted in Sweden, which is considered to be a force in health technology (Business Sweden, 2018).

2.7 Context

According to McGrail, Ahuja, & Leaver (2017), the importance of virtual visits is expected to increase even though at the moment, virtual visits are considered to be a small part of primary care. Virtual visits are seen as supplementary to traditional forms of access, not a replacement to them (McGrail, Ahuja, & Leaver, 2017). For virtual visits to become as important as physical visits, healthcare should take advantage and make the best use of future opportunities (See section 2.6). After exploring such future opportunities, it is important to explore what is required for virtual visits to augment or make use of identified opportunities. Requirements that need to be in place to ensure virtual visits reach their potential will be explored in this study. The available literature does not focus on suggesting ways or plans to ameliorate virtual visits, but rather focuses on comparisons between virtual visits and physical visits. The identification of conditions required to improve virtual visits may be seen as a starting point of making virtual visits an integral part of health care.

2.8 Conceptual Framework

After exploring the previous sections, a framework consisting of six main themes has been developed. These themes are respectively: novelty, content, benefits, challenges, future opportunities, and context. The goal of this study is to explore the phenomenon of virtual visits; hence, the first theme deals with how stakeholders perceive the novelty of virtual visits. This is crucial to understand how virtual visits changed traditional healthcare. This is followed by the theme of content. To address this theme, informants were asked about the telemedicine application they use to conduct virtual visits and the services their application offers. This is to gain a general insight on the different applications out there and the capabilities of these applications and the services they provide. The informants are also asked about their role within the telemedicine company whether it be in their capacity as physicians who communicate with patients or as employees with business or technology related roles within the company who are in charge of the planning and running of the application. It is also important to know the types of patients who benefit most from virtual visits. The following theme encompasses the perceived benefits of virtual visits based on the literature review. These include accessibility, cost, time, and quality of care. However, as will be shown, despite all their benefits, whether virtual visits will be able to rival physical visits is still questionable (Shah et al. 2018). Not all diagnoses supported by physical visits are suitable for virtual visits (Husebø & Storm, 2014) which leads us to the following theme of challenges. This theme classifies

challenges in terms of technological, behavioural and external factors. Technological challenges are challenges related to technology such as downtime, sound/video quality or lack of IT support. Behavioural factors have to do with the challenges physicians face in their daily work with virtual visits and challenges in their communication with patients. Lastly, external factors have to do with laws that stand in the way of companies that try to expand telemedicine applications. The next two themes deal with the future of virtual visits and aim at understanding how virtual visits can be augmented to become an integral part of healthcare. The first theme explores the potential future opportunities for virtual visits. Informants are asked about the plans their companies have in place in order to improve virtual visits. Lastly, the theme of context aims at understanding what is required for the identified opportunities of virtual visits to become reality. This will serve as a roadmap for successfully augmenting the capabilities and uses of virtual visits.

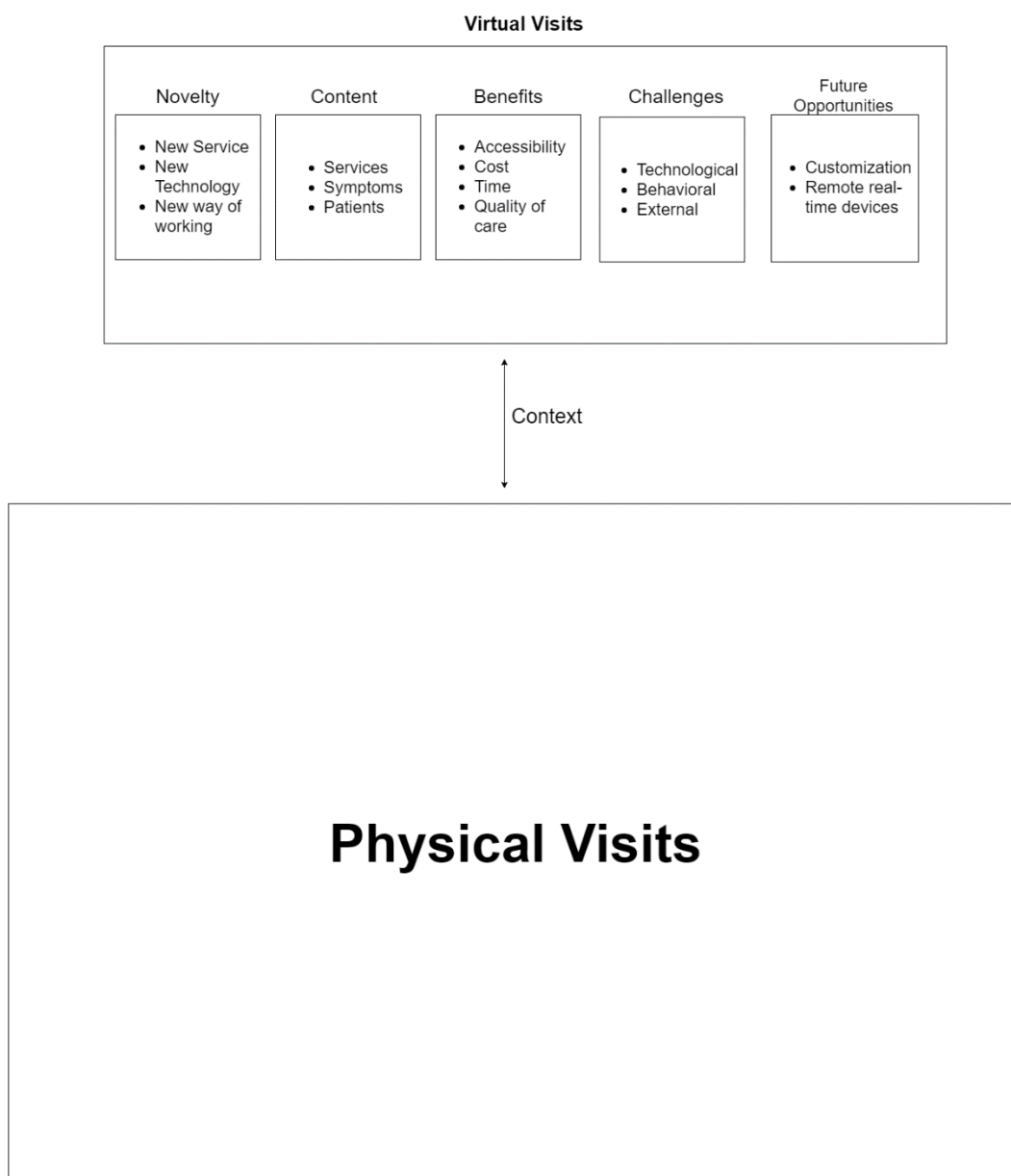


Figure 2.2: Conceptual Framework

The large rectangle in the framework represents traditional physical visits held between patients and physicians whereas the smaller rectangle represents virtual visits. This is to represent the difference in diseases that can be diagnosed in the two types of visits and importance of each type to healthcare. Many diagnoses that are done physically cannot be done virtually. The virtual visits rectangle contains the five themes of novelty, content, benefits, challenges, and future opportunities. The theme context, which deals with the conditions that need to be in place for virtual visits to augment, is between the virtual visits rectangle and the physical visits one to show that it is by addressing this theme that virtual visits can expand and reach their full potential thereby, being an integral part of healthcare just like physical visits are.

The following table shows the literature found on each of the themes in the framework that was developed.

Table 2.1: Literature Classified into Themes

Theme	Sub-theme	Literature
Novelty	New Service	Greenhalgh et al. (2016) Rexha & Telemo-Nilsson (2016)
	New Technology	Greenhalgh et al. (2016)
	New way of working	Johansson, Lindberg, & Söderberg, 2014b (2014)
Content	Service Types	Ram, (2018)
	Diagnosis Types	Accenture (2015) Atherton et al. (2018) Deloitte (2018) Ekman (2017) Johansson, Lindberg, & Söderberg (2014a) Johansson, Lindberg, & Söderberg (2014b) PwC (2016) Randhawa et al. (2018) Rexha & Telemo-Nilsson (2016)
	Patient Types	Atherton et al. (2018) Bhatia & Falk (2018) Johansson, Lindberg, & Söderberg (2014a) Johansson, Lindberg, & Söderberg (2014) Kahn (2015) McGrail, Ahuja, & Leaver (2017) PwC (2016) Randhawa et al. (2018)
Perceived Benefits	Accessibility	Kahn (2015) PwC (2016) Rexha & Telemo-Nilsson (2016) Shah et al. (2018)

	Cost	Dixon & Stahl (2008) Harvard Health Letter (2016) Kahn (2015) PwC (2016) Rexha & Telemo-Nilsson (2016)
	Time	Dixon & Stahl (2008) Husebø & Storm (2014) Liu et al. (2007) PwC (2016)
	Quality of Care	Dixon & Stahl (2008) PwC (2016)
Perceived Challenges	Technological	Barry et al. (2003) Baumann and Scales (2016) Careau, Vincent and Noreau (2008) Johansson, Lindberg and Soderberg (2014b) Koivunen, Niemi & Hupli (2015) Varkey et al. (2008) Wolf et al. (2013)
	Behavioural	Liu et al. (2007) Malvey & Slovensky (2015)
	External	Breen and Matusitz (2010) Kahn (2015)
Future Opportunities	Customization	PwC (2016)
	Remote real-time devices	PwC (2016)
Context		No Available Literature

3 Methodology

This chapter is an overall description of the strategy and of the methods that will be taken in this research. The approach, the data methods, and data analysis techniques are all described in this chapter along with the rationale for using such methods and techniques. The chapter is concluded by a discussion of the importance of abiding the scientific quality and ethics standards.

3.1 Research Strategy

Our research questions lead to the choice of a qualitative research method since "...qualitative research aims at understanding phenomena in context." (Recker, 2013, p. 88). The phenomena that this thesis aims to explore is virtual visits as one of the main services provided by tele-medicine companies. To achieve this goal, the perception of different stakeholders was analysed by considering certain factors that may have affected their perception. Factors such as their role, company they work for, and the regulations of country they work in, are all important to fully understand the phenomenon under study. In addition to contextualization, studying the phenomenon in depth is another benefit of applying the qualitative research method (Brinkmann & Kvale, 2005; Creswell, 2014; Recker, 2013). In contrast to quantitative research, qualitative research is focused on text and peoples' beliefs, behaviours and experiences (Haradhan Kumar Mohajan, 2018). Furthermore, the phenomenon of virtual visits is still emerging and not yet mature in terms of theoretical research and implementation which is another reason for using a qualitative research method which is appropriate for phenomena that have not been fully explored (Recker, 2013).

The most appropriate paradigm for qualitative research is interpretivism, because of their interconnected goal of understanding in-depth human behaviour and experiences in a specific context (Thanh & Thanh, 2015). Our research goal is exploring virtual visits through understanding of informants' perceptions which is in line with the paradigm of interpretivism. Furthermore, an interpretive approach provides a rich theoretical understanding of the phenomenon under study (Ponelis, 2015). This study thus aims at drawing conclusions based on a systematic literature review and observations of empirical data, in order to contribute theoretically to the identified problem areas (See section 1.2).

3.2 Data Collection

3.2.1 Literature Selection

In order to explore virtual visits, a systematic literature review was conducted. The importance of the literature review lies in the understanding of the current state of the problem area, of existing theories and research methodologies (Recker, 2013). In addition to this, (Randolph, 2009) states that a careful and systematic literature review makes the researcher avoid useless approaches and most importantly, provides new insightful perspectives.

The process of literature selection and review was the most time-consuming and intense. It was however indispensable to developing the theoretical framework applicable to virtual visits, which served as a guide to drive the empirical investigation. The primary sources used to select influencing academic studies were Google Scholar and LUBSearch, the online library of Lund University. In order to select the most relevant literature for the topic, different queries were used.

A challenge faced during literature selection was the lack of a unique term for virtual visits. Different studies name this innovation in different ways, for instance: virtual/remote visits and virtual/remote consultations. Hence, the queries included all the afore-mentioned terms in order to avoid missing relevant literature. However, other interchangeable terms might exist and there is an awareness that missing their corresponding literature is a potential risk for the quality of this research. The main queries retrieved were as follows:

Query 1: ("remote" OR "virtual") AND ("visits" OR "consultations")

An important part of our research focuses on identifying differences between virtual and physical doctor-patient interaction. The implication of this search lies in identifying the strengths and limitations of virtual visits by comparing them with physical visits. For instance, some of the queries that were used to extract articles relevant to the topic were:

Query 2: patient* AND ("doctor*" OR "physician*") AND interaction*

Query 3: ("remote" OR "virtual") AND ("visits" OR "consultations") AND ("benefits" OR "strengths")

Query 4: ("remote" OR "virtual") AND ("visits" OR "consultations") AND ("challenges" OR "limitations" OR "constraints")

The selection process went through three main steps: Firstly, titles of articles were observed, and all duplicates were removed. Titles that showed that their articles solely served a medical audience were removed as well. The second step consisted of carefully reading the abstracts of the articles. Many articles focused on how patients perceive and adopt virtual visits, which is not the goal of this study and hence, they were removed. In the final step, the full text of the remaining articles was read by both of the researchers. All the selected articles were critically analysed, with the goal of trying to find insightful as well as contrasting ideas among them, a strategy supported by Randolph (2009). Literature search procedures are explained in detail and documented to ensure the transparency and hence transferability of our research, in accordance with Randolph (2009).

3.2.2 Interviews

A qualitative research method, in combination with an interpretive approach makes interviews suitable as a data collection technique (Bhattacharjee, 2012; Recker, 2013). Interviews provide rich contextual information, based on feelings, emotions and the thoughts of informants (Oates, 2006). In order to maximize informants' output, a symmetric dialogue was adopted to establish trust between the two parties and hence encourage informants to freely express their opinions or feelings (Kvale, 2006). A script of pre-determined questions was developed and then used as a guide during the interview process (Recker, 2013). The script consisted of the main themes of the developed framework, with the flexibility to have changes throughout the

interview (Myers & Newman, 2007). Hence, the type of interviews was semi-structured to ensure flexibility, improvisation and facilitate the discussion between the two parties (Myers & Newman, 2007; Oates

, 2006; Recker, 2013). This was done to extract more in-depth information and knowledge out of the informants. The term “informant” is used throughout this study rather than the term “respondent” since the aim is to obtain information and not just answers. To achieve this, Yin’s (2003) advice of using open-ended questions was followed. Recker (2013) further explains the advantages of semi-structured interviews, by stating that two-way communication makes it more personal and hence enables the informant to reveal hidden and perhaps, sensitive information. With this type of interviews, the aim is to gain a deeper understanding of virtual visits, based on telemedicine stakeholders’ perceptions, beliefs and experiences.

Interview Guide

The interview guide was developed in accordance with the presented conceptual framework (See Section 2.8) and the questions were categorized based on the framework’s themes. The compatibility between the conceptual framework and interview ensures that the interview questions, and their answers target the identified problem; thereby meeting the main purpose of answering the research questions.

Table 3.1: Interview Guide based on Framework Themes

Themes	Sample Question
<p>Novelty</p> <ul style="list-style-type: none"> • New service • New technology • New ways of working 	<ul style="list-style-type: none"> • Do virtual visits represent a new technology or a new service? • How have virtual visits changed physicians’ way of working ?
<p>Content</p> <ul style="list-style-type: none"> • Services types • Diagnosis types • Patient types 	<ul style="list-style-type: none"> • What services does your application provide to its patients? • What symptoms/diseases can be diagnosed virtually? • What kind of patients benefit the most from virtual visits?
<p>Perceived Benefits</p> <ul style="list-style-type: none"> • Accessibility • Cost • Time • Quality of care 	<ul style="list-style-type: none"> • What in your opinion are the benefits of virtual visits? <ul style="list-style-type: none"> ▪ Accessibility ▪ Cost ▪ Time ▪ Quality of care
<p>Perceived Challenges</p> <ul style="list-style-type: none"> • Technological • Behavioural 	<ul style="list-style-type: none"> • What in your opinion are the challenges of virtual visits? <ul style="list-style-type: none"> ▪ Technological

<ul style="list-style-type: none"> • External 	<ul style="list-style-type: none"> ▪ Behavioural ▪ External
<p>Future Opportunities</p> <ul style="list-style-type: none"> • Customization • Remote real-time devices 	<ul style="list-style-type: none"> • What needs to be done in the future to augment virtual visits?
<p>Context</p>	<ul style="list-style-type: none"> • What conditions need to be in place to make use of remote diagnostic tools to augment virtual visits?

Recording and transcribing are two important phases of the interview process, because their quality impacts the quality of evidence and hence, the overall objectives of the research (Recker, 2013). Oates’ (2006) advice on the methods consists of a combination of audio recording and field notes. While audio recording was indispensable in order to capture informants’ answers, field notes were not used as most of the interviews were done via phone. It is important to mention that permission to record the interviews was asked beforehand, as recommended by (Bhattacharjee, 2012). In the end, recordings were transcribed carefully by both the researchers of this study, immediately after each interview, with an awareness of the fact that transcribing is a time-consuming process (Oates, 2006).

3.2.3 Informants Selection

The focus of this thesis is on telemedicine companies that provide virtual visits. The strategies used for the selection of these companies were convenience sampling and snowball sampling as supported by (Myers & Newman, 2007). Firstly, we visited a telemedicine company located in Sweden, due to the convenience of the location. Then, some of the informants were asked for recommendations and then contacted by email. Other informants were contacted through our personal network. However, what was mostly important during the selection of informants was to contact stakeholders of telemedicine companies. By having informants from a variety of telemedicine companies, generalizability is ensured, and thus, the findings may be applied to other telemedicine companies. To gain a complete and deep understanding of virtual visits, different kinds of informants were selected in order to ensure different perspectives were considered. Stakeholders under study are experts in different areas of telemedicine companies: business, technology and organization in terms of C-suite employees and other employees such as physicians. The choice of experts in the field is in line with the recommendation of Bhattacharjee (2012) of selecting informants with in-depth knowledge and expertise regarding the topic. Furthermore, a diversity of informants has a two-fold advantage: first. It leads to diverse perspectives and second, it is useful to fully understand the bigger picture of the phenomenon under study (Bhattacharjee, 2012).

The perspective of physicians is important since they are the core part of healthcare in general and virtual visits service in specific (Malvey & Slovensky, 2015). Hence, they are the people who use virtual visits and as a result, the most appropriate target group to understand the content, benefits, and challenges of virtual visits. Ultimately, telemedicine companies are businesses with the goal of maximizing their profit. To achieve this goal, new ways to expand the business should be found constantly. Hence, people involved in the business development sector are the ones who can give useful insights into future opportunities for this business.

The viability of such opportunities depends on the existence of specific conditions, most importantly on the technological level. Thus, it is crucial at this stage of the research to have the perspective of the stakeholder of telemedicine companies involved in the technological and innovative sector. Below, all the respondents and their respective telemedicine companies will be described briefly.

Info1 is the head of innovation at MinDoktor. MinDoktor is one of the first Swedish telemedicine companies or digital health centres, starting its operation in 2014 (Ekman, 2017). MinDoktor offers guides about a variety of health problems such as skin conditions, mental illness, cold-related disorders, etc. Furthermore, MinDoktor offers the patient the possibility to talk with over 70 experienced doctors whether by messages, phone, or video, providing diagnosis and if needed medical prescriptions (MinDoktor, n.d). *Info1* joined MinDoktor in the early stages, hence, his perception is valuable to understand virtual visits since their inception and throughout their development process. Despite his experience, his role is another factor that makes his perception relevant to this study. He acts as a liaison between the tech department and clinicians and he is always looking for new products or services to integrate into existing ones to get new customer or patient segments. Thus, he is especially useful in understanding future opportunities of virtual visits and also the context or the requirements that need to be in place in order for new innovative technologies to be implemented and hence to ensure that virtual visits augment.

Info2 is a physician; a general medicine doctor at Push Doctor. She has worked with Push Doctor since October 2017. Push Doctor is a UK-based telemedicine company that offers video appointments with NHS-trained GPs (PushDoctor, n.d). Since *Info2* is a user of virtual visits, her opinion is insightful in understanding the content of this innovation, perceived benefits and challenges. As physicians are considered the core driver of healthcare culture (Malvey & Slovensky, 2015), their expertise is important and useful for this study as we have mentioned earlier. *Info2* provides several real-life case scenarios and facilitated our understanding of virtual visits.

Info3 is CMO (Chief Medical Officer) and co-founder of HealthTap. HealthTap is a leader in digital health and in 2018, it served 7 billion answers to different health queries (HealthTap, n.d). It serves hundreds of millions of users and delivers care through over 140,000 doctors in more than 170 countries (HealthTap, n.d). It is important to have the perspective of this company due to its development in technological terms. For instance, the use of augmented intelligence through the app Dr.AI is useful in assisting both patients and doctors, in the sense of engaging patients into learning more about their symptoms and directing them to the appropriate care (HealthTap, 2018). Despite the importance of the company, understanding the standpoint and perception of one of the most influencing peoples in the company is useful to provide insights into the evolution of virtual visits and their future opportunities.

Info4 is the CEO of Campus RX. Campus RX provides access to telemedicine service mainly for students (CampusRX, n.d). It is interesting to have this perspective because compared to other telemedicine companies, Campus RX, a company that started over 3 years ago, has a specific target group, i.e. students. *Info4* is the main decision-maker of the company, hence his insights could prove important to this study.

Info5 is a physician at HealthTap and TelaDoc Health, practicing remote medicine since 2014. TelaDoc Health is considered the most comprehensive virtual care solution in terms of general medical, mental health and complex care (Teladoc, n.d). TelaDoc serves millions of

people in 130 countries with over 30 languages through more than 50,000 expert specialists (Teladoc, n.d). As the main user of virtual visits, Info5 provided us with his perception about the benefits of virtual visits, but also with difficulties that he faces in his everyday work. His opinions are very valuable, as a physician with experience in both physical and virtual care and a broad background in different disciplines such as emergency room, surgery, paediatrics, and more.

Info6 was previously a business developer at MinDoktor. Info6 worked with MinDoktor for 4 years and a half. She started in 2015, during the early stages of the company. As a business developer, Info6 was useful in understanding virtual visits from a business perspective, i.e. how and why it started and what is expected in the future.

Info7 is the co-founder of Aiten, a registered healthcare provider in Sweden, with the vision of giving patients with chronic conditions the possibility to control their conditions through digital tools (Aitenhealth, n.d). Their combination of the digital doctor with connected measuring equipment (Aitenhealth, n.d) is very interesting and in line with what this research is trying to explore. Info7 has also worked as a business developer at MinDoktor, with the role of expanding and building out the business. Info7 provided us with interesting insights into future opportunities of augmenting virtual visits especially for chronic diseases and also requirements that need to be set in order for these connected devices to be functional and valuable.

Info8 has been CMO (Chief Medical Officer) of MDLive since 2018. MDLIVE is one of the best telemedicine companies in the United States (CPOE, 2018). Their core service is offering visits with doctors through phone or online. Doctors provide health guidance for over 50 minor illnesses categorized into medical (common cold, allergies, cough, etc), behavioural health (depression, stress, anxiety, etc) and dermatology (acne, skin cuts, etc) (MDLive, n.d). Due to his extended background in healthcare, Info8 provided us with a very interesting background of telemedicine since the late 90s with email and phones, until the latest developments around virtual visits.

Info9 is the Chief Business Development Officer at Doktor24, based in Sweden. Doktor24 gives the possibility to patients to meet doctors and psychologists and the visit starts with a chat, moving to video if necessary (Doktor24, n.d). Info9's job consists of overseeing all business activities across the company. The information he provided was very useful especially in the part of future opportunities, by identifying interesting lines of development and the requirements that need to be in place for virtual visits to be enhanced.

The following is a table with details about the interviews that took place with the informants:

Table 3.2: Scheduled Interviews

Informant code	Position	Organization	Date	Medium	Length
Info1	Head of Innovation & Partnerships	MinDoktor	07/05/2019	Face-to-face	1 hour 5 minutes
Info2	Physician	PushDoctor	05/05/2019	Phone	1 hour
Info3	CMO/Co-founder	HealthTap	03/05/2019	Phone	34 min
Info4	CEO	Campus RX	03/05/2019	Phone	42 min
Info5	Physician	HealthTap & Teladoc Health	10/05/2019	Phone	45 min
Info6	Business Developer	MinDoktor	07/05/2019	Google hangout Video	35 min
Info7	Co-Founder/ Business Developer	Aiten/ Min-Doktor	06/05/2019	Phone	30 min
Info8	CMO	MDLive	21/04/2019	Email	-
Info9	Chief Business Development Officer	Doktor24	16/05/2019	Google hangout Video	32 min

3.3 Data Analysis

According to Recker (2013), qualitative research leads to an abundance of qualitative data, which makes it difficult for the researcher to analyse data due to time limit and lack of experience. However, in his impactful social science research article, Bhattacharjee (2012) advocates employing qualitative analysis based on sense-making as the most appropriate analysis method for qualitative research. In support of Bhattacharjee's (2012) suggestion of employing qualitative analysis, Miles & Huberman (1984), proposed a flow model consisting of three main components of data analysis that "communicate" iteratively: data reduction, data display and conclusions: drawing/verifying (see Figure 3). This model was followed for the analysis of data collected in this research.

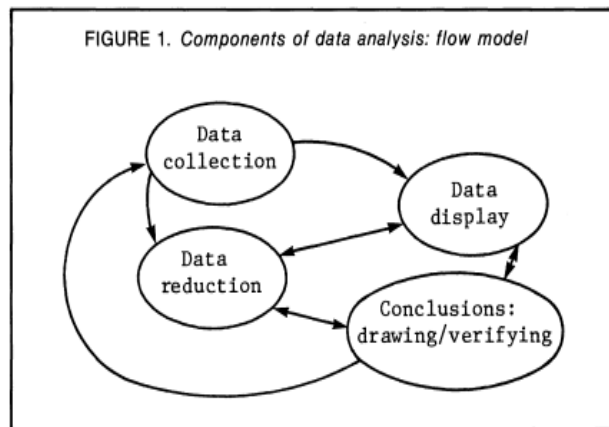


Figure 3.1: Components of data analysis: Flow Model

Source (Miles & Huberman, 1984)

Data reduction is not constrained within the qualitative analysis process, but the data is reduced continuously throughout the whole research, probably unconsciously from the researcher (Miles & Huberman, 1984). Miles & Huberman (1984) refer to data reduction as the process of selecting, simplifying and transforming raw data into organized data with the goal of drawing valid meaning and hence valid conclusions. The data reduction tool that was used in this research is coding schemes, as recommended by many scholars (Miles & Huberman, 1984; Paré, 2004; Recker, 2013). The Coding scheme was driven from the conceptual framework (see Section 2.8), which in turn was driven by the research questions (see Section 1.2).

Table 3.3: Coding Scheme

CODE	Framework Elements
<i>Nov</i>	<i>Theme 1: Novelty</i>
Nov-Serv	<ul style="list-style-type: none"> • Service
Nov-Tech	<ul style="list-style-type: none"> • Technology
Nov-Work	<ul style="list-style-type: none"> • Way of working
<i>Cont</i>	<i>Theme 2: Content</i>
Cont-Serv	<ul style="list-style-type: none"> • Services
Cont-Diag	<ul style="list-style-type: none"> • Diagnosis
Cont-Pat	<ul style="list-style-type: none"> • Patients
<i>Ben</i>	<i>Theme 3: Benefits</i>
	<ul style="list-style-type: none"> • Accessibility

Ben-Acc	<ul style="list-style-type: none"> • Cost
Ben-Cos	<ul style="list-style-type: none"> • Time • Quality of care
Ben-Tim	
Ben-Qua	
<i>Chall</i>	<i>Theme 4: Challenges</i>
Chall-Tech	<ul style="list-style-type: none"> • Technological
Chall-Beh	<ul style="list-style-type: none"> • Behavioural
Chal-Ext	<ul style="list-style-type: none"> • External
<i>FOpp</i>	<i>Theme 5: Future Opportunities</i>
FOpp-Cust	<ul style="list-style-type: none"> • Customization
FOpp-Rrd	<ul style="list-style-type: none"> • Real time diagnosis devices
<i>Conx</i>	<i>Theme 6: Context</i>

The second activity of the flow model is data display, which consists of visualizing organized data, to facilitate the understanding of the phenomenon under study (Miles & Huberman, 1984). For instance, in this research, use cases were used to explain actor attributes and interactions using virtual visits (See Figure 4). These visualizations added value to the analysis and enhanced research validity (Miles & Huberman, 1984). Reduced and displayed data was used to extract meaning in terms of patterns and explanations of the themes (Miles & Huberman, 1984). Furthermore, the validity of the conclusions in this research was assured by using some of the techniques proposed by Miles & Huberman (1984). These techniques include looking for contrasting findings and getting feedback from informants. Despite the difficulties of getting feedback from informants, this technique has confirmatory power, as acknowledged by Miles & Huberman (1984).

3.4 Scientific Quality & Ethics

3.4.1 Research Quality

Considering that qualitative research is contextualized and interpretive, ensuring credibility, validity, consistency and hence quality is not a straightforward process. Hence, Klein & Myers's (1999) principles were applied throughout this research:

- The Fundamental Principle of the Hermeneutic Circle

In order to ensure a correct understanding of the topic of interest at a large base from preliminary conceptions or prejudices of smaller parts and their interrelations, a hermeneutic circle was applied, as suggested by Klein & Myers (1999). Moving backward and forward from the whole picture to specific parts enables unity and harmony of meanings between informants and researchers. In this study, this principle was reflected by understanding when virtual visits can be applied and under what circumstances, in order to understand why virtual visits cannot reach the expansion of physical visits. Hence, from specific parts of virtual visits and their interrelations, general understanding of healthcare in terms of both physical and virtual visits was driven.

- The Principle of Contextualization

Understanding how the specific phenomena under study emerged implies the need to set the phenomenon into the corresponding historical and social context (Klein & Myers, 1999). In the first chapter, historical background of the evolution of e-health was provided starting with telehealth, telecare, telemedicine, and ending up with virtual visits (See Section 1.1).

- The Principle of Interaction between the Research and Subjects

This principle outlines the importance of the social interaction between the researcher and participants, acknowledging the important role of participants not just as informants (Yin, 2003), but as analysts (Klein & Myers, 1999). This study aimed at enhancing the social interaction with the informants by minimizing social dissonance, as suggested by Myers & Newman (2007). The presence of social dissonance is understandable since the researchers in this case are young and have little experience in the field of healthcare. However, a focus on minimizing social dissonance by gaining extensive knowledge about the topic, before interacting with the informants was used. Furthermore, ethical considerations are a pre-requisite of the social interaction between the two parties (Bhattacharjee, 2012; Recker, 2013). Ethical considerations will be explained in details in the next section (see Section 3.4.2).

- The Principle of Abstraction and Generalization

The debate of whether conclusions drawn from qualitative and interpretive research can be generalized, is still present among researchers (Klein & Myers, 1999). However, the principle of abstraction and generalization requires comparing the research and conclusions to other researchers' findings and conclusions. That is why in Chapter 5, parallels were drawn between the findings in this research, and the findings of other researchers on the topic. Furthermore, the diversity of our informants ensures generalizability of our findings, as supported by (Bhattacharjee, 2012).

- The Principle of Dialogical Reasoning

According to Klein & Myers's (1999) principle of dialogical reasoning, the researcher should compare prejudices or initial thoughts about the topic with the final findings or conclusions. Relating this principle with the hermeneutic principle, we realize the important impact of biases in our understanding of the topic. Acknowledging the importance of considering biases, initial thoughts about the themes of interest are presented and compared to the findings driven from empirical evidence in addition to the literature review. In this study, informants' biases about virtual visits were explored and their first perceptions (See section 4) are compared with their perceptions in the post-adoption phase (See section 5).

- The Principle of Multiple Interpreters

Comparing conflicting interpretations of informants and identifying reasons why these multiple viewpoints exist is fruitful for an in-depth understanding of the topic of interest, as advocated by (Klein & Myers, 1999). The existence of multiple interpretations and the process of comparing them is supported also by Myers & Newman (2007), as a useful method of ensuring generalizability. Comparisons between different interpretations, especially those related to the perceived benefits and challenges of virtual visits were provided in this study (See section 5.3; 5.4).

- The Principle of Suspicion

The principle of suspicion goes beyond the critical analysis of the answers of informants into understanding the social world behind them (Klein & Myers, 1999). Interpretive researchers expressed their concerns about social research being suspicious, as pointed out by Klein & Myers (1999). Considering these concerns, a suspicious approach was not applied in this study.

Adherence to most of Klein & Myers's (1999) principles ensures the quality of our research. However, an important element that defines quality is reliability. According to Bhattacharjee (2012), reliability is the consistency of the construct when measured multiple times. In order to achieve reliability, transcriptions of interviews were analysed separately from the researchers of this study (Recker, 2013). Then disagreements were identified, discussed and resolved by consensual agreement.

3.4.2 Research Ethics

According to Bhattacharjee (2012) and Davison & Kock (2001), the concept of ethics corresponds to the moral distinction between right and wrong. However, identifying what is right and what is wrong is hard and easily questionable. Conducting one-to-one interviews is the best choice for researchers interested in extracting valuable information, but not that appropriate for the informants who give up from their "anonymity" (Recker, 2013). However, this research ensured anonymity and confidentiality, by not disclosing informants' names and disguising their identities (Oates, 2006). Their job positions and companies were mentioned since we do believe that this information is insightful to better understand the context and to enhance our analysis. This goes against what Walsham (2006) advocates in the sense of not revealing informants' positions and organizations' names by their real names (Walsham, 2006). It is to be noted that permission was taken from the informants to record interviews

and use the information revealed in this study, as suggested by Oates (2006), Bhattacharjee (2012), and Recker (2013).

Before starting the interviews, informants were informed about their right to not participate and to withdraw any moment of the process. Information about the research topic, reasons for interviewing, interview duration, and location were also provided to informants as recommended by Oates (2006). Honesty is the value that drives this research, as suggested by Bhattacharjee (2012), in terms of proving transparency of all decisions made, motivations behind them, along with limitations faced throughout the development of this research. To ensure accordance with ethical standards, the AIS Code of Research Conduct was followed (R. M. Davison & Straub, 2018; Recker, 2013). Most of the AIS Code of Research Conduct's ethical guidelines relate to impeding plagiarism in all its forms of using other researchers' published or unpublished methodologies, findings or even ideas and impeding the falsification of empirical data, data analysis or findings (R. M. Davison & Straub, 2018). This research aims at being original and respectful towards the work of other researchers, hoping to significantly contribute to the existing knowledge.

4 Empirical Findings

This chapter provides the findings of the semi-structured interviews that were conducted for this research and categorizes the findings into the themes that were used to develop the theoretical framework described in section 2.8.

At the start of the interviews, informants were asked about their first impressions of conducting visits with patients virtually. While not part of the framework that was developed earlier, this question was an important one to find out about any reservations the informants may have regarding virtual visits. The answers received to this question were very interesting and set out the tone of the rest of the interview.

Info3, who is co-founder as well as CMO of HealthTap, one of the leading telemedicine companies in the USA, provides his initial concerns about virtual visits:

“Before we got started, I was very concerned that the video would feel like a barrier between me and my patients, that I would feel disconnected, that it would be hard to connect or understand what is going on in their lives as I speak to them about their medical issue” (Info3: 12)

One physician, who is now solely a telemedicine physician, and a big advocate of virtual visits, had initially refused to join because of the reservations she had.

“So, I was a bit apprehensive as well as sceptical about it. But then, over a couple of years Push Doctor became a little bit more settled, people knew more about it. And then I thought that this is properly probably future of medicine. Because the research shows that 70-80% of the patients who are present to the general practice, they can be actually managed through video consultation, they don't need to actually see the doctor face to face in a room. And they could be managed through video. So, I thought let's give it a try.” (Info2: 6)

When asked about the reservations Info2 had at the beginning, she responded by saying that the most important one was that she would not be able to touch the patient.

“So initially, of course, you have this apprehension that you won't be able to examine the patient. But then when you start doing the consultations and you realize that you don't always need to do that.” (Info 2: 8)

On the other hand, Info5 who has been a traditional physician for over 30 years had no reservations when it came to virtual visits. On the contrary, he was really excited and saw the benefits such services could offer straight away.

“I found that we human beings when we find things are inconvenient over and over then we start to find ways around. That's what made me have this expectation that this process will grow because its more convenient for the patient. This is one aspect. The other aspect is that in some places that have pretty limited resources in medical care, and if this opportunity is available, it will be a very big prosper for them. So that gave me a good impression that this move will be strong and grow and grow more than anybody expected.” (Info 5: 10)

Info8 went 4 decades back and talked about how emails were used to communicate with patients remotely.

“Email came out as I was ending college (1988) so it was already a natural way for me to communicate and I jumped on board quickly when I was practicing in the 1990s and encouraged my patients to communicate with me that way. I was considered one of the more aggressive physicians nationally doing this and would speak to others about it.” (Info8: 6)

4.1 Novelty

After finding out about their initial thoughts regarding virtual visits, informants were asked whether they thought virtual visits were perceived as a new service or a new technology. The novelty of virtual visits raises debates, because it depends on the individual perception of each stakeholder. According to Info8, who is CMO of MDLive, phone-based care has been in use for 100 years and video-based care for 10 years now. Hence, the general concept cannot be considered new (Info8: 48).

Info1, who is Head of Innovation at MinDoktor advocates that they are not using any new technology; just simple questionnaires with basic questions. However, what is new is the integration of new innovative technologies such as AI (Info1: 12). In line with this standpoint, Info4, who is CEO of CampusRX states that technology has not changed, but the novelty is in the integration of different services such as behavioural health, along with medical services and the possibility to interface with other EMR (Info4: 19). On the other hand, physicians consider virtual visits a new technology (Info2: 12; Info5: 12). *“...a new technology, in the sense that telemedicine is a relatively new concept in the UK...”* (Info2: 12). Furthermore, Info2 and Info5 do not consider virtual visits as a new technology only, but also as a new service. Info5 gives the example of places that have limited health care resources. For them, this service is completely new and beneficial (Info5: 14). Info4 and Info6 disagree with the notion that the phenomenon of virtual visits is a new service (Info4: 17; Info6: 12). Virtual visits are considered to be the same service but through a different medium (Info6: 12). In line with this opinion, Info1 believes that virtual visits are only a new distribution model to provide the same service but in a different way (Info1: 12).

From a medical perspective, virtual visits have significantly changed the way of working of physicians (Info7: 14, Info6: 14). Info7 mentions the change in the way data is pushed to the physician and the amount of information that the physician has. However, in terms of medical practice, Info7 believes that virtual visits do not change how the physician treats or prescribes medication to patients (Info7: 14). Info6 makes a distinction between video consultation or synchronous consultation and message consultation or asynchronous consultation. In a synchronous consultation, both parties are present at the same time, hence, it has no change in the way the physician works (Info6: 14). On the other hand, asynchronous consultation consists of message transactions which differ from the face to face conversation between the patient and physician (Info6: 14). The physicians interviewed also talked about the changes in their way of work. *“...instead of having the device in my hand and I do exactly what I want, I will be getting used to listening to the heartbeat through a speaker...”* (Info5: 15). These changes are because of the habits of physicians, who are used to physical consultations, where they have their devices to measure health parameters and thus diagnose based on physically measured health parameters, not by just guessing (Info2: 14). Acknowledging the habit of physicians of seeing the patient physically, Info2 states that her practice has not changed but has improved. This is because they are following the UK’s NICE (National Institute of Clinical Excellence) guidelines and the physician’s work is regulated by CQC (Care Quality

Commission) “...as a physician, my practice has improved... Prescribing for example certain antibiotics, they can be prescribed for five, seven, ten days, but guidelines say they can only be prescribed for five days. So, I will only prescribe them for five days, I won't go beyond that.” (Info2: 14)

A different way of thinking around the theme of novelty is that of Info9, who is a business developer at Doktor24. He believes that virtual visits are not an innovation in itself, but a commodity. However, Info9 provides a broader scope and states that what is an innovation is digital healthcare pathways, which is much more than the virtual communication patient-doctor: “The big innovation lies within the ability to manage set up design, really innovative patient pathways, where the actual communication between a doctor and the patient is only a small component of that pathway.” (Info9: 14)

4.2 Content

4.2.1 Services

The main services provided through virtual visits are health guidance, diagnosis, redirecting to the right health care, and prescription of medication (Info1: 4; Info2: 10; Info3: 6; Info6: 8). Info6 points out that services have been expanded to include physiotherapy consultations and consultations with midwives (Info6: 8). Furthermore, Info3 explains that the HealthTap platform goes beyond general practice and offers different specialities. Services such as finding the right doctor, follow-up care and reminding patients to follow and record their treatment are additional services of virtual visits (Info3: 30).

In order to make it easier to understand what services are included in a virtual visit, two main use cases are presented:

Use Case 1: “...a woman wakes up in the middle of the night, she needs to pee. It stinks when she pees, that's the common symptom when you have a urinary tract infection. So, she will then go to the doctor service, she will log in and answer a couple of questions. What happens is that these answers will be read through from a doctor... If she answers YES on three typical questions, she does not have any other severe symptoms or risks for example pregnancy... If everything is good, then the solution is to prescribe antibiotics... If she does not get well within three or four days, she should return because she needs to take a urinary test to find the specific bacteria she has...” (Info1: 10)

Use Case 2: “...I have a few birthmarks. I am not afraid of them, but this might be something I need to check out. What I will do is login to the service. I will use what we call the guide for skin diseases. And I will also take a picture, upload a picture and then the skin specialist within the service will look at the picture and questions answered. And, then he can say this is just a normal birthmark, nothing to be afraid of. He can say, this is a skin condition, not cancer but you perhaps need some kind of antibacterial lotion...” (Info1: 10)

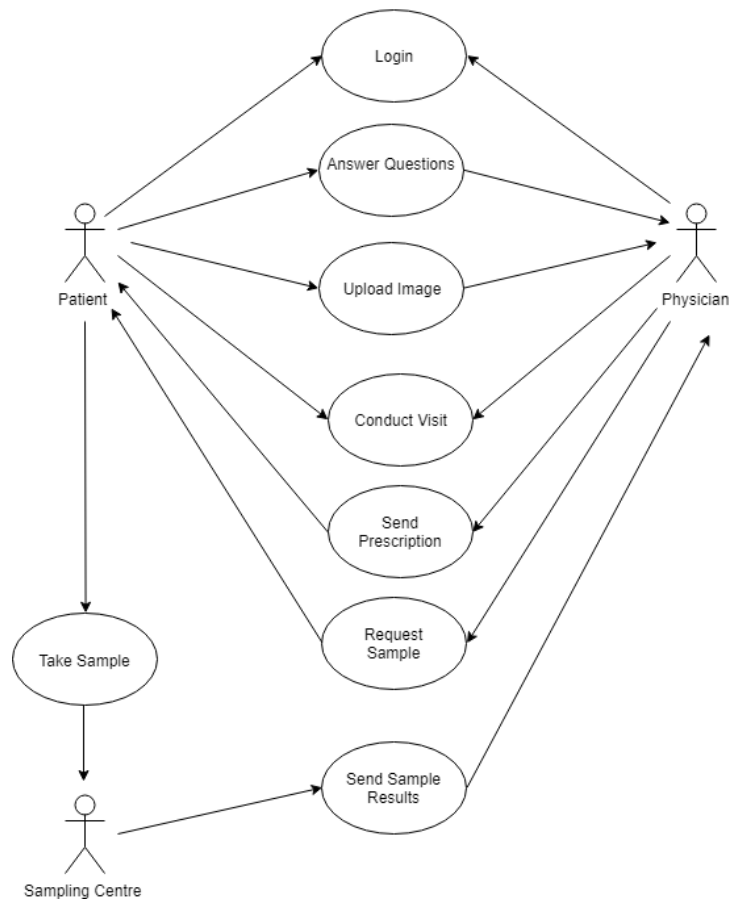


Figure 4.1: Use Case - MinDoktor

4.2.2 Symptoms

According to Info1, the patient can use the service of virtual visits to get the first response from clinicians in cases such as flu, sore throat, skin conditions or birthmarks, rashes (Info1:4). The possibility to diagnose these ordinary acute diseases through virtual visits is also supported by (Info2: 16, Info4: 15). Info2 provides other areas that are easy to be diagnosed virtually; for instance: tonsillitis, chest infections, asthma exacerbation, knee joint problems and so on (Info2: 16). On the other hand, Info6 provides insights into areas that are not suitable for virtual visits with the current technology such as ear infection, stomach problems in the abdominal area due to the inability to touch and feel (Info6: 16). On the other hand, Info9 does not agree that some symptoms cannot be diagnosed virtually because of the lack of physical examination and looks toward the future (See section 4.5.2): “*I think the notion that a symptom cannot be diagnosed because you need a physical component, it's not actually true. Because what you can do is that you can put the physical device that you need to use for diagnosis in the hands of the patient...*” (Info9: 20)

Info2 advocates that everything can be diagnosed virtually. The only case when a diagnosis cannot be done virtually is when the specific diagnosis requires further confirmation. Parallels between virtual visits and face to face visits are drawn:

“...even if I am examining the patient face to face in a room, doesn't mean necessarily that I will be able to make a diagnosis. So, it all depends upon what is the final outcome of the consultation...” (Info2: 16)

While Info2 believes that the possibility of diagnosis through virtual visits depends on the final outcome of the consultation, Info5 believes that it depends on how experienced and comfortable the physician is during a virtual visit:

“...there are certain words and sentences the patient uses and this can matter a lot in a diagnosis. So, you as a physician have to pay attention, not interrupt the patient and let him talk as much as he can...” (Info5: 18)

4.2.3 Patient Types

Everyone can potentially benefit from virtual visits, and the only requirement is having an internet connection (Info3: 32). However, some existing and potential categories of people can benefit the most from virtual visits. One of the categories mentioned by Info2 is young patients who usually do not have time and are satisfied with being able to see a physician whenever they need (Info2:18). This is also supported by other informants (Info4: 7; Info5: 54; Info8: 52). Info4 specifies college and university students as the main target group of CampusRX and as an underserved demographic that greatly benefits from virtual visits (Info4: 7). The following is a typical use case in CampusRX:

“...a student is in their dorm room. It is 11 o'clock at night. He has got a sore throat, cough or fever. The student can request a consultation with a doctor through phone or online and within an average of 19 minutes, a doctor would call the student back, ask questions, make diagnosis if possible and prescribe medication...” (Info4: 15)

Old patients benefit from this service because they feel too old or sick to leave the house (Info2: 18). Another group that is mentioned among informants is that of patients with mental health issues (Info1: 26; Info2: 18). People with mental issues such as anxiety and depression do not like to go out and wait in waiting rooms whereas another mental issue is agoraphobia which makes the person unwilling to be around others *“...sitting in waiting rooms is a stigma attached to depression and anxiety...”* (Info2:18). Contrary to the past, mental health issues are widespread among young men and children nowadays (Info1: 26). Hence, people with mental health issues have increased and they become a significant group that could greatly benefit from virtual visits.:

“What kind of help will benefit them, whether it is counselling medication, online behavioural therapy or just talking because some patients just call the doctor because they want to talk to somebody...they want to talk to a doctor just to relieve the burden.” (Info2: 18)

Finally, the majority of informants believes that the people who will potentially mostly benefit from virtual visits are chronic patients (Info1: 26; Info6: 18; Info7: 30; Info8: 52; Info9: 16). Virtual visits will enhance the quality of life of chronic patients by providing them with monitoring (Info1: 26).

“...around 85% of the world's health care costs is for chronic diseases... there is a lot of money involved...” (Info7: 30)

“...today, that's not the main target group, because there are few obstacles on the way, but more long term for sure, chronic patients will be the ones benefiting most from this...” (Info9: 16)

“...I believe that people with chronic conditions for follow-up and evaluation will benefit greatly... Because it's a checkpoint, it's not a critical assessment.” (Info6: 18)

Info2 mentions visitors as another type of patients that benefit from virtual visits:

“...a person comes from the US to UK, and he suddenly runs out of his medication, he came for four weeks on a business trip and he has to stay longer. And now he doesn't have his blood pressure tablets... This is one of the best ways to contact a doctor and get prescribed...” (Info2: 20)

Interestingly, truckers are another demographic that could benefit from virtual visits, since they are always moving, unable to visit the doctor in-person:

“...truckers are another demographic that because they're always on the road there, they're moving and they get sick, but they're not making money unless they are driving. This allows them to speak to a doctor in any state that they are in over the phone...” (Info4: 51)

4.3 Perceived Benefits

Apart from the benefits identified in the framework, the informants provided two new benefits. These are as follows:

- Facilitating the work of physicians

One of the ways virtual visits facilitate the work of physicians is that videos make the physician focus on the patient, without other distractions and hence, makes him/her concentrate on important issues for an accurate diagnosis:

“...what the video does is it causes you to focus, there is no distraction. There are no other things in the room, there are no people walking by, there's no hallway with other things. There's no patient in the next room, all you have is a focused view of your patient in front of you, without any other distraction. And so, this gives you the opportunity as a doctor to concentrate on more subtle issues associated with manners, appearance, facial expressions, body posture, attire, and other more subtle cues that help us understand what the real issues are facing a patient coming to see...” (Info3: 12)

Another way physicians' work is facilitated is because of the amount of data collected from a virtual visit that can be used as a feedback to analyse the performance of healthcare providers (Info1: 28; Info6: 24).

“...doctors will get a work report every week, a report saying you have had these kinds of patients, this week or the last month, you have created these referrals, ordered these lab tests, you have provided these kinds of antibiotics. So, we are collecting all that data so that the doctors can reflect of how they are working, how they are following guidelines and also we are measuring the outcome of patients...” (Info1: 28)

Furthermore, the work of telemedicine physicians in the UK is regulated by CQC. Hence, physicians are observed and in order to follow the guidelines, the telemedicine company supports them with webinars and presentations (Info2: 14).

- Efficiency

According to Info1, virtual visits provide efficiency since the physician can handle more patients in a specific time interval, compared to physical visits:

“...the typical MinDoktor can handle between 15 and 20 patients an hour. And in the physical setting, if you are a really fast doctor, I think you can perhaps handle 7-8 at the maximum. So, it’s probably twice the efficiency...” (Info1: 10)

Virtual visits can also provide efficiency to the healthcare systems because patients who do not really need to see a doctor will not go to the clinic:

“...it takes pressure off the NHS, because you are seeing all these patients who really did not need to see a doctor in the room, so it’s good for NHS, as well...” (Info2: 20)

4.3.1 Accessibility

Virtual visits influence access to care significantly (Info2: 28; Info6: 22; Info8: 24; Info9: 30). Info8 provides some factors that make visiting the physician in-person not accessible such as geography, cost, time, shortage of physicians’ shortages (Info8: 24). Another mentioned factor is age (Info2: 28, Info6: 22). While Info6 acknowledges that accessibility of virtual visits decreases with age, Info2 believes that virtual visits are accessible to elderly people because they are easy to use:

“...they are quite happy to use professional collaboration. It is very easy to use because I see many elderly login themselves...” (Info2: 28)

However, nowadays people and even elderly are becoming more digitalized and hence more comfortable in accessing online services: *“...accessibility is in Nordic countries, where everyone is very digitalized, even up to 70-75 years old, most of them are fairly comfortable accessing such a service online...”* (Info6: 22)

In addition to age, another factor to be considered is symptom area (Info6: 22). For instance: people with disabilities find difficulties in going physically to a clinic, thus virtual visits are the only means of accessing care.

“...some people who seem to be on the older side of the spectrum, may be limited in movement...so it comes from the individual and also the symptom area...” (Info6: 22)

4.3.2 Cost

Cost is one of the benefits of virtual visits that can be seen from two perspectives, i.e. the patient (Info2:24, Info3:16, Info4:13, Info7:22, Info8:24) and the healthcare system perspectives (Info1:6, Info5:52, Info7:22, Info8:24). Info4, CEO of CampusRX explains the cost benefits for patients who use virtual visits in absolute terms:

“...when you go to a doctor and on average a doctor’s visit is about \$30, you are going to pay the entire amount, until you reach your deductible. In our case, depending on the size of universities, the price can be for as little as \$5 to \$10 a month...” (Info4: 13).

Info2 believes that virtual visits are cost-effective, giving the example of prescriptions that cost 8 pounds at Push Doctor, noting the satisfaction of the patients with this service (Info2: 24). Another type of cost that is saved through virtual visits is the opportunity cost, and that is the ability to save two hours or more of travel time and hence costs (Info8: 18).

From a healthcare system perspective, there are cost savings because of the opportunity of scaling down the capacity for physical settings (Info1:6). Info5 believes that virtual visits are cost-effective for the healthcare sector and this informant substantiates this belief with the fact that with virtual visits, healthcare can avoid spending a lot of money in hospitals, urgent care or offices (Info5: 50). He also relates cost to physician reimbursement:

“...the healthcare sector saves money because they reimburse the physician. Healthcare system already spends a lot of money in hospitals, urgent care or in physicians’ offices, because they know the hospitals supports so many employees and the surgeon centre supports many. So, the less the physician is spending the money, you will be willing to take this money and the health care will be better...” (Info5: 52)

In contrast to the other informants, Info7 believes that virtual visits do not save money from a healthcare system’s perspective because they are not yet at the point of becoming an integral part of the system (Info7: 22).

4.3.3 Time

Time is mentioned in two ways from our informants, waiting time (Info1: 4, Info2: 20, Info4: 27, Info6: 20) and consultation time (Info2:22, Info4: 27, Info7:16, Info8: 18). The average response time from the moment the patient starts getting in contact with a physician, till the physician communicates with the patient is 5 to 10 minutes (Info1: 4). Info4 states that an average of 10 minutes is needed to get a call back from a physician from the moment the virtual visit is requested (Info4: 27). To better understand the benefits of virtual visits in terms of time, Info2 compares waiting times between virtual and physical visits:

“...if I, and even as a doctor myself, know I am ill and want to know what is wrong with me and what kind of medication I need, I would rather go to Push Doctor, rather than making an appointment with my GP and wait for 2 weeks to be seen...” (Info2: 20)

Regarding consultation time, Info2 does not see any benefit since the GP visit lasts 10 minutes, whereas the virtual visit usually lasts 12 to 13 minutes and can last even more, if patients are willing to pay more (Info2: 22). On the other hand, Info4 sees consultation time as a benefit since, according to him, calls last typically 6 to 7 minutes (Info4: 27). The fact that physicians have access to data beforehand, because patients are required to fill data ahead of the visit can save on consultation time (Info7: 16; Info8: 18). In contrast to the other informants, Info5 considers time a challenge for physicians, in the sense that patients will overuse the 24-hour service, and this will lead to pressure on physicians (Info5: 50).

Info9 believes that whether virtual visits save consultation time or not depends on the mode of consultation and how well you prepare the consultation. He provides an interesting opinion on how to well prepare the consultation in order to save consultation time:

“...if you automate the whole medical history taking, which is usually something that a doctor needs to do manually otherwise, and it doesn't matter if it's on video or physically. So, the asking questions like, you know, do you have any other illnesses? Do you have any allergies, what are your symptoms, what are pain levels, all of that, if you automate all of that, and then you also match the patient to the right mode of healthcare. And you also, as we do summarize that entire piece of information to the doctor, so when the doctor actually talks or chats, in our case, with the patient, everything, is prepared, we save quite a lot of the actual consultation time...” (Info9: 34)

4.3.4 Quality of Care

Info1 believes that the quality of care is higher in virtual visits because accuracy is higher when the computer asks the patient questions:

“...the computer won't miss any question, with the questionnaires. Today, if you have a stressed doctor, perhaps he will miss one or two questions. But the computer will repeat the same questions over and over to every patient that will come for the virtual visit...” (Info1: 30)

In line with this Info1's approach, Info9 states that virtual visits provide higher quality when they are suitable. To support his opinion, Info9 provides the example of a revision of antibiotics usage in his telemedicine company from a Swedish National Agency:

“...we were reviewed a couple of months ago, and for a very large patient group, which is a urinary tract infection among women. And we had 99.6% of adherence to national guidelines, which is basically unheard of the usual number is somewhere around 70% in standard healthcare. And the reason why we can be so much better is because we can automate basically everything. And basically, machines never, never forget to ask questions or never do not follow guidelines...” (Info9: 30)

Even though Info1 supports the use of questionnaires and the possibility to upload pictures in virtual visits which enhances the quality of care, he acknowledges that there are some quality aspects to be considered in the case of video consultations (Info1:30). Info6 explains that the reduction of quality of visits done virtually with the fact that the communication between the two parties is intangible and hence there is a lack of touch, feel and rapport (Info6:24). On the other hand, Info2 believes that saying that the quality provided by virtual visits is lower compared to physical ones is a mistake. She gives the following example:

“Last month, a mother called. She had a 16-year old in the background. So, she said: ‘My daughter has been unwell for two weeks. She has caught flu, and now she has been having high temperature for a couple of days. She has a bit of cough and I think she has a chest infection. So I was thinking if you could give her some antibiotics’ So the mother made the diagnosis and at the same time she's asking me, she's telling me what to do. So I asked a few questions and when I looked at her daughter she looked unwell. So I told the mother that she had the flu for two weeks, fine, but now she is running high temperature. I think there is something

new developing over there and this daughter of yours needs an examination, proper examination for proper diagnosis, I won't be able to give you antibiotics. But thankfully the mother was quite happy to take my advice...I told her to call 111 service and book an appointment with the outsourced GP. So about, two weeks later, we got a letter from that mother to Push Doctor and they passed on the letter to me. So in that letter, she praised me for whatever I advised her because she spoke to 111 and they said you should take your daughter to the hospital. Because by the time she spoke to 111, her daughter had deteriorated. So, she said 'by the time we reached the emergency, my daughter developed a rash, and she was diagnosed with meningitis.' So, she wrote in the letter 'your doctor saved my daughter's life'" (Info2: 26)

When it comes to comparing the quality of care within virtual and physical visits, Info1 said the following:

"...we already have a few studies within Sweden, but more in other countries, where they say that the quality or the possibility to actually provide a patient with the correct diagnosis is quite similar to a physical room..." (Info1:30)

Info4 believes that the quality of service in a virtual visit is as good as seeing the doctor in-person because the process of the visit is basically the same and the quality is not affected by the type of visit whether it be physical or virtual (Info4:25).

Although Info3 acknowledges that it is easier for bad medicine to be practiced virtually, he states that quality of care is not dependent on the type of visits, but on the experience and capability of the doctor:

"...the quality is driven by understanding of the issues, ability to direct conditions, knowing the correct treatment appropriate for the condition you have diagnosed, those quality issues are the same virtually or in-person..." (Info3: 20)

In line with Info3, Info5 assures that the problem is not in the method, but in the physician. The physicians' experience and capabilities (Info3: 20) along with honesty (Info5: 44) are what affect the quality of virtual care.

Another interesting standpoint is that of Info6 who believes that in the case of virtual visits that are text-based, where the physician is provided with tools to gather data for the patient, the performance of healthcare providers improves due to analysis of this data hence, enhancing the quality of care (Info6: 24).

Info2 and Info4 state that they had not heard of telemedicine companies having lawsuits for malpractice (Info2: 26) and (Info4: 25).

4.4 Perceived Challenges

4.4.1 Technological

One of the main challenges the informants talked about was technology. The means of connectivity, i.e. the internet, is crucial to virtual visits. The problem of having a stable internet connection with good speed is one not encountered by physicians, rather by the patients

(Info2: 30). With the availability of internet almost anywhere, people can now connect while being mobile. However, this can have a negative effect on internet quality and hence, affect the virtual visit (Info2: 30; Info3: 24). This is addressed by advising patients to make sure they have a stable connection and not move once starting the call (Info3: 24). Other problems relating to internet connection can be experienced by underserved and rural patients who simply do not have a good internet connection (Info8: 14).

Another technological challenge is the bugs and glitches that accompany any technological service (Info4: 26). Info6 also made mention of the challenges with technology such as technical downtime (Info6: 26). These problems, however, can be solved and according to Info4, are not as prevalent as they used to be due to the evolution of technology.

“Really any challenge that someone’s got when they’re using technology, it doesn’t always work perfectly.” (Info4: 31)

4.4.2 Behavioural

Behavioural challenges dealing with how physicians and patients, the two parties using virtual visits, sparked interesting debate between informants. One challenge that is always brought up when it comes to discussing virtual visits is the sacred relationship between physicians and patients and whether it can be created without a physical meeting. Info5, a physician who has experience with both physical and virtual visits believes that the type of visit has no effect on how strong the relationship between patient and physician is. He believes that some physicians can be physically present with the patient but have other things on their mind which the patient feels right away. *“If you care, the patient will feel it no matter where you are.”* (Info5: 26). Info1 believes that this is not a challenge; however, he does believe that a few physicians feel that they cannot create a deep relationship with patients remotely *“They are, of course criticizing us a lot, saying that we’re removing the specific bond between the patient and the doctor.”*(Info1: 32). Info1 opposed this by telling us what patients think. *“We have patient statements saying I haven’t felt so much seen and heard by a doctor in my life than when I met the doctor from your online service.”* (Info1: 32). On the other hand, some of the informants feel that a physical meeting between a patient and a doctor is necessary to establish an ongoing relationship (Info3: 14; Info6: 26).

“Also, there is some communication between people that disappears, it’s not there in the same way it is when you’re in-person or the person in the same room.” (Info6: 26)

Another behavioural challenge deals with the feeling of authority that physicians are known for having. Info1, who is head of innovation at a telemedicine company has confirmed that some physicians have this feeling of authority and find that virtual visits threaten it.

“I think a lot of doctors, when they’re introduced to medicine, they’re being told that they are now a special part of the society. Which comes with great responsibility, great power. But something is happening. That’s when I was talking about democratizing of health. Now it’s more of an equal collaboration with a doctor and patient, and of course, some doctors are really intimidated or frightened by this change. Because they have been so used to having all the power to just tell the patient you should do this and this and this, no, no questions asked, just follow my orders, and everything will be okay. But now, when patients are being educated, they have read through a lot of information before they sit, they will start asking

questions. Do you think I should do this and this and this, and this is new situation for local doctors, which is quite difficult to handle for them” (Info1: 34)

Info6 who was in charge of business development feels that virtual visits do indeed take away the monopoly of authority and create a symmetric dialogue between patient and physician.

“It takes away the monopoly of authority, because it creates a better dialogue and understanding. I think that in set structure is where, you know, in societies where the doctor, the priest and a teacher were, you know, the authorities, you know, that's changing. It opens up for more egalitarian dialogue about health.” (Info6: 32)

The two physicians, Info2 and Info5 gave interesting answers when asked about this. They both disagree with this concept of physician authority and believe that patients should be the centre of attention in the relationship between patient and physician. *“...usually I like to inform my patient and the patient that likes to understand and discuss every decision. It does not make me feel uncomfortable because a patient who is empowered is a better patient for me.” (Info5: 28).* Info2 has also shown strong feelings towards this concept of physician authority and believes that it should not exist.

“It is all about patient. The patient is the most important thing. It is not about the patient who has the authority. It's not about authority, it's about the patient is that it is a very wrong concept.” (Info2: 32)

4.4.3 External

External challenges have to do with things that neither physicians nor telemedicine companies can change. One of the things that physicians and other stakeholders don't have is the power to change regulations. *“Sometimes we get stuck. Due to reasons that we can't do anything about.” (Info1: 38)* When talking about challenges, most informants told us about the problem of cross-state licensing. In the USA, physicians have to be licensed in the state in which they are practicing (Info3: 26; Info4: 45; Info5: 45; Info8: 26). It is not only a problem with licensing, but sometimes the rules differ from state to state (Info4: 45). The same can be said in Sweden where there are 21 regions and the regulations differ from region to region (Info1: 32). This problem seems to exist in many countries. *“...traditionally, healthcare has been quite region based.” (Info1: 32)* Not only should regulations be unified on a national level, and perhaps a continental one, but they should also be more flexible (Info1: 38; Info5: 32). Despite all of the problems relating to regulations, Info5 is confident that regulations could be loosened in the future. *“I think with time they will be overcome because of the quality and positive impression from the people in that field will prevail and the movement will be accepted and the laws will be in its favour.” (Info5: 32)*

Another external challenge is reimbursement (Info1: 32; Info5: 24; Info8:26). Info5 finds it to be the biggest challenge. *“...I think some physicians may be dragging their feet because they are scared of the financial impact on their practice. But once reimbursement is good and will be acceptable then you'll find that this will flourish more and more.” (Info5: 24)* Info1 believes that the current reimbursement model in Sweden is simply not good enough and that it needs to be updated (Info1: 32).

Info2 who is a physician working for a telemedicine company in the UK talked about the issue of indemnity.

“It is a private work unsafe in the sense that I do not have access to patients’ records. I cannot see what patient has been doing or what has happened to the patient...Because my work is unsafe, and my work is private, my indemnity goes up. So I bring higher medical insurance. So this is one of the impacts on doctors practice that when you're doing this kind of work, your insurance goes up.” (Info1: 34)

4.5 Future Opportunities

The importance of automation and the use of technology to make healthcare more efficient is something that was mentioned by many of the informants. Info8 believes that “...*there is no shortage of physicians, but a shortage of using them efficiently.*” (Info8: 46). Automating and virtualizing healthcare is the way to manage physicians efficiently, improve access, improve quality, and cut costs (Info8: 46). Another problem is demographics and ageing populations. Sweden is a prime example of a country with an ageing population problem that will cost society a lot in the next 15-20 years unless solutions are found to augment virtual healthcare (Info1: 10). Info1 believes that initiatives like virtual visits can offer the same amount of treatment but save a lot of money. Info4 also talked about the problem of taking care of the elderly (Info4: 33) and how technology can be used to address this problem. Virtual visits need to keep evolving (Info2: 36). Info2 believes that patient dynamics and demographics change and thus, more services need to be developed to make sure virtual visits expand and are useful to society.

4.5.1 Customization

Customization for patients based on their symptoms and history can be achieved by the use of Artificial Intelligence. A story of the use of AI in health is when a Japanese woman with a type of cancer was examined by 10 or more cancer specialists who could not specify, let alone treat her cancer. IBM’s Watson AI was used to diagnose and treat this woman and she successfully responded to the treatment (Info1: 20). MinDoktor, the company Info1 works for, intends on introducing Artificial Intelligence to improve their existing questionnaires and have a machine learning algorithm that will take responses from patients and based on these responses, ask relevant questions that would help with the diagnosis and treatment of the patient (Info1: 12).

MDLive use machine learning for a variety of reasons. The first is to help with the scheduling of visits with doctors. MDLive also use machine learning for sentiment analysis to understand if a patient is having a bad experience. Lastly, machine learning is also used to ensure quality documentation (Info8: 44). Another way AI could be used is to tell the patient if their symptoms can be diagnosed and treated remotely or if they need to go be examined physically (Info1: 20). Info1, who is head of innovation at MinDoktor sees the use of AI to further enhance virtual visits as a very exciting prospect. Info4, who is associated with a company that has developed an “...*artificially intelligent virtual caregiver that is going to revolutionize the whole of healthcare as we know it*” (Info4: 33). He believes that in the next 5 years, AI will drastically transform healthcare and that it can be extremely useful for patients.

“Think of having a face and body that appears on a tablet around the home and is able to watch over you 24/7 and has the mentality of a nurse, practitioner or even a doctor but also has the tools of machine learning, so it’s constantly learning about your daily activities and the way that you react to certain things. They can detect things, they can help people with medication, adherence to medication plans, nutrition, their gait, the way they walk, the risk of falling if they show signs of, or they’ve had a mini stroke, or if they’re showing signs of Parkinson’s disease. I mean it’s amazing what has been developed in that area. This is the thing that is going to change home health care, not only US, but around the world, because what they’ve developed is probably at least three years ahead of anyone else in developing this type of product. Her name is Addison and she can speak up to 42 languages, so it’s going to be a worldwide product.” (Info4: 35)

Doktor24 is already using AI, and is the most advanced AI company in Nordic healthcare, as stated by Info9 (28). Info9 explains also the whole automated process from when the patient logs in to the app or website until when the type of care the patient needs is identified: *“...you have to talk to a chatbot first that basically collects your medical history. So, you ask your questions, you basically you can write, you know, I woke up this morning with a headache or my knee hurts or whatever, whatever you want. And then that chat bot will take you through questions, and then we’ll do something which is called triage in healthcare...But based on the medical history of a patient, it will identify the type of care you need...” (Info9: 28)*

Info9 gives also two main reasons why they decided to use AI and automate the process: to provide sustainability and to collect data which is the main reason why they do automated chat sessions instead of quick videos that provide “dead” data (Info9). Hence, ... *“gives us an advantage when it comes to building clinical decision support tools and really understanding our customer needs and pathways...” (Info9: 28)*

However, physicians did not share the same point of view. Info2 feels that AI might not be in patients’ interests and gave the example of Google and how patients sometimes enter their symptoms on the famous search engine to diagnose themselves and end up believing they have a serious disease when they do not (Info2: 38). However, she does believe that AI can improve, especially, when medical professionals have more input into it. Info5, a physician who is very excited about the use of technology in general and virtual visits in particular, is also sceptical when it comes to the use of AI.

“I don’t know because this technology does not feel the emotions or the stress of the patient. If the patient says: “I have this pain that comes around during my finals.” The technology will only pick up on the start of the sentence when the patient says: “I have this pain” leaving out the important part of the sentence where the patient says: “during my finals”. This part completely changes the sentence. How the patient says it is important as well. If the patient says it laughing it is not the same as the patient saying it not being able to finish the sentence. The same sentence can make a big difference in the meaning” (Info5: 60)

4.5.2 Remote real-time devices

Info9 introduces the idea of patients having remote real-time devices and using them for diagnosis. He does not agree with other informants who believe that some symptoms cannot be diagnosed virtually because of the lack of physical devices:

“I think the notion that a symptom cannot be diagnosed because you need a physical component is not actually true. Because what you can do is that you can put the physical device that you need to use for diagnosis in the hands of the patient...” (Info9: 20)

Info9 goes further and determines the potential augment of virtual visits from the use of real-time devices:

“...the type of consultations that can be done digitally only, it's about 35% of the full GP population. If you add the medical devices that are physical from the perspective of the patient, but virtual from the perspective of the doctor, you add the approximately 15 to 20% on top. And then if you add lab tests, you add another approximately 35%. So, from the perspective of a patient, they have done the lab tests physically, but still they have not been into contact with a doctor physically. So, combining all of that there is the potential to care for approximately 70 to 75% virtually if you combine physical components from the perspective of the patient...” (Info9: 20)

Patients doing lab tests at their home is a future opportunity, mentioned also by Info8 who believes that eventually these tests can be done in the patients' homes using a simple drop of blood or saliva (Info8: 34). Info9 also mentions this as one of the future plans of his company: *“...we will set up new service lines where for instance, the patient can take the lab tests themselves, and other types of solutions where we can sort of increase or expand the scope of diagnosis that we can manage.”* (Info9: 26)

With regards to remote real-time devices, Info1 (14) talked about a barometer where patients with asthma can exhale and then receive data on their smartphones about their current lung capacity. This will empower patients and give them the opportunity to monitor their oxygen intake thereby allowing them to manage their own condition without the need to go to the emergency room. Another device Info1 talked about was a digital stethoscope that could measure the amount of oxygen in the patient's blood (Info1: 14). Info9 stated that they are piloting with seven different devices, one of this *“...a device with which you can listen to the heart and listen to the lungs, look into the ears and into the throat of patients”* (Info9: 22)

When asked about devices that could help with diagnosis rather than monitoring, Info1 believed the use of these devices to make diagnosis is a few years away (Info1: 16). Info6, however, believes that using these devices for diagnostics is not just very useful, but is happening right now.

Another device that is being discussed now is one that can give someone going into a cardiac arrest an electric shock and save their lives (Info2: 42). Info2 believes such devices could cause wrong diagnosis but nevertheless, she says: *“it could be lifesaving and even if it saves one life, it's worth it”* (Info2: 42). Info5 believes that the use of these instruments can be vital in monitoring patients especially after being discharged from hospitals to help them treat themselves before their conditions get worse, and they have to be readmitted (Info5: 20). Info3, who is Co-Founder of HealthTap believes that these devices are very useful for monitoring patients but less so for examining and diagnosing. Info8 agrees that these devices are not necessarily of much use to diagnosis, but more with monitoring and the early detection of problems (Info8: 56). This is due to the fact that these devices are not generally available in people's homes until they need them. He believes that the technology and the devices are there and can be used in the management of a variety of conditions, but other than that, he does not see more opportunities for the use of these devices (Info3: 38). HealthTap have

already conducted various trials with these devices and demonstrated their ability to record accurate data. Info3 believes that to use these devices in a larger scale, they would have to have partnerships with other self-care providers (Info3: 43). Info4 confirmed that there are devices like that being used right now (Info4: 33) and that the technology is changing so fast and can only improve (Info4: 41).

4.6 Context

The final theme of the framework is that of context and it deals with the requirements needed to make sure virtual visits reach their potential and become as widespread and important as traditional visits. Informants were asked about what needs to happen in order to augment virtual visits and the requirements needed for this to happen.

4.6.1 Integration

One requirement that many informants mentioned was that of integration. The unifying of services throughout nations and the coordination between all different kinds of services whether they be public or private services is crucial for the diffusion of virtual visits. Info3 called out for coordination between virtual care platforms and overall care (Info3: 45) whereas Info1 has called for a nationwide infrastructure. He believes that in Sweden, there is a regional focus on technical solutions and that there must be integration between all solutions on a national level. Info1 suggests that there must be a nationwide database with the medical data of all citizens.

“I mean, you can you can order stuff online from pretty much all over the world, we can send packages to I don't know, every country in the world. But 200 kilometres from here, the hospital have no clue about us an individual.” (Info1: 40)

Info2 who works for a company that offers virtual visits in the UK proposes that the services be integrated with the National Health Service (NHS) (Info2: 36). This can be beneficial to both parties. For a start, referring citizens to applications that provide virtual visits will take a lot of pressure off the NHS. It will also make virtual visits more efficient and as a result be used more by citizens because the applications providing the virtual visits will have access to patient records thereby making virtual visits a part of the healthcare system within the UK rather than a private solution.

4.6.2 Distribution & Awareness

Another requirement that informants talked about had to do with distributing devices and tools and creating awareness for patients and physicians. It is important to get the word out and let people know about virtual visits and the services they offer to make sure they become prevalent all over populations. Info4 talks about educating people and coaching them on how to use new devices and services (Info4: 49). He also believes that letting people know such services exist is also important for the widespread of virtual visits. Info8 also talks about the importance of getting the word out and making sure people know about virtual visits (Info8: 38).

“Most people don’t even know that it exists. Once they’ve used it one time, I guarantee they’ll never want to lose it, because it’s just a valuable service.” (Info4: 51)

“This is much more about awareness than technology. People have access via web, mobile devices or call centres, they just need to know it exists! Once they do, they use it on average almost 2 times a year and in any given day, 40% of our patients are repeat customers” (Info8: 58)

Info9 believes that the main barriers of having real-time devices are in HCP’s ways of working and on patients’ side who may not feel comfortable using these devices. On the patients’ side, the logistics and distribution of devices are important aspects to be considered: *“...the barriers are within mainly, I would say logistics in the sense that you have to fix the setup for how do you as a patient get hold of, for instance, a glucose meter? How is that being distributed? Who is doing the service and support when things are not working well? How do you connect that medical device to someone basically, who answers on the other side of the phone?”* (Info9: 24)

In line with Info9, Info6 also believes that the distribution of remote devices need to be considered, in order for these devices to be used. Furthermore, Info6 believes that another factor worthy to be considered is cost of these devices. Info2 also mentioned cost when she said that these devices are currently very expensive but is confident that the technology will become cheaper.

“I’m sure when these apps or these kind of external devices become more common in us become actually become cheaper. It’s all about the price. If Apple introduces some external device, which is like for hundreds and hundreds of pounds, people will not use it. But when it becomes automated, and they are available for 10 pounds and 15 pounds, then everybody will use. So it all depends on availability. So I’m looking at maybe in the next couple of years, more and more people will be using these external devices.” (Info2: 48)

4.6.3 Regulations

The effect of regulations on virtual visits has already been discussed as one of the challenges impeding virtual visits. As previously stated, some countries such as Germany have struggled to reap the benefits of telemedicine because of strict regulations. Info5 calls for the loosening of regulations and says that they have to be more simplified and encouraging (Info5: 56). Info 6 believes that with time, the private and public sectors will get used to regulations and be able to influence adjustments in existing laws:

“...understanding of exchange of information and how to protect the individual and patient information and how to exchange data between providers to ensure that it benefits the patient. These things we are learning, and they are really requirements to bend, take the benefits from an individual encounter, all the way to realize the potential.” (Info6: 36)

4.6.4 Device Testing

Remote real-time devices that measure patient parameters is one of the exciting future opportunities for virtual visits. However, making sure that the parameters are accurate is one of the requirements that many of the informants mentioned. Info2 believes that there must be clear guidelines on any new devices or services that can enhance virtual visits to make sure they are used properly (Info2: 48). Info6 also talked about verifying that the measurements these devices make are accurate and that there are certain standards to measure the quality of these devices (Info6: 42). Info7 has also voiced concern about the devices giving the correct data (Info7: 56). He suggested that there be device regulations that make studies to ensure the correctness of the data (Info7: 58).

5 Discussion

This chapter analyses the empirical findings of this research and tries to relate them to the literature review. To this end, a reference to the framework and its themes is inevitable so as to allow for a summary of the findings while highlighting any differences that might have occurred between previous research done on the subject and any new findings in this research.

Before discussing each of the themes set earlier in the framework used for this study, it is important to understand the respondents' first perceptions of virtual visits, especially the physicians, as the main stakeholders of virtual visits. It is interesting to see how different people in the same profession perceive the same phenomenon in different ways. Two of the physicians were very sceptical at the beginning for different reasons. The first informant expressed his initial concerns because of the preconception that virtualization makes the two parties, physician and patient disconnected. On the other hand, the second physician was sceptical for a different reason: he viewed virtual visits not very popular at that moment. Other physicians had a positive initial perception of virtual visits for instance (Info5) was very excited seeing it as a great opportunity for places with limited resources in healthcare, while (Info8) was very aggressive at spreading the word among other physicians about virtual visits. Hence, the initial approaches vary from one person to the other. One explanation for such disparity besides the personality aspect is the difference in the level of digitalization of informants' respective national healthcare system.

5.1 Novelty

An important element of the stakeholders' perception of virtual visits is novelty. This theme aims at understanding whether virtual visits are perceived as new and what novelty virtual visits brought to the healthcare system. This is very useful in understanding the concept of virtual visits as an innovation and helps in understanding the extent to which virtual visits can affect changes in the traditional healthcare system. The novelty of virtual visits is analysed from the aspects of technology, service and way of working, in line with (Länsisalmi *et al.* 2006).

Most of the informants believe that virtual visits are not a new technology, because the same technology has been used for years now. This standpoint goes against Greenhalgh *et al.*'s (2016) study that considers alternatives to traditional visits as new technologies. Only two physicians perceive virtual visits as new technology, in line with Greenhalgh *et al.* (2016). In terms of technology, what is new with virtual visits is the integration of innovative technologies such as AI, as stated by Info1, who is Head of Innovation at MinDoktor.

Most of the informants do not perceive virtual visits as a new service either because the process of visiting the physician is the same, independent of whether it is digital or physical. This is not consistent with (Greenhalgh *et al.*, 2016; Rexha & Telemo-Nilsson, 2016) who consider virtual visits to be new services. Only two of the physicians see novelty in the transformation of the service. One of the informants believes that the novelty is in the integration of new services to the traditional medical service such as behavioural health, while two other informants stated that virtual visits are the same service provided through a different medium.

Hence, the novelty that virtual visits brought in their perception is in the care distribution model.

In terms of physicians' way of working, the physicians interviewed believe that virtual visits did not completely change their way of working because the practice remains the same. However, there are changes such as having a lot of information beforehand and not having the devices at hand to physically examine patients. One of the physicians believes her way of working has slightly improved because the physicians who use the virtual visits applications, she uses to receive a lot of support and training to follow guidelines since virtual visits are highly observed and regulated. The benefit of training is acknowledged also by Johansson, Lindberg, & Söderberg (2014b). At a broader scope, according to one of our informants, the novelty lies in the digital healthcare pathways, which consist of much more than just the virtual interaction between physician and patient. The virtual interaction between physician and patients addresses only a small proportion of the modern healthcare value chain. Digitalizing the patients' journey that results from this value chain is an interesting future line of development, suggested by Info9.

5.2 Content

The theme of content aims at exploring the kind of services and the nature of the symptoms/diagnosis that can be enabled virtually. Furthermore, the theme aims at identifying the types of patients who benefit the most from virtual visits. The theme helps in understanding better what virtual visits include, and their existing limitations in terms of services, symptom areas and patient types. The theme is important in answering the call of many researchers as to when virtual visits can be used, and which patients benefit the most.

5.2.1 Services

Some of the main services mentioned by most of our informants are multiple: offering health guidance, making a diagnosis when possible, redirecting the case to the right health care, identifying whether the case is an emergency or, if it requires a physical examination, and prescribing medication. These services are in line with the services provided by Hurst (2006). Informants have also mentioned more services such as physiotherapy and midwife consultations. The CMO of Health Tap, one of the most important telemedicine companies in the USA, goes beyond general practice and provides insight into new services such as finding the right doctor, and reminding patients to follow and record their treatment.

5.2.2 Symptoms

Many of the informants acknowledge that not all symptoms can be diagnosed virtually. This seems to be consistent with many studies related to virtual visits (Rexha & Telemo-Nilsson, 2016; Atherton et al. 2018; Johansson, Lindberg, & Söderberg, 2014b). According to our informants, what can be diagnosed virtually includes symptom areas such as flu, sore throat, skin conditions, rashes, tonsillitis, chest infections, asthma, exacerbation and knee joint problems. One of the informants provided insight into areas that are not suitable to be diagnosed virtually with current technologies such as ear infections and stomach problems in the abdominal area. According to Info6 these limitations come from the lack of feel usually

available in physical examinations. This is in line with different studies that aim at exploring when virtual visits are mostly suitable (Accenture, 2015; Randhawa et al. 2018). One of the business developers disagrees with the statement that not all of the diagnosis can be done virtually because of the lack of physical devices. This is because he looks into the future and states that all you need is to put these devices into the patients' hands.

While most of the informants agree that virtual visits are limited when it comes to symptom areas, one of the physicians does not perceive it as a limitation of virtual visits. According to this physician, it is possible for the physician to be unable to diagnose the patient even if they meet face to face. Hence, the limitation of diagnosing is dependent on the final outcome of the consultation, whether further confirmation is required or not. Another interesting insight is provided by another physician who relates the limitation of diagnosis with limitations of physicians in terms of experience and comfort. The physician needs to pay attention to the words patients use in order to be able to provide diagnosis virtually rather than redirecting patients to clinics.

5.2.3 Patient Types

Most of the informants agree that there are certain patients who benefit most from virtual visits. The type of patients identified by the majority of informants as the one with the greatest potential to benefit from virtual visits is chronic patients. The reason why they benefit is that they routinely need follow-up meetings with physicians. This will also be a benefit for the healthcare system, since more than 85% of the world's healthcare costs go to chronic diseases (Info7: 25). This is a new category not presented in Section 2.3.3. Another potential beneficiary mentioned by four of the informants is young people. This category spends most of their time studying or working with no time to visit a physician in-person. This has been mentioned in the literature (McGrail, Ahuja, & Leaver, 2017). CampusRX is an example of a company that worked on young people in the form of college students.

On the other hand, one of the physicians mentions old people as a type of patients that benefit from this service. Since old people prefer to stay at home, thus, they benefit from the convenience of virtual visits (Atherton et al. 2018; Kahn, 2015). Two of the informants believe that patients with mental health issues such as anxiety, depression or agoraphobia benefit since they do not like to stay around other people or wait in the clinic's waiting rooms for fear of being stigmatized. The category of patients with mental issues is presented in literature, in the study of Randhawa et al. (2018), where some respondents considered virtual visits beneficial to this category, while other respondents did not conceive of any benefits since it is difficult for these patients to communicate with physicians, considering their health conditions. Two other categories mentioned by our informants and not present in the existing literature are those of visitors and truckers. Visitors can benefit because they are short-term residents and do not have time to wait and schedule physical appointments with physicians. On the other hand, truckers are considered by one of our informants to be an underserved social group as they are always on the move and spend most of their time on the road.

5.3 Perceived Benefits

This theme aims at exploring how the main benefits of virtual visits, identified from the literature (See section 2.4) such as accessibility, cost, time and quality of care, are perceived by stakeholders of telemedicine companies. It is noteworthy that Kahn (2015) believes that these benefits are far from real. Therefore, the interviews tried to validate these benefits and identify new ones. One of the new findings of this study in terms of perceived benefits is that virtual visits facilitate the work of physicians in three main ways. The first is related to the use of video that makes the physician focus on the patient, without other distractions, and as a result, facilitates the physician's decision-making process. The second is the observing and regulating of the physicians' work, giving them guidelines to follow, and again, facilitating their decision-making process. Lastly, the large amount of data gathered in virtual visits that is used as feedback for physicians helps improve their work. Another new perceived benefit of virtual visits identified based on the empirical findings is efficiency. The findings show that virtual visits provide twice the efficiency compared to physical visits. Especially with the asynchronous mode of virtual visits, physicians can handle many patients at the same time, hence increasing the efficiency. Efficiency is also a benefit for the healthcare system in the sense that patients who do not really need to see a physician may use virtual visits and take the pressure off other public health services.

5.3.1 Accessibility

The majority of informants perceive accessibility as one of the main benefits of virtual visits. One of the physicians mentions that it is difficult for people living in rural or remote areas to access care physically. Therefore, the possibility of having access to care virtually is important for people living in these areas. Another informant talked about the importance of symptom area when talking about accessibility (Info6: 22). For instance, people who are limited in movement can access care virtually, without going physically to a clinic, thus virtual visits improve their accessibility to care. Geography and patients with disabilities are two factors often discussed in literature when it comes to accessibility (Kahn, 2015; Rexha & Telemo-Nilsson, 2016; PwC, 2016; Johansson, Lindberg, & Söderberg, 2014a).

Two of the other informants believe that virtual visits are accessible even to elderly people, despite their belief that accessibility decreases with age. On one hand, the elderly find difficulties visiting physicians and hence, virtual visits provide them with access to care. On the other hand, the elderly may find difficulties in accessing virtual visits via technologies such as smartphones and thus, decreasing the accessibility of virtual visits to this target group. However, one of the physicians has denied the latter claim saying that virtual visits are very easy to use and that many of the elderly patients are capable of using technology to have virtual visits. Hence, looking at literature and the answers from the informants, it is confirmed that virtual visits increase accessibility to various patient types, especially, the elderly and patients living in remote areas.

5.3.2 Cost

Overall, based on the empirical findings in this research, virtual visits are beneficial in terms of cost. This is also supported in a number of articles (Rexha & Telemo-Nilsson, 2016; McGrail, Ahuja, & Leaver, 2017; Kahn, 2015; Dixon & Stahl, 2008; PwC, 2016). When

discussing costs, informants analysed it from the perspective of the patient and from that of the healthcare system. There are cost benefits on the patients' side with virtual visits costing three times less than a physical consultation (Info4: 13). The literature confirmed a reduction in costs, although not the same as the informant's stat, with a study showing that virtual visits cost about half the costs of physical visits (Harvard Health Letter, 2016). Furthermore, there is an opportunity cost that consists of saving travel expenses and fuel. This finding is supported in other studies (Kahn, 2015; Dixon & Stahl, 2008; PwC, 2016).

Regarding the healthcare system side, two of the informants believed that virtual visits save money because of scaling down physical settings: hospitals, urgent care, physicians' offices. This standpoint is in line with Ekman's (2017) findings that show that in Sweden, economic costs of virtual visits are less than in-person visits due to the use of fewer resources. However, one of the informants believed that virtual visits are not beneficial to the healthcare system in terms of costs because they are not yet at the level of replacing physical visits. Such findings are supported by Randhawa's et al. (2018) study where many respondents stated that virtual visits have high initial costs and they will not save money in the long term.

5.3.3 Time

Several studies consider virtual visits as time-effective (Husebø & Storm, 2014; Dixon & Stahl, 2008; PwC, 2016) and most of the informants have actually confirmed this. Time-saving can be seen from two perspectives: waiting time and consultation time. Regarding waiting time, two of the informants stated that the patient has to wait an average of 10 minutes to see the physician from the time the request is sent. According to one of the physicians (Info2), waiting time is less in virtual visits compared to physical, where patients have to wait up to two weeks, considering time as an important benefit of virtual visits.

Two of the informants believe that consultation time is lower in virtual visits compared to physical, because physicians have patients' data beforehand and this is consistent with the explanation that several studies (Liu et al. 2007; Accenture, 2015) provide to support the consultation time benefit of virtual visits. Info9 goes further and describes how to prepare the consultation beforehand to save time. This preparation consists of automating the medical history-taking, matching the right patient to the right care and summarizing every piece of information to the doctor. In this way, virtual visits will be significantly beneficial in terms of consultation time.

However, what is interesting is that there is evidence from two of the physicians that actually the consultation time is not a direct benefit of virtual visits, thus, going against what Ekman (2017) concluded. In this respect, they identified two factors: flexibility and accessibility. The flexibility of virtual visits allows patients to talk more than 10 minutes (the limit without extra charge), hence the consultation time is not perceived as a benefit by (Info2). Since virtual visits are more accessible to patients (See Section 5.3.1), this raises the risk of having patients overuse the system 24-hours a day and clearly the time spend will be higher (Info3). These two interesting standpoints provide new insight into the theme of time, which are not found in the existing literature.

5.3.4 Quality of Care

Our informants define the quality of care as the accuracy of providing the right diagnosis and the right treatment. What is interesting from the empirical evidence is that physicians, as well as other stakeholders are aware that it is easier for bad medicine to be practiced virtually. However, according to some of them, considering the setting as the determining factor for the quality of care is a mistake. Factors that determine the quality of care are related more to the physician: his/her experience, capability, honesty; in short, the level of his/her efficiency rather than the setting. The CMO of HealthTap mentioned experience and capability of the physician in the sense of understanding the issues and how to address those issues. Honesty was mentioned by a physician working with HealthTap and TelaDoc Health in the sense that the physician needs to be honest in understanding the limitations of virtual visits and, accordingly, needs to redirect patients to the right care needed.

However, two of the informants acknowledge that there are some quality aspects to be considered in the case of video consultation since the communication between physicians and patients is intangible and hence there is a lack of touch, feel and rapport. On the other hand, relying on computers rather than humans in the process of prognosis ensures a level of accuracy and reliability due to the ability of computers to preserve memory rather than the risk of human error. This automation is the reason why one of the telemedicine companies had 99,6% adherence to national guidelines related to antibiotics usage, when the average of the primary care is just 70% (Info9: 30).

It is interesting to see how stakeholders especially physicians overcome their initial perception about virtual visits with regards to the quality of care, as one of their main concerns (See section 4). However, with these findings it cannot be proved that the quality of care is improved through virtual visits, as supported by Johansson, Lindberg, & Söderberg's (2014b) in their study on physicians' perspectives about video consultations in rural areas. In only one instance was evidence found (Info9: 30) that proves that virtual visits provide higher quality than in-person consultation, which is not sufficient. In the same way, our findings do not support Dixon & Stahl's (2008) findings of no significant difference in quality between physical and virtual visits. What these findings support is that it is easier for bad medicine to be practiced virtually, however the quality is independent of the setting, but is dependent on the physicians' experience, capability and honesty.

5.4 Perceived Challenges

5.4.1 Technological

To have a successful virtual visit, it is crucial that the technology is working without any errors or connection problems. In general, virtual interactions using ICT have always had problems when it came to connectivity, especially in rural areas (Puskin, 1995). The informants have said that this is not much of a problem nowadays and that they have a more reliable internet connection. However, problems with connectivity have to do with the patient's mobility while doing the virtual visit.

Another technological challenge discussed in the literature was that of the failure of technology, and devices giving inaccurate readings (Barry et al. 2003; Johansson, Lindberg and Söderberg, 2014b; Baumann and Scales, 2016). Informants have stressed the need to thoroughly test the devices and make sure they meet certain quality standards.

Informants also pointed out day to day problems relating to technology such as bugs and glitches as well as technical downtime.

5.4.2 Behavioural

The behaviour of physicians and how they react to virtual visits affect their perception of it. Many physicians are apprehensive when it comes to virtual visits because they feel that the bond created with a patient virtually is simply not as strong as when they meet the patient in person. In a study comparing virtual visits and physical visits conducted by Liu et al. (2007), physicians felt that virtual visits were inferior to physical visits when it came to their ability to show empathy with the patients. Only two of the informants maintain that only an initial meeting is necessary to establish an ongoing relationship. The rest of the informants denied that virtual visits affect the relationship between patient and physician with some even claiming that virtual visits can help create an even more special bond between patient and physician.

Another behavioural problem has to do with the physician's general feeling of authority. Over the years, physicians have always had authoritative power when dealing with their patients. Virtual visits however, which help empower patients to seem to threaten this authority (Malvey & Slovensky, 2015). Informants who are in charge of business development and innovation in telemedicine companies agreed that this is a challenge since physicians are used to having this authoritative power and giving it up can be problematic. However, the physicians interviewed denied having this problem; moreover, they both believe that patients should be empowered explaining the need of doctors to talk to patients and convince them rather than coerce them into following their instructions.

5.4.3 External

The last type of challenge that accompanies virtual visits, but the one that informants were most concerned about was that of external challenges. This is because unlike technological and behavioural challenges, there is not much that can be done to address external challenges. One example of external challenges is the strict regulations in most countries and the issues they bring with it such as cross-state licensing (Breen & Matusitz, 2010; Kahn, 2015). With almost half of our informants working for telemedicine companies in the USA, they agreed that this challenge has to do with the requirement of physicians being licensed in each state they intend to practice in. One informant from Sweden confirmed that having regulations that differ based on region is problematic and that regulations should be unified.

Another external challenge is reimbursement. Physicians have traditionally shown an unwillingness to adapt to new technologies and services until they are reimbursed as was the case with the adoption of electronic health records (Malvey & Slovensky, 2015). Three of the informants mentioned reimbursement as an external challenge with two of them calling for an improvement in the reimbursement models in place.

One informant talked about a new challenge not mentioned in the literature studied and that is indemnity. Due to the fact that physicians have no access to patient records, and that they cannot see the patients, errors in judgement are more likely to happen. To protect themselves, physicians demand large indemnity, and this can be seen as one more external challenge associated with virtual visits.

5.5 Future Opportunities

Several scientific articles have called for studies that focus on improvements or future opportunities of virtual visits (Atherton, et al., 2018; Johansson, Lindberg, & Söderberg, 2014a; Johansson, Lindberg, & Söderberg, 2014b; PwC, 2016). The informants also believe that virtual visits have great potential to improve.

“...what we’ll see over time is a move to a large proportion of cases, visits happening virtually, as I say, if it’s possible for a visit to be virtual, why on earth would you want to do it in-person?” (Info3: 16)

5.5.1 Customization

The use of Artificial Intelligence to analyse patients and customize treatment for them is one of the future opportunities mentioned in the literature and supported by a lot of the informants. It is one of the main goals of the e-health vision for 2025 (eHalsomyndigheten, 2017). Many of the telemedicine companies already use AI for a variety of purposes such as asking patients questions related to their symptoms, scheduling visits with doctors, and understanding when patients have a bad experience. The main reasons why telemedicine companies decided to use AI is to provide a sustainable healthcare system and to collect data that can be useful in understanding patients’ needs and in building clinical decision support tools (Info9: 28). However, two of the physicians interviewed expressed some concerns when it came to the use of AI. These concerns stem from the fact that the technology is not able to understand the emotions of the patient and even the context of his/her statements. However, one of the patients believes that with the input of medical professionals, AI can improve.

Future opportunities for the use of AI have to do with a machine telling the patient whether they can be treated virtually or not thereby saving time. Using the data gathered in automated chat sessions is also an opportunity for telemedicine companies who mostly rely on providing the service via video. One of the informants talked about preferring chat to video to later analyse the data the patient gives and make use of it. Another informant talked about an intelligent virtual caregiver that will accompany patients around the clock and watch over them. He believes that such a solution will transform digital healthcare.

5.5.2 Remote real-time devices

The evolution of smartphones has provided physicians with more capabilities to achieve much more than ordinary calls. Smartphones can now connect to external devices and transmit and receive data from these devices. This is relevant to digital health as devices can be used in coordination with smartphones to send images and data to physicians to aid in diagnosis (PwC,

2016). Some devices that patients can use to check for certain infections, in the ear or the eye for instance, mentioned by the informants are also discussed in the literature (PwC, 2016). The informants mentioned the use of remote devices in monitoring, diagnosis and lab tests. However, most of them believe that these devices will be more useful in monitoring, than for diagnosis or examining.

All informants have confirmed that such devices can be used and are actually being tested right now to be used in the future. This finding is different from a survey done by PwC (2016). In this study, only 25% of participants thought that having patients using a medical device to check for an ear infection is very possible. This difference between the findings of this research and PwC's survey is because of the subject of the study. The participants in PwC's survey were doctors and nurses, whereas this research considers other stakeholders in the business and technology sector who may have more expertise when it comes to the applicability of these devices. One of the informants gave an insightful prediction about the potential amelioration of virtual visits by using these remote devices. According to this informant, if 35% of visits can be done digitally without the use of devices, then the use of these devices can augment virtual visits by 15-20%. Furthermore, devices for lab tests, can further augment virtual visits by 35%. In total, he sees a potential of 70-75% of the increase in the use of virtual visits just by using these devices. This finding is insightful because it shows how crucial remote devices are for the future of virtual visits.

5.6 Context

The final theme of the framework, i.e. context has to do with finding the requirements and conditions that need to be in place to make sure that the implementation of future opportunities within virtual visits are successful. This was one of the main gaps in the current literature that this research tried to address. The answers received from the informants were as follows:

5.6.1 *Integration*

Integration of virtual visits into the mainstream health system is crucial in a democratic society. To this end, coordination is paramount between all kinds of services on a national level to avoid having different services and regulations in different regions in the same country. This is to facilitate the exchange of information and to overcome the challenge of cross-state licensing. Thus, virtual visits must be integrated into the main healthcare system of countries to make sure that all citizens not only have access to it but are also aware of its existence.

5.6.2 *Distribution & Awareness*

The informants have also mentioned the importance of letting patients and physicians know about virtual visits and the services they offer. There is a belief amongst informants that not many people know about this service and that once it becomes more widespread and more people are exposed to it, it will be used even more. The use of devices that measure patients' parameters and transmit them in real time need to be distributed which is expected to happen once the technology evolves and these devices become cheaper. One of the informants mentioned distribution and logistics as the main requirement to be considered in terms of setting up for the use of remote devices. Making sure that patients get a hold of such devices and use

them, that there is support when these devices do not work, and making sure the data from these devices are sent to physicians are all important for the success of these devices. Hence, the distribution, logistics and cost of remote devices are all factors that need to be considered. In addition to this, physicians and healthcare professionals in general also need to be trained and educated on how to use these devices.

5.6.3 Regulations

Regulations must also become more lenient to encourage the use of this service and the development of even more services and devices. According to one of our informants, it is important to have regulations about the privacy of individuals and the confidentiality of their data and also about to exchange information between providers in a way that benefits patients. She believes that with time, they will be able to influence existing regulations based on what is beneficial for the patient. Hence, influencing existing regulations when it comes to using remote devices is another requirement to be considered by stakeholders of telemedicine companies, while planning to use these remote devices within virtual visits.

5.6.4 Device Testing

To ensure that the devices talked about in future opportunities are distributed and used more often frequently, verifying that these devices work and make correct measurements is a must. According to three of the informants, in order to verify devices' accuracy and to measure their quality, device regulations or standards with clear guidelines are needed. This is another important requirement to be considered by stakeholders to achieve the full potential of virtual visits (See section 5.2.2).

6 Conclusion

6.1 Research questions and purpose

This research set out to fully understand virtual visits focussing on how they are viewed by stakeholders of telemedicine companies. After going through the available literature thoroughly, one of the main gaps that were discerned is related to the lack of literature on the subject which can be explained by the fact that this service has been in use for less than a decade. Thus, it became evident that a thorough understanding of virtual visits in the present and their future potentialities was necessary. A theoretical framework was then developed and used as a blueprint for the rest of the research. Semi-structured interviews with the stakeholders of telemedicine companies were conducted to gain insight to help answer the following research questions:

- How are virtual visits perceived by stakeholders of telemedicine companies?
- How can virtual visits be augmented in order to become an integral part of healthcare?

We believe that by answering these questions, telemedicine companies and the healthcare sector can gain a solid understanding of what virtual visits entail; such knowledge in turn would help them develop the tools necessary to make full use of the potentials offered by virtual visits.

6.2 Key findings

- **How are virtual visits perceived by stakeholders of telemedicine companies?**

Stakeholders of telemedicine companies (business, technology, management, physicians) in general *do not perceive virtual visits as a new service or technology*, but a *new distribution model*, i.e. the same existing service accessed in a different way. Virtual visits *improve physicians' way of working but do not change it* since the practice remains the same. Research has shown that virtual visits provide *twice the efficiency* as traditional physical visits. It is, however, the job of physicians to adapt to this service and make sure they fully reap its benefits. Initial concerns about the negative effect virtual visits may have on the sacred relationship between patients and physicians have not only been proven wrong, but on the contrary, stakeholders believe that virtual visits can create a *stronger and more personal connection*. The *empowerment of patients* through virtual visits should be seen in a positive light by physicians as it could be a crucial factor in facilitating their work.

Virtual visits are seen to be beneficial to many different types of patients. These include the young, the elderly patients, patients with mental health issues, and visitors; to name only a few. It has been found that all stakeholders share the belief that patients who benefit mostly from virtual visits are *chronic patients* due to their need to continuously communicate with a physician. The benefits patients of different categories will get are *an increase in access to care, saving hours of waiting time, and decreasing the financial burden of traditional*

physical visits. Quality of care, a topic that has raised debate amongst researchers and stakeholders, can neither be considered as a benefit nor a challenge. While it is easier to practice bad medicine virtually, *quality is not perceived as dependent on the setting*, but on other factors related to physicians such as their experience, capabilities, and honesty.

While it is evident that virtual visits have bestowed many benefits upon physicians, patients, and healthcare in general, they are by no means devoid of any challenges. *Technological challenges* arising from any innovation are not seen to be as effective as they once were due to the continuously evolving nature of technology and there is great confidence that *behavioural challenges* on the physicians' side can be overcome with both education and awareness. It is rather the presence of *external factors* such as *regulations, reimbursement and indemnity* that are perceived as the most difficult challenges that need to be seriously addressed.

- **How can virtual visits be augmented in order to become an integral part of healthcare?**

Virtual visits are expected to move to a *larger proportion of cases*. To achieve this, virtual visits need to make use of technologies such as *AI* and *remote real-time devices*. The use of AI consists of having automated chat sessions, collecting data and customizing solutions to specific patients. This will make the process more efficient and save patients and physicians time, thereby increasing the popularity and use of virtual visits. AI can also be used in the near future in the form of intelligent virtual caregivers that accompany patients and watch over them around the clock. Virtual visits must also make use of *remote real-time devices* that can measure patients' health parameters and send them in real-time to physicians in order to ameliorate the diagnosing capabilities of the service. Not only are these devices important for diagnosis, but also for monitoring. The use of these devices along with home lab testing is expected to increase cases that can be treated virtually by up to 75%. However, to achieve this ambitious number, some conditions must first be considered. Firstly, there needs to be a plan for the *distribution and logistics of these devices*. This entails making sure that all patients have access to these devices and that the process of sending patient parameters from the devices to the physicians is as smooth and efficient as possible. Moreover, *the cost of these devices* needs to be considered since they are currently very expensive for the average patient. *Awareness* is another crucial condition in terms of training and educating both patients and physicians to effectively use these devices. The devices should also be *tested for their accuracy and quality* and hence, *device regulations* with specific guidelines are required. Last but not least, the *integration of virtual visits into the primary healthcare system* is crucial for virtual visits to prosper and become one of the main pillars of healthcare.

6.3 Implications for future research

In the first part of the thesis an overview of virtual visits through the perception of stakeholders of telemedicine companies was provided. Many calls of other researchers were answered in this overview (See section 1.2). Future research can focus more on measuring the quality of virtual visits in terms of measuring real-world patient data to clear up all doubts on the ability of virtual visits be on par with traditional physical visits. Moreover, we invite researchers to focus more on chronic patients, who according to this study will benefit most from virtual visits. How chronic patients can greatly benefit from virtual visits is an area in need of further investigation. Finally, most of the literature on virtual visits focuses more on synchronous

communication through video. Based on the findings of this research, there is a great potential especially in terms of the abundance of data collected from asynchronous modes of communication such as text. Further research in this area could be an important addition to the subject.

In the second part of the thesis, the use of real-time devices for monitoring and diagnosing was identified as one of the main future opportunities of virtual visits. The conditions required for healthcare to make the best use of these devices were also identified in this research. However, identifying the best practices to achieve these conditions, i.e. distribution, cost, and device testing, is an area that needs further exploration.

For practical implications, we believe that our findings of the conditions that need to be considered when it comes to remote devices, can be put to use as a starting point for the telemedicine companies that are planning to invest in these devices. Furthermore, innovative ideas relating to the functionality of remote devices and their applicability is highly recommended.

Appendix 1: First interview transcript

Line	Person	Content	Theme
1	Researcher	Can you tell me about your role as head of innovation at MinDoktor?	-
2	Info1	<p>Yeah, sure. I have been. I've been approached by Dr. Seuss in the really early stages. I joined when the company had its first customer and insurance company wanted to buy digital health services, and we tried it. And we also had our first angel investor, I was, I was approached by the founder and his team and, and he asked if I wanted to join, working mostly as, as head of business development, looking into how we could expand our service offering, could we find additional market or customer segments that we could operate within. My role has been being the glue between the tech department, our clinicians that have a picture of what we could actually develop in terms of how can you provide services in health care services digitally, we started quite close with only a service for women with urinary tract infection. That was everything we could, we could provide. But of course, there was thoughts about could we handle skin diseases, fever, sore throats? Yeah, the common symptoms that you have when you when you meet GP. So right now as head of innovation, I am running a small team, we have two major responsibilities. First of all, we handle all the business to business. So services or selling points that we have, we're providing our service to at the moment for large insurance companies in Sweden, where you as a customer, you can buy or you can get a benefit, you can get the private health care insurance, meaning that if you need health care, and the public system can't help or provide you with the time or an appointment, you can then call your insurance company say I need this appointment, because I have back pains, for example. So in certain cases, they can then provide you as a patient or a customer to MinDoktor service. So it's a private set up where they actually pay for the services that we provide for their customers. So within my team, we have a sales, head of sales,</p>	-

		<p>he is then responsible together with me, for all the sales we do within the business to business area, then we have the consumer area where we get public funding, then we have a responsibility to be the hand when it comes to innovation. So if we have internal ideas that someone would like to realize, and they can come to us, and we can we can help them provide a business case, provide a draft of a scope, the prototype, so to speak, to see if this is something that we should integrate within the overall service. Of course, we also have a responsibility to continuously monitor the surroundings. What happens in the competitive landscape does it show up? Or do we have any new entrants within the market? Any products that we can integrate with so we can add new customer or patient segment? Yeah, that's, that's pretty much the role of being head of innovation and partnership.</p>	
3	Researcher	<p>Okay, and can you tell me about MinDoktor and the services you offer?</p>	-
4	Info1	<p>Yep, sure. So MinDoktor, we're actually or we have been a digital caregiver, meaning that we have tried to digitize healthcare. Traditional healthcare is, of course, a very physical service, where you meet up mostly at the doctors or a nurse's office, you get examined, and then you can get some kind of treatment or advice. So what we did is through our cell phones were created a platform where we tried to digitize the process, if you look at what happens when you meet the physician or clinician, is that you will first be interviewed asking about why are you here? Okay, you have a sore throat for all long have you had it? Do you have any fever? Those questions call anamesis or the patient's description of her own problem. What we did is that we screened every regular visit and the guidelines within Sweden, starting to understand, okay, which are the normal questions that you are considering the guidelines need to actually ask a patient. So what we did was that we created quite easy web forms initially, where all these questions based on what kind of symptoms you had, were answered by the patient. And within this forum, the patient also can upload pictures, they can write the additional information,</p>	<p>Cont-Serv Cont-Diag</p>

		<p>whatever they would like to do. What happens then is that these answers, they will, they will transform into a decision support tool for our clinicians. So a clinician will then meet the patient, read through all these questions and answers. And they can, in the most cases, they can, they can actually set the diagnosis based on the questionnaire. In additional meetings, we can we can send them for blood samples or whatever needs to be done within the and that's pretty much close to a typical doctor's visit. So in some cases, you need to take some blood tests, then we can do it, we can refer you to a test center, you will take your test and our doctor will get the result and then we can then we can order a treatment area prescribe medication or whatever. So I think we cover most of the normal illnesses. For example, if you have flu, sore throat, if you have skin or birthmarks, rashes that would like to, to assess them, then you can use our service to get the first response from a clinician. And I think that the main feature, or the main point that we often talk about is, of course, the availability. We have a normal response time up between five and 10 minutes when you start your process to get in contact with a doctor until a doctor actually starts to communicate with you.</p>	
5	Researcher	<p>And when you first heard about virtual visits, when did you hear about it? And what was your impression?</p>	-
6	Info1	<p>I think, I think when the core team that that founded the doctor and Magnus he is a doctor himself. So what happened is that he was in the end of his education, he was out doing practicing medicine. So he was at the emergency care in Helsingborg. And he was also at a couple of GP practices. What he understood is that when he was there meeting patients, he realized that a lot of these patients they were they were seeking care due to anxiety or of being actually ill, but in most cases they weren't. I mean, that's pretty much why actually seeker because something is not right, and you're unsure what it is. So you would like to meet the doctor. So you can get an explanation, mentor, just get a positive feedback that will Everything is fine, just relax for a</p>	<p>Cont-Serv Nov-Serv</p>

		<p>couple of days. So he started to, to think about can I actually meet these patients earlier within the process, because as you mentioned, it's quite a big, it's quite a big step to first pick up the phone, call a nurse book an appointment, get to the clinic, then have the physical appointment. So can we try to offload a lot of the interactions that we as clinicians have doctors do every day. Hopefully, that will mean that we will have less costs, because we can scale down the capacity for the physical settings. So you started to look around. And I think that what he understood is two things; how can digitization in general, and how that transform a business. So he looked into the bank business, traditionally, 10 years or 20 years ago, when you had to do some kind of bank errands or something, you had to go to the bank office, of course, even if it was paying the bills, if it was withdrawing or deducting money from your account, everything was done at the office. So they gradually transformed their service. They opened up a lot of services. So customers could do it themselves. For example, you can you can now pay your bills for the internet phone, we can swish money to each other, and then whatever. So then he looked at North America because they have started with tele-medication services. But they were mainly based on video consultations. So he thought, he starts saying can we do anything more efficiency rather than only replacing the physical visit with a video consultation? If you look at it from the bank point of view, it would be quite unnatural, I think to pay your bill by having a video visit with a bank clerk at the office say I would like to, you know.</p>	Ben-Cos
7	Researcher	Yeah.	-
8	Info1	<p>But nevertheless, they have started with tele-communication service, meaning that you could have remote consultations. So I think they were Yeah, they were the North Star that we're looking into. And then he thought about these tweaks, how can we how can we provide better services and more accurate services, by not having the video meeting every time. That's why when he introduced these questionnaires, because the typical visit this, I don't know 5-10</p>	Nov-Serv

		<p>minutes of an interview, small examination and then the doctor know what it is, and they can prescribe you some kind of medication and you can go home. So by offloading a lot of their work to the patient, he will create efficiency within the system, it will be more efficient for the clinician, the patient will actually feel a lot more seen in some cases, because they will in their own time. They can reflect about the questions they can ask them they can they can, they can provide additional information, everything that's quite important for them within this meeting with a doctor. So I think that's one of the main features at the moment, it will provide efficiency, we have availability, but it will also provide efficiency in the long run.</p>	Ben
9	Researcher	<p>Could you very quickly just walk me through a typical visit that would happen between the patient and the doctor.</p>	-
10	Info1	<p>Yeah, sure. We can take the court case that we started with the UTI. A woman wakes up in the middle night, she needs to go and pee. And it stinks when she pees that's the common symptom when you have a urinary tract infection. So she will then go to the doctor service, she will log in. And then she will answer a couple of questions. What happens then is that these questions they will they will be written through or read through from a doctor. And the guidelines for UTI is what we call, now I just forgot it, empirical diagnostics, meaning that the woman will diagnose herself by answering these questions from the doctor. So if she answers yes, on three typical questions, she doesn't have any other severe symptoms or any risks, for example, pregnancy, the regard a lot of categories that you need to exclude. But if everything is good, then the solution is to prescribe antibiotics. So in this in this case, she will actually just answer the questions. And the Dr. will read through the questions, understand that she is actually a wealthy woman who will need prescription. So without actually interacting or we have a text we have a chat feature or a text based message feature. So that so the doctor will actually acknowledge that, yes, you have urinary tract infection, and as a treatment we will</p>	Cont-Serv Cont-Diag

		<p>provide you with a prescription of drugs. So you should then go to the pharmacy collect the medication and start using them. If she does not get well within three or four days, she should return because she needs to take a urinary test to find the specific bacteria she has. So with a minimal interaction, these two in real time, they will actually get a prescription. And another use case can be someone who has, Yeah, I have a few birthmarks. I'm not afraid of any. But let's say, I think though this might be something that I need to check out. What I will do then is login to the service, I will use what we call the guide for skin diseases. And I will also take a picture, upload a picture and then we have a skin specialist doctor within the service, they will then look at the picture, they will also look at all the questions that they are answered. And they can then say, well, you can take care, this is just a normal birthmark, nothing to be afraid of. Well, they can say that. Yes, this is a skin condition, not cancer, but you perhaps need some kind of lotion, or an antibacterial lotion, or whatever. So they can actually interact by sending messages back and forth. So it's very little we have direct or peer to peer communication in real time, we're using what we call them a synchronous communication model. Because in this way, we can we can always let the patient contact our doctors, then we have the pool of doctors, they can just work by saying yeah, I'm reading through this, okay, you need to do this, and this and this. And if the patient isn't available, they can then wait for a notification for when the patient can have been directed with them. So they can then start the interaction. So I think we're creating efficiency. In general, you can say that the typical MinDoktor, they can handle between 15 and 20 patients an hour. And in the physical setting, if you're a really fast doctor, I think you can perhaps likely to 7-8 at the maximum. So it's probably twice the efficiency. Of course, it's not the same patients mix. But nevertheless, I think one of the core values of MinDoktor is if we should, of course, we should be a successful company working within this sector, who is actually funded by taxes in Sweden. So of course, it should be a good, it should be efficient for a doctor to work within the service, we should</p>	<p>Ben</p>
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		<p>give them good tools. And of course, they should be able to assess and treat patients with the highest medical quality available. And, of course, not expose any patients for some kind of risks. Because there are risks by having remote consultations, of course, the other is, of course, the patient point of view, we should try to create a good experience where you can feel that you're in a secure and safe environment. And all the advice or all the treatment that you get should be at least equal to if you had moved to, to a traditional GP. And the third aspect is, is the society aspect, we would like to be a part of the solution where we can actually treat more patients, I don't know if you look at the demographic background within Sweden, but within the coming 15 to 20 years, we will have a lot of growing or age people, meaning that they will be needing more care, which will cost us a lot as a society if we don't do anything. So we would like to be a part of the solution working offer at least the same amount of treatment, but make the cash last for even more people.</p>	<p>FOpp</p>
11	Researcher	<p>Do you think virtual visits are a new service or new technology?</p>	<p>-</p>
12	Info1	<p>I think they're both? Of course. Well, if you look at technology aspects, I would say no, we're not using any new technology, I mean, basic questionnaires where you ask where you answer a question for how long have you had this? Three weeks, one week, two weeks? Nothing new with that specific technology, of course and, and video visits. Yeah, or text based visits. Technology has been around for a couple of years. Of course, we're trying to introduce new technologies such as artificial intelligence, can we move ourselves away from different pre field questionnaires to a more AI or machine learning based algorithm where the patient will start answering a few questions and then the system will know what kind of additional questions we need to ask these patients. So yeah, sure, we're trying to integrate new technologies. But I think it's quite rudimentary, I think what we have, we have done this is, of course, changed the distribution model, meaning that we're using technology to provide a service in a</p>	<p>Nov-Serv Nov-Tech FOpp-Cust</p>

		<p>new way. Which is probably the definition of an innovation, I think. But this was something that we hit with. I think, if you look at it historically, also, I think it was like 20-25 years ago, up in northern Sweden, where we have more rural landscape. They had worked with telecommunication services, remote examinations for the last 15-20 years, because they needed to. It's quite difficult to actually get doctors working up in northern Sweden, there are wide distances between the GP and where the citizens live. So they had to be innovative. But when they started I think the technology itself, it was quite expensive, and perhaps it wasn't that developed as it is today. So they did some pilots, and they have them up and running. But they were Yeah, there were smaller, but quite expensive. What happened the last 5-10 years is of course, that technology has been more and more cheap. And it's, it's also a bigger extraction or a bigger percentage that, for example, uses smartphones and such. So by having more cheap and available technology, I think that was that was timing that we need it so we can start scaling this in a much bigger level than what previous pilots have actually been able to do.</p>	
13	Researcher	<p>So we've talked about diagnosis, and how Min-Doktor can diagnose skin diseases, urinary tract infections. But there are a few diseases that cannot be diagnosed virtually. And there are a few devices coming up right now that can be connected to the smartphone, such as digital stethoscopes. And there are devices that can look into the ear, and then the doctor can see this real time into the throat, blood pressure monitors, things like that, and then just be connected to the phone and transmit the data. Does Min-Doktor intend on using such devices?</p>	-
14	Info1	<p>Absolutely, yeah, sure. We're already doing a few pilots. And it was quite fun. This morning at TenePhaedra, I can send you the link, there was an interview with a company called Asthmatoon or management, they have created a solution for people with asthma, where you actually will be able to self-monitor your issues or your symptoms. So, they will have this barometer, it's like the base where you actually exhale,</p>	FOpp-Rrd

		<p>it will connect to an app within your phone. And then you can you can measure your lung capacity. So we have been partnering up with them. So we can start to remote treat and follow patients with asthma diagnosis. So what happens is that they get they come to the doctor, they say that they suffer from asthma, and they have a treatment plan from the doctor. And they have also medications. And they know, they know they have done a measurement of their max lung capacity. So what happens is that you enter this data into their app, we will send them as parameter and we will onboard them into this this specific app. And then they will start monitoring themselves. And hopefully this means that they can, they can have a better understanding of their own sickness. Hopefully, that will lead to that hopefully they can manage their own condition. And they can understand when they need to take, for example, extra treatment or of medications or so then they don't need to go to the emergency room or whatever. So of course, when it comes to remote monitoring, that's something we're looking into, we're partnering up with another company, where they have actually a device where you can use it as a digital stethoscope, there is a camera attached to it, you can also measure, I don't know the English word, see what's happening, how much oxygen you have in your blood. So there are a few parameters you can measure with it. It could be handled by the patient, him or herself. Or we will have nurses were we're building a network of clinics around Sweden at the moment. So we will have these devices at the clinics. But the doctor will be able to remote monitor or remote interact with the patient.</p>	
15	Researcher	<p>So sure, this is monitoring. But what about diagnosis, can these devices be used to diagnose something more than the common cold the sore throat? Maybe I don't know, diabetes, cancer? I know it seems far-fetched. But do you think one day this could happen?</p>	-
16	Info1	<p>I think sure, but at the moment, if we look at development within that kind of sector, I think initially we will have a lot of devices that will be able to monitor follow a certain condition. And</p>	FOpp-Rrd

		<p>within a couple of years, I think that we perhaps we can get solutions that can be used for diagnose and diagnostics. But I think they are a couple of years away. But what will happens is that traditionally in the healthcare sector, we haven't had a lot of date, I want to comes to how should we understand the patient? In terms of of how should I? How should I explain this? I think big data in general is something that everyone is talking about. Of course, big data can be used for diagnostics as such, but we haven't we haven't had that kind of data available until now. So I think we will need a couple of years. So we can start collect real, really huge amounts of data, then you can start to elaborate or, or Yeah, you can start to test with that kind of data. And that will probably be the one thing that will then lead to how you can create these kinds of diagnostic tools. So it will take a couple of years because that data is not accessible and the historical data that we have about individuals because we have been used electronic health records for the last 15-20 years. But it's not structured and it's not being we're not collecting those kind of parameters needed for developing solutions. So within a couple of years probably</p>	<p>Conx</p>
17	Researcher	<p>And MinDoktor will surely be waiting there to grasp the opportunity.</p>	<p>-</p>
18	Info1	<p>Absolutely, of course. I think this is really interesting at the moment when it comes to the healthcare sector. And what I think is most interesting is that no one really knows what's happening. We're developing solutions in so many areas, of course we have when it comes to diagnostics, then we have all the DNA testing that's going on at the moment. We have where you're doing this genotype being you can say that your DNA or RNA structure is you have a higher possibility to suffer these in these in these diseases. So yeah. When it comes to medicine at the moment, I think there were so much research in every area. So yeah, it will be really cool to see what happened in the last 5-10 years or coming 5-10 years.</p>	<p>FOpp</p>

19	Researcher	And do you plan on using certain technologies such as AI we've mentioned earlier to tailor solutions to specific patients?	-
20	Info1	<p>Absolutely. I think AI will be used in different ways within healthcare. Of course, some are thinking about as Watson who can then discover these rare diseases that no doctor can actually find. There is a typical story about I think it's a Japanese woman who had some kind of really old cancer, She was examined by, I don't know, 10 cancer specialists know what could actually find a solution or a treatment that worked for her specific type of cancer. And then they let Watson read through all her files and looked into thousands of medical publications. And then what some found that Yeah, she suffers from, from this specific cancer, she needs this treatment. And she responded, apparently. So that's probably one use case, I think what we will try to start with is, is using in the AI solution for telling individuals quite early if they can be helped by having a physical visit, or help by having a digital visit, because I think what we have understood is that today apparently, or between 15 to 20% of all the individuals that come to MinDoktor, they will need a physical visit. But that will happen after our doctors have examined them. So for example, say that you have a sore throat, you also have diabetes, perhaps that's not the patient that we should try to treat the with a remote consultation. So could we implement a solution where we have an AI algorithm? Understanding that? Yeah, this is this is your specific symptoms, these are not suitable for digital care. That will be I think that we will give a much better patient experience. If you don't need the first initial visit with a doctor or the nurse say that, well, I can't help you, you should go to this place and stuff. That's another use case where I think AI can be quite easy to implement.</p>	FOpp-Cust
21	Researcher	But you don't think that virtual visits can one day replace traditional presence?	-
22	Info1	I think it will not. No, I don't think it will for some cases it will never replace. This is impossible. But what I do think is that it can of course	FOpp

		<p>help an argument or the conditions working today. This is a very knowledge intense area. I think I can't I can't the exact figures. But I think that all the data available when it comes to medical the medical field, I think it doubles within every, every three months or so. I mean, it's just exploding with new knowledge all the time. So it's almost impossible for a GP to understand, what are the latest guidelines, how are the treatment programs, blah, blah, blah. So this is where artificial intelligence or some kind of much better knowledge support system that we have today will come in handy to assist the doctor saying that, yes, you need to do this and this and this, but it will still be the doctor having the responsibility in most cases. So yes, we can we can use AI to become a system when it comes to handling the patients and probably create more efficiency within the system.</p>	FOpp
23	Researcher	<p>So what do you think needs to be done to improve virtual visits in the future so that they become as important as traditional visits?</p>	-
24	Info1	<p>it's a really difficult question. You can talk so much as and have different angles. I don't know if there is some kind of self-purpose to have digital visits? Perhaps. Yeah, if we're talking about if we can, if we're trying to create efficiency and availability, I think virtual visits will be really good in some cases. But I think that one of the biggest questions is that, how, if we're talking about democratizing healthcare, traditionally, when you enter a room, if you look at the power balance between the clinician and the patient, it's, it's quite obvious that within this room, we have the king of the world is the doctor, they will be the one who will answer all the questions they have, they have all the knowledge. What has happened, the last 10 years is are gradually more of course, but what has happened is that all the medical information that were formerly only available for all the conditions, it's now online, of course, everything's public, you can you can just google symptoms, and you will get recent papers, research protocols, and all the latest guidelines within this specific area. So if we're talking about digitization of healthcare, I think what we</p>	Conx

		<p>have done is that we have given a lot of information to us individuals, and in most cases, I don't think that we're not competent enough to understand how what we should do with this information. So talking about virtual visits, for me, that's only a small part, I think, what what Sweden or Western Europe needs to do is to create efficiency within the system due to that we have an aging population, meaning that we will have like it today, it's, it's, I think, between 12 and 15% of the individuals, they stand for almost 80 to 85% of all the costs connected to the healthcare system. Due to that they're old, they're quite sick, these individuals, they will be probably doubled within the 15-20 years. So either we need to raise our taxes to an extreme level, or will need to exclude a lot of patients that have access to the system today. And this is where I think digitization can, can actually be helpful. But then we need to talk about virtual visits, then we need to talk about automation, for example, for what kind of symptoms do you not need to meet doctor, you can get the prescription, pretty much by answering questionnaire. And then you've had an algorithm saying that, yeah, if you haven't collected any medication for two years for this specific symptom, you should, you should have antibiotics prescribed. So I think it's about it's about we reshaping the healthcare system. And it's also about giving the patients tools to take care of themselves. I think a lot of visits today, they are due to that we have guidelines. For example, if you have diabetes, you should you should meet your doctor, twice a year. That's the standard protocol. I'm not sure but this is a hypothesis. But there is a guideline saying that, yeah, you should have a follow up or a shake up every half a year. Now you should check this and this and this and this and this. And for some patients, they will be they will, they will, they will take care of themselves. They won't have any issues, but they still will be they will still be you need to see the doctor saying that check-up say everything is fine. And then we have additional patients that are having perhaps a more severe and diabetes, they perhaps need to see their doctor four times a year. But due to due to that they need to see all the health of diabetes patients,</p>	
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		they can't afford to offer them extra consultations. So I think this is where it can use the decision. So So for all that are being feeling quite healthy, they will have some kind of remote monitoring tool, then you can just leave them for as long as they need. It could be five years, 10 years, until their diabetes is gradually making them feel worse. So you can start to individualize these kinds of treatment protocols or guidelines. Today, they're based on larger populations. I think that will also free up a lot of resources.	
25	Researcher	Who would you say would benefit the most from virtual visits? What type of patients?	-
26	Info1	Today, I think there are a few patient categories. The ones that I think will benefit is pretty much the category we spoke about today. The chronic patients where they can get it to monitor themselves. So they can feel that. I mean, for example, when we're talking about medicine, or we're talking about patients, it's always a discussion about an individual's diagnosis. I mean, but other than the force is for me as a diabetes patient, I'm not considered myself as a patient in most of the times, yeah, I have a chronicle condition. But I'm still, for example, if I would have diabetes, I wouldn't consider myself a sort of a diabetes patient, I would consider myself as head of innovation at MinDoktor, so my goal is to be healthy, to have a good life to live with my family, and be as independent as possible from the healthcare system. So by providing good digitization over remote monetary solutions for the ones that can use them, I think we will create a lot of people having, for example, I had my dad, he died from cancer a year ago, the last two years, everything was based around his condition. He was supposed to go on a trip with the with my mom and my family. The day before we were about to fly away. He had a setback. So he called the hospital and he asked Can I can actually go to this location. And they were will know, we should try to see the doctor and you perhaps you need to go to do some blood tests. And then we'll have to wait a few days to see if this is something bad or area. If it's just a short setback, with some kind of remote monitoring	Cont-Pat

		<p>tool from him, he would probably be able to do this trip, because that's what he was considering Kai, can I have a good vacation with a family. But now instead of not having these kinds of solutions, he was forced to stay home. And but everything was okay. But due to some kind of misunderstanding, it was impossible to have remote consultation and during the doctor wasn't available when you call the nurse at the moments blah, blah, blah. So stay home just for this minor thing. And I think those frightening forces, you can you can Yeah, you can improve the quality of life for a lot of patients or people living with certain conditions. Today, another area is mental illness outside. If you look at mental illness issues, it's an arising factor in Sweden and Western Europe as well. Traditionally, it's been mostly women suffer from mental illness, but now it starts to, to expand amongst men within my age and also younger kids. And studies has proven that digital consultation, when it comes to psychology source, psychology, treatment is really efficient. So I think there is a lot of good things about providing these time services for people living with some kind of mental health or mental illness related issues as well.</p>	
27	Researcher	<p>Our thesis also explores benefits and challenges of virtual visits. So could you tell us what you think are the benefits of virtual visits?</p>	-
28	Info1	<p>One benefit is the structured data that we're collecting. When patients, users, their businesses, as I told you, they answered all the questions. And what happens then is that the doctor and the patient they had would they would have the visit? It could be text-based communication, it could be video visits, in some cases, or it could be a short call over the phone saying that well. Yeah, I noticed that you use you said in the questionnaire that you have been coughing your blood for three weeks? Are you sure it's blood from the blah, blah, blah. So just a short follow up? What happens is that the data that we're collecting, we're using it at the moment for, for providing both feedback for the doctors. So they will get some kind of they will get a work report every month, they will they will have like a</p>	Ben

		<p>report saying that you have met these kinds of patients this week or the last month, you have created this many referrals you have ordered this men in lab tests, you have provided these kinds of antibiotics. And according to guidelines, you should have been providing this and this and this. So we're recollecting are using all that data, hopefully, so that the doctors can reflect of how they're working, how they're following guidelines, and also how they're actually tweeting, we're measuring the outcome of the patient as well. So the data, I would say, the new date that we're adding into the platform, then we can, can reuse and, and feedback to the to the doctors or clinicians is something that's really, really important. And one of the benefits. So we're trying to we have an ambition that we should provide a more safe consultation than within a traditional visit. Because the computer won't miss any question when we're, we're talking about the questionnaires. Today's the doctor, and if you have a stressed doctor, perhaps they will miss one or two questions. But the computer will repeat the same questions over and over every patient that will come from this virtual business. So our ambition is to actually provide better quality.</p>	<p>Ben Ben-Qua</p>
29	Researcher	<p>Which leads me to my next question, quality of care. There's a debate amongst researchers, whether virtual visits, lack quality, as compared to traditional visits, because in video consultation, for example, due to technology, maybe the resolution isn't as good, you can't actually see the skin disease as well. What do you think about that?</p>	-
30	Info1	<p>I think, if we're talking about video consultation, yes, there are a lot of quality aspects that you need to consider. Are you really sure that you can set the diagnosis based on a short video base. But we have tried to remove a few of those risks by having the questionnaires. And instead you can actually upload better pictures, for example. But there are risks, for sure. But there are there are risks every time a doctor meets a patient. I think when it comes to a</p>	Ben-Qua

		<p>traditional visit, we always we always seem to consider that every time it will be the perfect visit between a doctor and a clinician. But I think that people are people are people meaning that sometimes the doctor will forget to answer questions. Sometimes the doctor in the in the traditional media room will forget to listen to her lungs, or whatever. So, by introducing technology, I think that we can, we can find solutions, where these kinds of individual or human errors actually will be removed. But sure, there will need to be done more clinical studies of outcomes and such. But we already have a few not so many within Sweden, but in other countries where they say that the quality or the possibility to actually provide a patient with a correct diagnosis is quite similar as to physical room. But I think that's a debate that will be ongoing for five or 10 years. So sure, more studies, we're doing a few studies ourselves, together with other partners as well. But it's an important area.</p>	
31	Researcher	Of course, what do you think are the challenges of virtual visits?	-
32	Info1	<p>I think there are a lot of challenges. One challenge is that we have a healthcare system that's public funded, it's owned by the regions, we have 21 regions within the Swedish country, meaning that we have 21 different implementations of regulations, reimbursement, systems and such. So it's quite difficult because we have, as a digital provider, we have a nationwide focus. But traditionally, healthcare has been quite region based. So when it comes to regulation, legislation and such, I think that's one of the challenges. Of course, we have the reimbursement model, the current reimbursement model is not a good solution. When it comes to how private providers will be reimbursed from the public system. That's not something that we can actually interfere or do anything about more than we can address that they need to update the reimbursement systems. But those processes are quite slow. So that's, that's a challenge, of course, and also, a partial challenge is that a few doctors, they believe that they have this vision that the patient should be seen in the physical</p>	<p>Chall-Ext</p> <p>Chall-Beh</p>

		<p>room. And I as a doctor should have, pretty much all the time I need to assess the patient, what happens is when we are providing digital services, they have they they're thinking that we can't we can't create this psychological or relation deep relation with the patient because of the limitation of we're meeting in the physical room. So they are actually quick. They're there. They are, of course criticizing us a lot, saying that we're removing this specific bond between the patient and the doctor, that's really, really important. But we have we have patient statements saying that I haven't, I haven't felt so much seen and heard by a doctor when I met when I met the doctor from from your online service that I did in my in my life, so. But those kinds of expectations, of course, they they create a lot of noise.</p>	
33	Researcher	<p>We actually characterize the challenges into three categories. One of these deals with the technologies. I'm sure in the beginning, it was difficult to get a good internet connection in rural areas, I think that's probably not the case anymore. We also have external challenges such as laws and regulations, and behaviour and ones and this is the one you mentioned doctors' perception and how they believe that the sacred relationship between patient and doctor will cease to exist with virtual visits. There is another statement, it's that virtual visits, they empower patients. And this can take away the authority doctors once had over the patient. What do you think about that?</p>	-
34	Info1	<p>I totally agree. And I think that's also something that's causing a resistance of transforming the system. Because, yes, I think a lot of doctors, they are introduced to medicine, they're being told that they are now a special part of the society. Which comes with great responsibility, great power. But something is happening. That's when I was talking about democratizing of health. Now it's more of an equal collaboration with a doctor and patient are of course, some doctors are really intimidated or frightened by this change. Because they have been so used to having all the power to just tell the patient you should do this and this and this, no, no questions</p>	Chall-Beh

		asked, just follow my orders, and everything will be okay. But now, when patients are being educated, they have read through a lot of information before they sit, they will start asking questions. Do you think I should do this and this and this, and this is new situation for local doctors, which is quite difficult to handle? I think. so sure.	
35	Researcher	And as head of innovation, do you face problems with regulations and laws, when you have a new technology, an idea where you'd like to roll out, but then maybe the laws would be a bit strict on that, or they require a lot of testing before where you can actually roll out these features?	-
36	Info1	Absolutely. On a daily basis, so Well, perhaps not. But yes, sure. It's been a struggle. It's been a struggle. And it's always a struggle, when it comes to new technologies. Can we do this? Okay, we're trying to be innovative. But, yeah, it could be due to technological reasons. It could be to legislation or regulation. So then we need to start discussing perhaps with politicians and such, which were, of course, we're trying to, to find their ways to be able to, to make this shift or implement new ideas faster. But sometimes we get stuck. Yeah, due to reasons that we can't do anything about.	Chall-Ext
37	Researcher	You just said, you can't do anything about it, but is there any workaround around? This may be increasing awareness for example?	-
38	Info1	Absolutely. I mean, to be honest, I think a lot of politicians, they have realized that these kind of technological solutions, if would can address virtual visits and such, they will have a huge impact, but they're afraid at the moment, what will the consequences of this impact be? For example, will it mean that the, the costs are rising enormously, for example, they are afraid that can be our we delivering or providing services with less quality, what will that happen, will not mean that the normal patients will first have a virtual visit, and then they will immediately go to the traditional GP or emergency rooms. So then we'll won't go float on a capacity. But they are aware that we have legislation issues that	Chall-Ext

		that they're working upon, of course to find solutions, but it will take 5-10 years, before a lot of these changes will be implemented, unfortunately.	
39	Researcher	And lastly, we talked about the tools and devices that could be integrated into smartphones to enhance virtual visits. What conditions do we need to have in place to make use of these tools?	-
40	Info1	I think I think first of all, we need a better national or nationwide infrastructure. It's quite fragmented at the moment, due to that we have a regional focus on technical solutions. So a lot of more core infrastructure from a nationwide point of view, for example, bigger nationwide specific database today, if you live in lived in Africa, if you got stuck on tomorrow, and perhaps you've falling down and sprained your ankle or suffer from broken bone, they don't know anything about your medical history up which is really, really crazy. I mean, you can you can order stuff online from pretty much all over the world we can send packages to I don't know, every country in the world. But yeah, 200 kilometers from here the hospital have no clue about us an individual. We need some kind of nationwide database, of course. I think that's the biggest issue at the moment.	Conx
41	Researcher	This was really interesting. We've gotten lots of good answers, that would be really useful. Do you have anything you'd like to add?	-
42	Info1	I think we've covered most topics. Yeah, no, it's, it's, it can I think it can be perceived as if being head of innovation or being an entrepreneur within this segment or is challenging and of course it is. But I would say that the feedback that we get from our patients that makes everything worthwhile of course it's quite fun to understand that with quite easy solutions, you can have a huge impact on people's lives. Which is really, really cool.	-
43	Researcher	Okay, thank you very much Daniel this was of great help.	-

44	Info1	No worries. Thank you. Really interesting.	-
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Appendix 2: Second interview transcript

Line	Person	Content	Theme
1	Researcher	Well, we have, we have a few questions. First, we just wanted to know about your role in Push Doctor.	-
2	Info2	So I work as a physician with Push Doctor. So family medicine doctor, and I just do some hours for them every week. So I see patients online. These are like telemedicine patients day so they log in into the Push Doctor app or on Push Doctor website and they are given a slot appointment slot and then they log into that time around that time but for example a patient is told by the doctor customer services that okay, three o'clock a doctor will be available. So they will log in around that time and some doctor from the waiting room will pick him up this patient and then we just do the consultation with you.	Cont-Serv
3	Researcher	Can you tell us about the services Push Doctor offers?	-
4	Info2	Services are basically consultation advice, prescription. The fit notes or signals that we call University letters, those kinds of things, private referral letters to consultants, other consultants, other specialties.	Cont-Serv
5	Researcher	And when did you first encounter virtual visits or telemedicine? What was your first impression when you first found out about it?	-
6	Info2	Alright, so basically, Push Doctor has been around for umm I think around four years or so. I started working for them in October 2017. But prior to that I knew about them a couple of their, you know, people from the HR department, they contacted me directly to LinkedIn, and asked me whether I was interested in doing telemedicine and I was not at that time, I had a lot of reservations about it. And in those times, telemedicine was not very famous either. So, I was a bit apprehensive as well as sceptical about it. But then, over a couple of years Push Doctor became a little bit more settled, people knew more about it. And then I thought that this is properly probably future of medicine. Because the research shows that 70-80% of the patients who are present to the general practice, they can be actually	INIT

		<p>managed through video consultation, they don't need to actually see the doctor face to face in a room. And they could be managed through video. So, I thought let's give it a try. So I started working for them in October and initially there were some difficult things, you know, sometimes you come across some difficult patients, they are paying from their pocket. So they can be a little bit sometimes rude. And they are looking for something and they want that thing because they have paid for the prescription. But most important thing is whether the institute you're working for is supportive or not. And I found Push Doctor to be very, very supportive in my decisions, whatever decisions I made. So I'm still working with them and would love to keep working for them.</p>	Chall
7	Researcher	<p>And may I ask what kind of reservations you had before?</p>	-
8	Info2	<p>So of course, the most important reservation is that I'm not able to touch the patient. So as a physician, you have you are in the habit that you will take a history from the patient and then you perform a physical examination. So that is not possible through the video, except for whatever you are observing. So you're looking at the patient and out of your clinical experience, you can guess whether this patient is having any breathing problems whether this patient looks unwell does not look unwell. But when I started the video consultations, and I realized that most of our consultations do not actually need a proper physical examination. And most importantly, it's not like this is the only help available for the patient. So it happens take 10-15% ,10% I will say of the times that I have to ask the patient that you need to call 111 service which is our emergency service. And that you are too unwell to be managed through the video consultation and you need to call the service to book appointment for a doctor to see you properly physically. So then there are certain diseases like skin diseases, rashes, but you can simply diagnose it is a spot diagnosis doesn't matter whether you're looking at a patient through video or right in front of you, you can make a diagnosis. So initially, of course, you have this apprehension that you won't be able to examine the patient. But then when you start doing the consultations and you realize that you don't always need to do that. And many</p>	<p>Nov-Work</p> <p>Cont-Diag</p>

		times patients have got something available thermometer to give us their temperature blood pressure machine to give us their blood pressure. Blood Pressure machine also checks their heart rate. So they tell us about the heart rate. Now things are getting so much digitalized this soon we will be able to look at the ECG of the patient. And they can check like so many things which can which they can do for us while we are consulting them.	FOpp
9	Researcher	Can you walk us a virtual visit? How it would happen with one of the patients?	-
10	Info2	So basically, Push Doctor has its own login platform highly confidential and secure. So I log into that platform. First of all, there are some codes, we have to go through every time there is a new code to enter that, once I enter, and I just say that I'm available online. So there's something I click. So the Push Doctor, customer services can see that I've logged in, and I'm now available. So the number of hours are decided are pre-decided, so a month, six weeks in advance, I know what hours I'm going to do. So for example, today I was working until 1, three hours I worked this morning. So basically, you do log into that, and then you have got a waiting room in front of you. So on a screen, you can see how many patients are waiting to 4, 6, 8 10, 20. So these patients are not just for me, they are for all the Push Doctors who have logged in to Push Doctor at that time. So they could be four or five doctors available throughout the country who are going to see these patients. I don't know how many other doctors are logged in at one point. So I have no connection, no communication with any of the other GPs. So I cannot see how many doctors are available. Who is and I cannot see what the problem of the patient is I just pick up a patient and then I will once I start the consultation, then I will know whether the what the problem is. So I just pick up a patient and then the video starts, I just confirm their data, their name. And then after confirmation the screen opens on which I can do my notes I can sometimes I type while I'm talking to the patient, sometimes I type later on. And then there are some other columns, other sections on the screen for prescriptions for fit notes, to put in their allergies, past medical history, this from different things. So this is how it works.	Cont-Serv

		So the vendor consultation is finished, the patient will hang up from himself from his side. And then I go on and complete the notes because it's not necessarily I've done everything while I'm talking to the patient. So sometimes patients they hang up and then I go on complete the notes and then I end the consultation.	
11	Researcher	So would you say virtual visits represents a new technology or a new service?	-
12	Info2	It's a new technology as well as new service. So a new technology in the sense that of course, this telemedicine is a relatively new concept in the UK, maybe with the last four or five years. It is of course more famous and I think most established in the US. There are other specialties who are doing telemedicine as well. So in Push Doctor, we're just doing general practice. So it's a family medicine. So it's not specialized, like orthopedic surgeon or rheumatologist or cardiologist was doing it. But in the US, I'm sure that they have got specialties as well or do the video consultations. So of course, it's both. Technically it is a new thing and a new concept. And it is it is getting famous because many times patients are not able to go and sit in the walk in centers, or they can't get appointments with their GPs and they have caught something very simple, which needs to be managed. And if they have money, then they are happy to do it.	Nov-Serv Nov-Tech
13	Researcher	So has it changed your way as a physician? Has it changed your way of working? Or is it just a continuation of previous telemedicine technologies.	-
14	Info2	This is my first experience with telemedicine Push Doctor, I never worked in telemedicine before this. So but my practice hasn't changed rather, I think it has improved. Because when you're working through Push Doctor, you're following guidelines more strictly, you know, the NICE. I don't know whether you've heard of NICE, NICE is a National Institute of Clinical Excellence in the UK. And we follow the guidelines which are set forth by NICE these guidelines are regarding the prescription prescribing guidelines. So when you're working through Push Doctor, of course, Push Doctor work is regulated by CQC care quality commission. So they are constantly under a microscope of CQC. They keep an eye on the how the doctors are	Nov-Work Ben

		<p>prescribing whether they are prescribing in the right manner, whether they are prescribing or according to the guidelines. So because they are under such a microscope, we are we get a lot of help and support from the Push Doctor in the form of webinars, presentations how to stick to the guidelines basically. So I actually as a as a physician, my practice has, I would say rather improved because I know that whatever I'm doing, it will be it will be it can be seen by somebody it can be obsessed by somebody whether I'm doing the right thing, prescribing the for example, certain antibiotics, they can be prescribed for seven days, 10 days, five days, but the guidelines of they say that they can only be prescribed for five days. So I will only prescribe it for five days, I won't go beyond that. So those that kind of thing.</p>	
15	Researcher	<p>As we know, through telemedicine not all diseases can be diagnosed. Can you tell me about the diseases Push Doctor can diagnose?</p>	-
16	Info2	<p>So basically, there is nothing that cannot be diagnosed. Push doctor, everything can be diagnosed, the only difference is whether this particular diagnosis needs further confirmation. So it is not necessary that even if I'm examining the patient face to face in a room, I will be able to make a diagnosis. So basically, it all depends upon what is the final outcome of the consultation, the final outcome will always be in the best interest of the patient. So because you're a non-medical person, so basically when a doctor, when a patient comes to the doctor, it is not necessary that a diagnosis is made on the first visit. Right? They could be the doctor raises some suspicion. The doctor says okay, you need these investigations done. Let's know these investigations and then let's see you again and then I might be able to give you a better diagnosis. So diagnosis is not something which can be done in the first sitting, there will be certain things like you said yourself tonsillitis, cold flu, sore throats, chest infections, asthma exacerbation, skin problems, knee joint problems, gout, these are very easy diagnosis to make, you don't need any blood test for them. But just like in a face to face consultation in the room, when you are physically with the patient, it is exactly the same as we Push Doctor that there will be certain things which cannot be diagnosed. So of course, we will advise the patient accordingly. So</p>	Cont-Diag

		<p>whatever advice we give to the patient, whether it is a diagnosis, whether they need more further blood tests or investigations, or whether they need to see a doctor again, it's always in patients best interest. So it's not it will nobody will be able to give you a clear answer that. Okay, these are the 10 diseases which I can diagnose through doctor. And these are the 10 diseases I cannot diagnose. It doesn't happen like that.</p>	
17	Researcher	<p>So what kind of patients benefit most from this service?</p>	-
18	Info2	<p>So basically, I've seen that you can see three categories. Number one young patients. Because these patients have don't have time, they don't have time to they are working five days a week, sometimes even on the weekends, they are working different kinds of hours. So they don't have time to go to see their GP, they don't have time, sometimes the problem is very minor. Sometimes it's a big problem, but the GP cannot see them for another three weeks. So young people are very receptive of this concept of Push Doctor, they are happy to spend money, the older generations they are used to the NHS, getting everything done for free. So they are still catching up. But the new generation is quite happy to embrace this idea that okay, if they have some money in their pocket, they can just pay the money and see a doctor at their will. So definitely young patients, I would say at the top are on top of the list, then there is another category and that is very old patients who too old or sometimes feel too ill to leave the house. So these patients are looking for advice most of the times, or sometimes it is something very simple like a urine infection or a chest infection. So these patients, for example, a 75 year old lady, she has got urinary symptoms, she can't be bothered going out sitting in the out of pocket center for four hours to be seen. She just does not have that kind of energy. Or she has called a GP practice and GP says I can't see you for another two weeks. So where would she go then it these are the patients who contact us through Push Doctor. And then there is another category and that is patients with mental health problems. Many patients who have got mental health problems like severe anxiety and depression, they don't like going out. And they don't like going out and sitting in the waiting rooms. Because it is a</p>	Cont-Pat

		<p>stigma attached to anxiety and depression. Or people think that they will anxiety depression, if they're sitting in the reading room, maybe somebody who knows them might look at them and say why them here. They could be many things going on in their mind. Some people suffer with agoraphobia, they don't like to be around people. So these people are benefiting a lot from this service. Because for mental health issues, you don't need a physical examination as such, you just need to talk to the patients and patients are finding it very helpful the service because then we can give them the right advice, we can guide them what kind of help they can get, what kind of help will benefit them, whether it is counselling medication, online of behavioural therapy, or just talking because sometimes some patients just call the doctor because they want to talk to somebody, they're feeling very anxious, they're feeling low, they are alone in the house, and they want to talk to a doctor just to relieve the burden. So I these kind of patients, they find it very helpful.</p>	
19	Researcher	<p>This is very interesting. So what are the benefits, in your opinion, of virtual visits?</p>	-
20	Info2	<p>Of course, they have a lot of benefits. Number one, it is time saving. Patients don't have to and it is readily available. So patients don't have to wait to see the doctor. And they can see the doctor at the will. So of course I'm sure that when they for example, if I log into my Push Doctor app, and say that I want to see a doctor, I will probably be given an appointment time within an hour or maybe immediately depending upon how busy it is. So I can see it off. So if I and even as a doctor myself, if I want if I am ill and if I know what is wrong with me and what kind of medication I need, I would rather go to Push Doctor rather than making an appointment with my GP and waiting for two weeks to be seen. Because NHS getting more and more burden. It is a free service as you may already know. So National Health Service is a free service and GP practice are already overwhelmed and overburdened with the growing population growing elderly population. So they are already you know, busy with so many chronic problems elderly patients and so much. So, this kind of services, virtual, this telemedicine, it is readily available, it is quick, you can see a doctor at university, this is a very big plus point, especially for</p>	Ben-Tim

		<p>young generation. And then the and of course, another thing which I forgot to mention is that this service is so good for visitors who are coming from the other countries who are visiting UK, or who are just here for six weeks, two weeks, eight weeks of work. And you know, for example, a person comes from the US, and he suddenly runs out of his medication, he came for four weeks on a business trip and he has to stay longer. And now he doesn't have his blood pressure tablets. So we would go. So this is one of the best ways to contact a doctor and get prescribed. So this is a very good service for also for visitors for young people, people who are working class people is very, very good. So this, this is a big advantage. And another advantage being Of course, there's this big advantage that it takes pressure off the NHS, because you are seeing all these patients who really did not need to see a doctor in the room physical examination was not required, they did not need to really see the doctor into and the you're taking the pressure of the NHS. So it's actually good for NHS as well.</p>	<p>Cont-Pat</p> <p>Ben</p>
21	Researcher	<p>Before you mentioned the waiting time that of course is lower un virtual visits, what about the consultation time? How is it compared to face to face visit?</p>	-
22	Info2	<p>So when you go to the GP practice, the GP has got 10 minutes to see you. But a slight differences that you have more flexibility with Push Doctor. So it's not like at the end of 10 minutes, I have to close the consultation, it doesn't happen like that. So in a GP sitting, he has already got appointments in front of him. So he has to maybe see 15 patients in the next two and a half hours. And that's about every 10 minutes he has calls with patients. So he's trying to just go through the consultations quickly, fast. But in the Push Doctor, of course, patient is charged for 10 minutes slot. So whatever the charge the patient, they whatever money they take the it is for 10 minutes. So what I try to do is I try to finish my concentration within 10 minutes, so that patient can hang up within 10 minutes. So if a patient hangs up from his side, within 10 minutes that he is not charged extra, then I may spend three, four extra minutes on typing my notes during the prescriptions, something else. So on average, one consultation will last about 12 to 13 minutes. Some consultations are</p>	<p>Ben-Tim</p> <p>Ben</p>

		<p>very quick, because the patient is only looking for a repeat prescription we have already started a patient on a medication is just coming back to get a refill. That will hardly take four minutes. So it could be as short as that but sometimes it goes into double concentration. So patient, after around nine minutes, we have sent a warning the patient gets a warning that this that extension will happen after 10 minutes, but if the patients are happy to pay for extension, then the consultation can be there for 20 minutes. We can talk for 30 minutes.</p>	
23	Researcher	<p>Okay, quite flexible. Yeah. And what about the cost? Do you think virtual visits are more cost-effective compared to face to face visits?</p>	-
24	Info2	<p>I don't I don't know the exact charges of Push Doctor. Maybe you could you can make an account yourself and see how much they charge. But I know that the prescription is charged at eight pounds because I send the request across to them to accept the cost of the prescription. So I know it is for eight pounds. But I think overall it is very cost effective. Because patients are very happy with this kind of service. The only problem is when patients and patients are looking for something and they don't get it. Then they start complaining that they spent so much money and they couldn't get what they wanted. And sometimes patients complain and they send a complaint to customer services, they want their money back. So the customer services will get right to us and ask us what exactly happened and then return some valuable advice. For example, a patient comes in and he says that I want antibiotics for chest infection. I tell him that I don't think you ever chest infection. I think it's just a viral cough. And he starts arguing with me. And he is adamant that he wants antibiotics. And I clearly explained to him that I'm very sorry, I don't think you need antibiotics. But if you're still worried you should see a doctor physically so that they can check your chest. And if they are convinced, then they can give you antibiotics. So this patient will not be very happy with the consultation, he will go back to customer services and say well, I wasn't happy to the doctor, then the customer services may contact me and asked me what exactly happened, I will tell them well, this is the advice I gave him. So they will then tell the patient that this whatever we charged you is</p>	<p>Ben-Cost Chall</p>

		<p>for advice. It is not a guarantee that whatever you're looking for, you will get it if the doctor gave the best advice which was in your benefit. So people are now usually I mean initially when the Push Doctor Service started, there were complaints like this because people thought initially that this is just a way to spend money and get whatever they wanted. But now people are getting our understanding that that's not the case. Similarly, there are a lot of medications which are on blacklist, we can't prescribe them to PushDoctor. So all the addictive medications, high dose opioid medications, and the medications which can cause drowsiness, sleepiness addiction, complete blacklisted. So tell me tell the patient as those kinds of medications, if somebody even asked for them, we just clearly tell them that sorry, this is on the blacklist, I cannot prescribe it to you.</p>	
25	Researcher	<p>One of the perceived benefits that raises debate amongst researchers is quality of care. Some people believe that the quality will never be the same as in physical face to face visits.</p>	-
26	Info2	<p>I would say, as I said that 70 to 80% of the consultations, you don't really need to be in the same room with the doctor. And this is what I heard before I started the video consultation. And now I believe in this also, because I see these patients, the basically what is quality, quality is making the right diagnosis and providing the patient with the right kind of treatment. According to the guidance. Now Push Doctor Service is monitored by CQC Care Quality Commission, which also monitors all the GP practices throughout the country, which also monitors all the hospital services throughout the country. So if the Push Doctor, or there are some others like Babylon, which is another online service, in the UK, if the services were below standard, they would have been closed by now. They wouldn't have been allowed to work. In the UK, you can't just open a service and start working. Everything is under scrutiny. And probably under more scrutiny as compared to the normal GP practice. Because over here, we are not able to touch the patient, we are just doing video consultation. So it is a myth that we say that definitely patient needs to be in the same room with a doctor. There are a lot of things with doctor can diagnose just an observation. And not of course we are able to. And more importantly, if we are worried</p>	Ben-Qua

	<p>about a patient, we just tell them that See, I'm worried about you. You look too ill to me to be managed through video consultation, you need a physical examination, and patients are quite happy to take that advice. I'll give you an example. about maybe last month, a mother called she had like a 16 year old daughter in the background. So she said that my daughter has been unwell for two weeks. So she has caught flu. And now she has started to high temperature for about a couple of days. So mother said that I think she has got a chest infection. She's got a bit of a cough. I think she has a chest infection. So I was thinking if you could give her some antibiotics. So the mother made the diagnosis. And at the same time she's asking me, she's telling me what to do. So I asked a few questions. And when I looked at her daughter, 16 year old daughter, she did not look well to me at all. She looked unwell. So I told the mother that she had so for two weeks fine, but now she is running high temperature. I think there is something new developing over there. And this daughter of yours needs an examination, proper examination for proper diagnosis, I won't be able to give you antibiotics. But thankfully the mother was quite happy to take my advice. She did not argue with me. She said okay, that's fine. What should I do? I said, Well, this is it was a weekend. So I don't know how, a GP would have been closed. So I told her to call 111 service and book appointment with the with the outsourced GP. So about three weeks later, two weeks later, we got a letter from that mother to the Push Doctor and they passed on the letter to me. So in that letter, she said that she praised me for whatever I advised her because she spoke to 111. And they said you should take your daughter to the hospital. Because by the time she spoke to 111, her daughter had deteriorated. So she said that by the time we reached the emergency, my daughter developed a rash, and she was diagnosed with meningitis. So she wrote in the letter that your doctor save my daughter's life. So it's not about the quality. The quality is their quality is being monitored. If quality will fall, Push Doctor will close. So it's not about that it's a mistake that you say that video consultation cannot provide the same quality of service, it can provide itself. Of course, there are limitations, you cannot say it's bad quality, it is limitation. So I could not my limitation was that I could not examine their 16 year old girl, I could only observe her observation,</p>	
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		the first step of examination in medicine. So I observed her and looking at her she did not look right to me and told the mother that she's not well, I'm sorry, I cannot diagnose and treat her on film on video she needs to be seen. So its about the limitation. It's not about the quality.	
27	Researcher	Okay, what do you think about to accessibility do you think is the main benefit of virtual visit? Because earlier you categorized the target groups into young people and old people, for young people it can be easier to access this kind of technology maybe for old people is more difficult. So do you feel it is more accessible?	-
28	Info2	Most of the time, they are not contacting us themselves, their granddaughter grandmother, a grand daughter or son or daughter will contact will connect them to us. So most of the times, but there are some very, very, you know, I would say intelligent people who use internet to go online and they are very good at that. So they login themselves, and they have got account under their name. But many of them I would say about 60 to 70% of elderly people, they come through their daughters or granddaughters. So the main account is under the name of their daughter or the name of their son, and then we add them to the account. And then we just consult them. So it's not that it is not accessible by them, they can access it. But as I said many of the elderly people are now more and more computer literate. And they are using internet anyway for other things. And they are quite happy to use professional collaboration very easy to use, I think from the patient's perspective, because I see so many elderly people who just log in themselves. And but as I said about 60% of them would come through their daughter or granddaughter or grandson and contact us.	Ben-Acc
29	Researcher	And the main challenges that you face during working with virtual visits as a physician.	-
30	Info2	So as I said, one of the biggest challenges that this is a private service. Yeah, so the person is paying for a prescription. In the UK, people are not used to this idea of being for medication being prescriptions that the UK about 88 there was a survey done to three years ago, about 90% of people are not paying for their prescription because somehow they are exempted. Either they are like up to age 18, working	Chall-Tech Chall

		<p>full time or they are 60 Plus or they are on certain medications, because of which they get free pre- scription and free medicine. So there's only 10-15% of people who are actually paying for prescription. So people in the UK are not used to this idea of pay- ing for their consultations paying for the doctors. So when somebody is paying from their pocket, they think that now they have the right. But whatever they ask for the doctor will just do that. So this is one of the biggest challenges. When you're doing a private consultation, you have to make the patient understand that they are here for an advice, medical advice, this medical advice, they may not like it, they may like it. As for it is for their benefit, I don't care whether they like it or not. But of course there is a way to talk to them. So you try to make them understand but still nice, they complain, they com- plain, we don't we know that that there will be some patients who will never be happy. But this is one of the biggest challenge. And they of course the other thing is there's sometimes you wish that I wish I could just have a listen to this patients just once be- fore I'm prescribing this antibiotic or before and pre- scribing this. So some patients are not so unwell that you tell them to go and see the doctor face to face. And at the same time you wish that if you could just listen to their chest. So these patients can be a little bit tricky. So when you have to make a decision, whether you would like to prescribe them something or you want them to just go and see a doctor for physical examination, sometimes the video quality is not 100%. So because we do quality defence both ways. My internet speed, mic is perfect, but it may not be very good for the other person who is either using a phone he's outdoors, sometimes people are talking to us while they are in a car moving car. Sometimes they are talking to us in the train, some- times they are just at workplace. So internet connec- tion may not be very, very good. So sometimes that can be a limitation as well. It can be sometimes challenging. Listening to the patient, sometimes they are just sitting in a restaurant and talking to us say so much background noise. So these are like technical problems sometimes that we face during the consultations.</p>	
31	Researcher	Doctor, would you agree with the statement that vir- tual visits empower patients and hence take away	-

		the authority doctors traditionally had? Does that pose sort of a problem for you?	
32	Info2	Yeah, okay. You see, the thing is that all medicine is about empowering patients. It's not about empowering the physician. It is not it is if somebody says that medicine is about empowering doctors than he does not know what medicine is all about. Whether you're seeing a patient in the hospital, whether you're seeing a patient in the GP, practice in the clinic, whether you're seeing them online, or whether you're just talking to them on the phone, patient is the center of the consultation. It is all about patient. The patient is the most important thing. It is not about the patient who has the authority. It's not about authority, it's about the patient is that it is a very wrong concept. In lot of countries where people think that doctor patient consultation is all about doctor telling the patient to do something. No, that's completely wrong concept. The correct concept is that the doctor has to listen to the patient. And there is a shared decision making. You cannot tell the patient you have to do this, this and this, you have to explain to the patient that this is these are your options. In my opinion, this is the best option for you. Now you decide what you want to do. This is called patient empowerment. So it has nothing to do with authority. If authority comes in a consultation, then this is not a doctor patient consultation. It is a business deal, or maybe something else. And I don't like this idea of authority anyway. So it's all about patient empowerment. It's not about physician empowerment anyway. So whatever type of consultation it is, whether it's a video consultation, audio consultation, seeing somebody face to face, seeing somebody in a hospital, it has to be about the patient.	Chall-Beh
33	Researcher	And the last challenge is, well we describe it as an external challenge, and it relates to regulations and laws. Do you know about any challenges you have faced in this aspect?	-
34	Info2	No I don't I just again, as I said, CQC does the opposite. And they go to the consultation. So for example, hundred consultations took place in a day. And they will pick up any 15 randomly. And they will look at the consultations they will look at the quality of the consultations whether the doctor put in all the notes properly, whether the doctor asked	Chall-Ext

	<p>the patient about allergies about the past medical history, their list of medication, there's quality of consultation, and then whatever doctor prescribed, whether that was according to the guidelines. So this is something which is reviewed by CQ see on regular basis. And the Push Doctor has got his own team of medical officers who keep an eye on our consultations. keep giving us you know, we get bulletins, we get videos, we get webinars, all sorts of things to keep us on the track to keep every so that you see it is very difficult to regulate something like this. If you have 350 doctors working for your platform, every doctor has its own set of experience. Every doctor is different, especially in family medicine, in general practice, the dental practitioners have a different every doctor has a different background. Many doctors or surgeons before then they came into family medicine, some are very newly qualified. So they are less experienced. Some are like working for 15 years and they are very, very experienced. Some doctors like to keep up to date, some doctors are very lazy. So it just it is job of certain group of doctors like medical officers to keep everybody on the same ground at the same level at least, that everybody knows that Okay, these are the guidelines we follow. This is how we do things. So to keep everybody uniform, and on a track, of course, we have got a team of medical officers. We are very, very obviously very supportive. If there is ever any problem, I can contact them, they always answer my questions. If they have a patient makes a complaint, if they're always very supportive, I can explain my side of things. And then I never hear back that means they take care of things. So it's so from a legal point of view. Of course there is the CQC now talking about indemnity when you talk about legality, there is something called indemnity or medical insurance, which every doctor has to get in this country to work. So of course, it has an impact on my indemnity, because it is an unsafe work. It is a private work unsafe in the sense that I do not have access to patients records. I cannot see what patient has been doing or what has happened to the patient. Previously, whatever patient has was telling me I have to take my word, his word for it, isn't it safe efficiency is that I have heard this kind of problem before, I can only take this word, I don't have any documentary evidence for that. So that's why my work is unsafe. Because my work is unsafe, and</p>	
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		practices that rather than patient data came from their pocket.	
37	Researcher	Do you know if Push Doctor plan on using technology such as AI in the future, to tailor treatment? So where you can chat with a bot and give it some data, and then it would decide the diagnosis or prescribe.	-
38	Info2	<p>But I think anything like this will need a lot of work on it. I don't know. Telemedicine was a very foreign call if 15 years ago, if I if somebody has asked me if this is something which is possible, I probably would have said Oh, how can that be possible? Without seeing a patient face to face? How could I just diagnose something, right? So I cannot say it won't happen or it cannot happen, it probably will happen at some point. And if Push Doctor is doing telemedicine now, they might actually take to take that up as well. I feel that is something which is wrong, and which is not in the best patients interest. The reason being that it can lead to a lot of problems, which we're actually already seeing. Patients putting symptoms in Google. And then the answer comes up as some form of cancer or somebody or disease. And the patients are then running off to the doctors asking whether this is the case, because they Google their symptoms, and the Google tells them that you have a brain tumor. Right. So if people are already in a way using this artificial intelligence in a in a group way, so of course, I'm sure when they will develop artificial intelligence it will be it will be more tailored, it will be more like intelligent. Of course, it will be made by medical professionals, they will have a lot of input into it. And it might help with some simple things like also and things like that. But again, end of the day, nobody can replace a doctor.</p>	FOpp-Cust
39	Researcher	Um, we mentioned earlier devices that could be used right now to measure certain parameters at home, such as blood pressure. Does Push Doctor use any of these?	-
40	Info2	So at the moment, no, because every person has got its own access to things, but this is something which probably might come up in near future. So at the moment, of course, every person is different. So these people may not have access to all these things. So it's not at the moment, we are lucky if somebody has got a blood pressure machine, and they tell us	FOpp-Rrd

		<p>about the readings or the heart rate and things like that, people are getting more and more intelligent. Now, people were using the service, they know that doctor might need this kind of information. So, if this information is not available, the doctor might tell me to go and see a doctor face to face. So in order to avoid that situation, many people they already you know, when they log in, they already have got some details on them available, people are getting clever. But yeah, they might be in future, this is something which is which is which I can see will be happening soon.</p>	
41	Researcher	<p>And do you see the use of these real time diagnostic devices evolving? Do you see them being used to help diagnose even more diseases?</p>	-
42	Info2	<p>In some situations. Because for example, as we see, as he as we are discussing now that there will be devices, which can even give you electric shock, if you are having arrhythmia and you're going into a heart attack or a cardiac arrest, they will be they will be devices which can even give you an electric shock. And you that might be a lifesaver. But of course it was a lot of apprehension. So if this is why there is no alternate to a doctor, so the machine might tell, okay, missing a beat, or you're having some extra beats. So see a doctor. So now tell patient how urgent it is to see the doctor. It could be something that's absolutely normal, it could be something very abnormal. So it can add to apprehension. And it can cause wrong diagnosis at times. But still, it could be life saving, and even if it saves one life, it's worth it. So I'm seeing more and more use of these things, we cannot stop people from using these things. We have to however adapt to it. As GPs, as telemedicine doctors, we have to adapt to all of this and we have to be ready for this, the patients will come to us. Now, for example, as a GP, I am always ready the patient will come to me after reading about his illness, all the doing all the research, what they could do online. And then and then it becomes a challenge for a doctor to explain to them that I know better than online search. So it is a it is already a challenge for doctors to conduct any kind of consultation. In these days when people have Google. When I became a doctor, there was no Google at the time. So this is the thing. So people are going into Google, looking at their diagnosis, looking at the disease, reading</p>	FOpp-Rrd

		about it. And then they come to the doctor fully equipped with all sorts of questions, and you only have 10 minutes. So it is a challenge. But I think we have become used to this. And I think 99% of the times patients are satisfied.	
43	Researcher	And one of the things we've been reading about in our research is, is the use of smartphone applications coupled with external devices, where you as a doctor would be able to remotely see into the patient's throat or ear to provide more diagnosis.	-
44	Info2	Yes. Because it will be very helpful, especially if you're doing telemedicine. It will be very helpful. Yes.	FOpp-Rrd
45	Researcher	But it's not being applied now.	-
46	Info2	No, not at the moment. As I said earlier, that I can see that this will, this is coming soon. Because you know, most of the people who come through telemedicine, these are people who have money. These are people who are tech savvy kind of thing. They are, they are the digital age. So they are using these all kinds of things. And they're very aware of these kinds of apps. And these people are very aware of, you know, the importance of good health. So these young people or people who are not so young, maybe in the middle age, or even in their 60s, the people who are now in their 60s, when the computers came in, and this digital age came in, they were in their 40s at the time. So even the old people are not that are not that, you know, completely illiterate from Digital Age anymore, because we are which has been good 25 years since Windows was introduced. So people are using these kind of apps, and I'm sure that we will be seeing this very soon and I will be very happy at least because then they will be able to make better diagnosis, and they will be able to advise better. And this is why telemedicine is so exciting. And it is it is the future basically. Be honest, still, there are so many GPs who are very skeptical about it. They asked me how do you do video consultations. And I actually encourage them to try it. There's no harm in trying it. So I tried it, and I never left. I still do it. It's a it's very exciting, actually.	FOpp-Rrd
47	Researcher	Okay, so what conditions do you think need to be in place in order to make use of these real-time remote	-

		diagnostic devices in the future in order to also enhance and expand your visits.	
48	Info2	I don't know I've never come across a situation. So of course, the person needs to have a smartphone, and they need to have the right app. But as I said, we have not been given any guidelines on that as yet. So I'm sure when these apps or these kind of external devices become more common in us become actually become cheaper. It's all about the price. If Apple introduces some external device, which is like for hundreds and hundreds of pounds, people will not use it. But when it becomes automated, and they are available for 10 pounds and 15 pounds, then everybody will use. So it all depends on availability. So I'm looking at maybe in the next couple of years, more and more people will be using these external devices. And then we will get some sort of guideline as well from Push Doctor. And this is why I said that all these processes have to keep evolving, according to patient demand patient population, the kind of you know, digital services available, so they have to keep evolving.	Conx
49	Researcher	Do you have anything else you'd like to add doctor?	-
50	Info2	No, I think I pretty much your questions covered literally everything. I was contacted by an international organization, I don't know whether you know about movie health. Moving health. Okay, so moving health is basically a kind of a, they still keep sending me emails. So basically they are a service with online doctor available for African countries. My patients, majority of African countries were so there are so many African countries where people have lot of money, but they don't have access to doctors, because nobody works. Like, you know, good physicians, US UK trained doctors, they don't go and work in those countries. So what they this to mobile health, what they're trying to do is trying to get the patients in Africa to get access to international, internationally, like UK and US trained doctors. So I was contacted by moving health a couple of years ago regarding this. But then, when I went more into it, and I tried to understand how it would work, it was very complicated. Because every country has its own, you know, medications, their guidelines. And there are a lot of chances of mistakes. When you are trying to see a patient from Africa, for	-

		<p>example, the kind of diseases you see in the UK are very different from the diseases and of Africa, you need to have more knowledge and Tropical Medicine, that kind of thing. So I just pulled away from it. So and my indemnity insurance, health insurance also doesn't cover for international work. But movie has said that they will cover me for health insurance, they will pay for my insurance, international health insurance, but I didn't take up that idea. But maybe four or five years from now, if movie health or something like that becomes more established, and more and more people are doing it. You never know I might be doing that as well. So it all as I said, we have just have to be very, very, you know, open words, new ideas, new ways to treat patients. We cannot just say that no, no, I don't like this concept on the old style, traditional type. I mean, I'm not like that at least. So I just like to embrace whatever new technology, whatever new is available.</p>	
51	Researcher	<p>Thank you very much. I forgot to ask you at the beginning. Is it okay, if we use your name in our master thesis?</p>	-
52	Info2	<p>Of course, yeah. I have no objection to that. But I will be happy to watch your cases is published. If you could send me a link so that I could read it.</p>	-
53	Researcher	<p>Yes, of course, of course. Thank you very much. We really appreciate you taking the time to talk to us</p>	-
54	Info2	<p>At all. It's always a pleasure to help students. Yeah, all the best of both of you.</p>	-

Appendix 3: Third interview transcript

Line	Person	Content	Theme
1	Researcher	Hello, thank you for accepting our invitation.	-
2	Info3	Hello.	-
3	Researcher	Before we start is it if we record this call and use your name and company's name in our thesis?	-
4	Info3	Yes, for sure. Okay.	-
5	Researcher	We would like to start with some introductory questions. So as co-founder of Health Tap, how did the journey begin? What brought the idea of having an application where you could communicate with patients virtually?	-
6	Info3	Well, you know, the presence of the development of technology to support healthcare has been present for decades. As a clinician in practice, I was actually teaching medicine at Stanford when I decided that it was on the processes of delivering healthcare better, which is why I went and did the PhD at Stanford, in computer science to learn the technology to understand. And as I did, that, this wonderful evolution of the internet started first, followed afterwards by the creation of multi to make it possible for people to have computing devices in their hand, and then the subsequent evolution of our society with our development of social media and the advent of people getting services on their handheld devices. So, all of these converged as we develop technology solutions, support health care. First on the web, I'm actually built the first consumer health website or service at the healthy on which became web and as a demo using technology to deliver information to patients. But when mobile technology took off, and people's culture and attitude for devices changed, it became obvious there was an opportunity to bring health care to mobile devices. And that was the foundation for starting the company now nine years, which was that it ought to be possible to get your health care on your mobile device. And so we built a company with the idea of creating a platform, solutions to people primarily through connected devices, asking ourselves, what kind of health care process can best be delivered	Cont-Serv

		through virtual care. And so, we build a platform to start with information and lead to people to connect directly with doctors, and then also to get follow up care with following yourself and helpful guidance to follow through with what the doctor had recommend doing.	
7	Researcher	And when you first heard about virtual visits or the possibility to hold visits virtually, what was your impression? What did you feel about that, as a physician?	-
8	Info3	Well, I mean we created a platform to enable people to access directly to quality information, which in the first step, of course, is just answers to questions which are not really health care, but just informational answers. And then with our platform, you have all to exactly what you're saying, which is virtuous. So, we created one of the first platforms that enabled people who discovered that they needed to actually see a doctor to connect with the doctor. The wonderful thing with high resolution video and voice communications is that you can duplicate through the virtual care, all of the aspects of healthcare that are seen as the patient interview, and it duplicates a visit very much like sitting across the desk from a patient and talking to them and understanding what's going on what they're experiencing. We do review as a first step, and before a medical physical examination is required.	Cont-Serv
9	Researcher	And as a physician, have you done any remote calls with patients?	-
10	Info3	Well, as a creator of the platform, I've been actively delivering virtual care with my patients through Health Tap for many years now.	Cont-Serv
11	Researcher	Okay, and were you excited to use virtual visits with patients?	-
12	Info3	Think over how much you could do through a virtual visit. Before we got started, I was very concerned that the video would feel like a barrier between me and my patients, that I would feel disconnected, that it would be hard to connect or understand what is going on in their lives as I speak to them about their medical issue. And what really struck me was the degree to which the video in real time is a very personal thing. And that, to my surprise, the connection virtually	Ben

		<p>feels more connected sometimes then when we see the person in the office, this was counterintuitive to me. And I realized after a while that what the video does is it causes you to focus, there is no distraction. There's no other things in the room, there's no people walking by, there's no hallway with other things. There's no patient in the next room, all you have is a focused view of your patient in front of you, without any other distraction. And so this gives you the opportunity as a doctor to concentrate on more subtle issues associated with manners, appearance, facial expressions, body posture, attire, and other more subtle cues that help us understand what the real issues are facing a patient coming to see. So, I was really very surprised, very pleasantly surprised with the degree to which it's possible on a virtual visit to make a personal connection with your patients.</p>	
13	Researcher	<p>That's a very interesting point to make, because we're trying to explore virtual visits from a physicians' perspective. And we had concerns and questions regarding the, you know, the sacred patient physician relationship that has always existed and whether these visits could impede that?</p>	-
14	Info3	<p>As I say, in terms of guidance to people, who Oh, what's going on and don't understand and may have some fear or concern about the degree to which connected convey an understanding of what's going on and express the human emotions associated with helping people is really unparalleled. And I again, I have been very surprised to create a connection is possible through video. It's not the same when you do a chat connection. Yeah, I let me expand a little bit on that. I would also comment that in establishing a new relationship, there is another element that is helpful if you're going to create an ongoing relationship with the patient, only you can do it virtually, I still believe that it's important that doctor and patient meet face to face if they're going to have an ongoing relationship. And that initial encounter calendar, including a physical examination, the laying on of hands of the doctor with the patient it's important to establish an ongoing connection. And after you've done that for a patient that you have met in person, that expands dramatically the ability of the virtual visit to support continued and ongoing care. Once you know someone and you've met them, and you've examined them physically, then you become more certain and your</p>	Chall-Beh

		understanding of what's going on and who they are and what the problems are and more able to discern the distinct differences or shouldn't have what may be happening and their care when you see them to follow up virtual visits.	
15	Researcher	Do you think that visits will ever fully replace traditional face to face visits in the future?	-
16	Info3	I think that's kind of a straw man false expectation. That's like, if you have an office, is that going to replace the hospital? Or if you have an emergency department is that going to replace the intensive care unit? Each is good for a different thing. What's happening is that virtual visits haven't been available before and they have a valuable role but they don't exclude other care. Because you have an emergency department doesn't mean that you don't need an intensive care unit, because you have virtual visits it doesn't mean that you no longer need an office. It's just that many things that were previously be done in the office, now are done virtually. There is a whole world of care that is best done virtually. Surely, here's another way of thinking about it. If it's possible for a visit to be done virtually just as well person, why on earth would you ever want to go and have the in-person visit. Think about it the overhead the time, the complexity, the difficulty, the inconvenience, and the cost of an in-person visit should only be incurred if the in-person visit is required. If you need to get a shot, if you need a physical examination, if you need a test that requires you to be there, then of course you need to be in the office. But if what you need is either evaluation, assessment and understanding follow up care of, or anything that really can be done by a doctor patient interaction that doesn't include a physical exam, then you can do that virtually. And what we'll see over time is a move to a larger proportion of cases, visits happening virtually, as I say, if it's possible for a visit to be virtual, why on earth would you want to do it in person?	-
17	Researcher	You listed some of the benefits of virtual visits. One aspect that divides opinion between researchers is quality of care. Would you see that as a benefit or a challenge of virtual visits?	-
18	Info3	Not sure I understand the question. Can you Yeah, explain what you're getting out?	-

19	Researcher	Yeah, so can virtual visits be guilty of providing maybe less quality of care that it would be better to have a face to face interaction with the patient?	-
20	Info3	<p>Depends on the experience and capability of the doctor, a bad doctor can give bad care virtually, but they will also give bad care in-person. So, quality of care is driven by understanding of the issues, ability to direct conditions, knowing the correct treatment appropriate for the condition that you've diagnosed, those quality issues are essentially the same virtually or in-person. But I think what you may be getting at is the issue of; Is there a danger using a virtual visit when an in-person visit is required. And that is also a measure of the, it's under the control of the doctor where a good doctor will do the right thing and a doctor with less experience or with a lower quality of a standard of care made it the wrong thing. And it this problem is endemic in all healthcare. Because wherever you are, as a doctor, you have the opportunity to do the right thing. And sometimes doctors will do the wrong thing or fail to recognize the problem. And so that issue occurs no matter what setting the doctors is seeing the patient. I would agree with you that it's easy to practice bad medicine virtually. And that virtual care does require a level of sensitivity and acumen from the doctor. But that's also true in any setting where the doctor needs to have the sensitivity and the acumen to recognize what's going on. The key issue in my mind is that doctors should understand the limits and capabilities of the virtual care and not trying to exceed them. In all of our practice, we are challenged or we are required, mandated to know what is the scope of practice for where we are. If I am in the office setting and somebody needs monitoring, I need to refer them to the level where they can get monitoring, I don't try and keep them in the office when they need a level of care beyond what the office can provide. Similarly, when I see a patient choice, they need a physical examination, I don't try and make a best guess and treat about it, I refer them to the place where they can get the care they need. And so, if you say you won't be able to give us good virtually I would disagree with you I would say the virtual channel is appropriate for the care can be excellent at the discretion of the doctor. The only issue is that the doctors need to understand when refer patients</p>	Ben-Qua

		inappropriate for virtual care to the correct setting for the problem at hand.	
21	Researcher	What kind of constraints or challenges have you experienced as a physician when working with virtual visits?	-
22	Info3	Well as I just said. Here's one way to think about it. Sometimes people's expectations are that everything done virtually, when in fact, their problem requires an in-person visit. We take a step back, this actually reflects on people who are looking for health care via text chat, for example, when they need a one-one connection with the doctor. So, many people on Health Tap, for example, will start out a request. With this stating a problem with the text interaction expecting that they're going to get their health care problem diagnosed and solved after with text messaging with the doctor. But when the doctors would say well hang on, I need to speak when so let's do a video set in order to get that next level of care so I can figure out what's going on. And then similarly, during a video visit, it may be required, the doctor will say look, I really need to examine you. So, let's have you come into the office. And the challenge is that here are sometimes people that want to get the care without having to take the next steps.	Chall
23	Researcher	And what about technological constraints? Have you ever encountered issues where technology failed, was inaccurate or poor sound video quality?	-
24	Info3	The issue with video of course is that it does have a higher band requirement. So, for example, people will sometimes try to do a consultation from their mobile device while they're traveling or moving. If you're in a car, for example, on a train or physically moving the cell, your network may change in your data connection, may not be persistent. So, it's possible to initiate a console and then have the video fail because of the failure of internet connection of the person during the consultation. We of course try to mitigate this by giving advice. If you're going to do a video console from your mobile device, you need to have a stable connection. So, don't move once you start the connection as an example.	Chall-Tech
25	Researcher	And what's about the external constraints such as dealing with governments under regulations and laws that need to be followed? I'm sure that that can be a	-

		lengthy process. Has that proposed problems on you in Health Tap?	
26	Info3	As you understand, I think regulation is very much location specific. Yeah. Many countries do it at the national level. The United Kingdom, for example. It's a single registration for the General Medical Council, whereas in the US, each state has its own state medical board and the ability to create regulations that are specific to the state. We have seen some states that were more conservative in their approach to virtual care who attempted to stop what is a bit like the tide coming in, we have some was a king canoed who tried to stop the tide from coming in. But I think with a very small number of exceptions now within the states, there's sure that telemedicine is an appropriate channel for doctors to deliver care. One of the issues for us is that we have to only connect patients to doctors who have an active license in a state where the patient is currently residing. And that is a requirement that is built into the technology platform. So, we call it Health Tap prime at 24/7, immediate urgent, digital Urgent Care Clinic if you will, so that you can push a button on the application of doctor at any time in any state we have to doctors on staff or who are staff. We actually contract with these doctors to be available to take these calls to be a doctor with a license in every state in order to enable calls and every state to be answered immediately.	Chall-Ext
27	Researcher	And Is this okay? Or do you see that it would be better if you could find a work-way around this and not have to change the application based on the state or have doctors working under certain states?	-
28	Info3	I was simply going to say that we've taken the approach that good medicine is good medicine anywhere, you know, by building a platform that focuses on doing the right thing medically, and everything else falls into place. We've addressed the issue of licensure by state by simply enabling or requiring that the doctor has a license in the state of location of the person requesting the consultation. It hasn't been a large issue today.	Chall-Ext
29	Researcher	Okay, and what type of services does Health Tap provide for its patients? What can be diagnosed virtually and what currently can't be?	-

30	Info3	<p>I mean, that's an open-ended question. The platform we've built is one that is intended to address any health problem, you can ask a question Health Tap for free actually and get an answer for free from a real doctor. We have doctors, 947 I think it is specialties now, more than 100,000 of them on our platform. So, there's a doctor available to give you an answer. So, you can ask literally any question any medical problem and get an answer from a doctor for free. So, seeing a doctor and getting care, then any problem can be addressed by the first step of any problems to speak to the doctor. And finding the right doctor, the right specialty is something the platform also enables. There are many, many problems that require more care that can be delivered virtually. But in those six steps, is talking to the doctor still a valuable thing because the doctor can orient you and give you an understanding what next steps are and why and motivate you to go and actually get that chair. So, the platform is available to and operates for and helps patients with just about any kind of problem, talk to just about any kind of doctor. Sometimes you have an operation or a procedure that can't happen remotely via virtual connection with a doctor. But guidance to understanding initial diagnosis and follow up care are all eminently well suited to the virtual touch one. Finally, the last thing important to know is that once the doctor provided a set of treatments for you that being reminded of and given the opportunity to record that you've actually followed them is something we do pretty consistently on the platform. So, you go back to look at your records and see if you said you did the things that the system reminded you to do.</p>	Cont-Serv
31	Researcher	<p>And what kind of patients do you think would benefit from your services at Health Tap?</p>	-
32	Info3	<p>Well, I think there's 7 billion people in the planet, about three and a half billion of them have internet connections, and they can all benefit.</p>	Cont-Pat
33	Researcher	<p>So you don't have a specific target group.</p>	-
34	Info3	<p>Everyone, everyone, everyone, everyone. So, health care is something we all need at one point or another and there's no restriction or no problem. Just about every kind of health problem benefits from information and guidance, the doctor, and even if it's not definitive care of the first house, but the care and the</p>	Cont-Pat

		direction for the right care are all achievable through a virtual health platform.	
35	Researcher	What are the future plans that Health Tap has regarding virtual visits?	-
36	Info3	I mentioned there's three and a half billion people on the planet that have internet connections. Globally, a little over 1-1.2 billion of those people have some way of something we would recognize as health coverage or health insurance. So, our plan is to enable the platform for all the people who have access to health care and we're doing that through a variety of channels.	FOpp
37	Researcher	As you said some diseases you need to go in and see the doctor. Does Health Tap have any future plans of using different types of technologies, where that wouldn't be necessary because you'd be able to diagnose such diseases virtually?	-
38	Info3	What I think you're getting at is the issue of remote monitoring and remote home devices, though, to supplant or augment what's possible to do virtually. Certainly, it is an expanding role of home monitoring for particularly managing chronic care conditions. Think about it, people with diabetes, for example, measuring their blood sugar at home. But similarly, even if you had just heart failure, you need to monitor your weights at home, having a scale to measure your weights on a daily basis to monitor and detect changes and ends up being quite important. Other devices that are available include things like an auto-scope are technically possibly for examining eyes and ears. But it's not clear to me that in the near term, this can be a use case in which people have these devices at home. Because they're technical pieces of technology that would not normally be there until you need them. When you need them, you don't already have them. So, there's less, I don't see huge opportunities, or an array of the basis that in a person's home that would preclude their need to actually see the doctor in-person. But I do see the devices being very helpful and use on ongoing management of follow up and routine ongoing care for a whole variety of conditions.	FOpp-Rrd
39	Researcher	And not just monitoring. Have you thought about having remote real time measurement solutions for patients in order to measure their health parameters	-

		and to transmit this data remotely and wirelessly to the doctor in order to augment virtual visits?	
40	Info3	What you've described is what I was trying to say, which is the opportunity for home monitoring devices to measure and automatically pursue or at least follow up. So, for example, in chronic care management, having devices at home that routinely measure the way to agent saturation and the blood pressure, and heart rate patient having those data fed automatically to a platform enables or routine and ongoing management that with guidance and feedback to the patient. As a changes in their parameter search detective, we're going to see more and more of this automated management of people's chronic conditions, which are distinguish from initial diagnosis based on the physical exam where you really need to have that as possible with individual monitoring devices in order to make that initial assessment.	FOpp-Rrd
41	Info3	I'm sorry, I need to tie I've got about five minutes before I have to jump to my next meeting. So just that's what we have.	-
42	Researcher	Ok, do you actually use these remote devices for patients to measure their health data remote at Health Tap?	-
43	Info3	We have a number of types and trials and unlimited circulation in place. We've demonstrated the ability for phone graphic record from any electronic stuff scope is one example. So, we've done trials to demonstrate this but what we haven't done is, is make it available in a public way. And we haven't created this large-scale clinical trial, so, use of these devices in care. This is something I anticipate would happen in partnership with self-care providers over time.	FOpp-Rrd
44	Researcher	And what are the conditions that need to be in place in order to achieve this in the future?	-
45	Info3	Well, if you think about it, the virtual care platform, the digital health platform is just a platform for virtual care, which is augmenting or complementary to systems of care. And so working in collaboration, systems of care for providers of healthcare, so we have the opportunity to create the clinical trials of the use of remote monitoring devices in the ongoing care of it, but it needs to be coordinated with the overall care rather than seen as a standalone. So, there are	Conx

		multiple possibilities, including demonstration of improved outcomes and pain, patients with congestive heart failure, asthma, diabetes, even hyper leukemia, and hypertension or cases, examples of condition. So, I think we're going to see increasing interactions with the virtual or digital health platform coupled with home monitoring devices.	
46	Researcher	Thank you very much. It was a pleasure.	-
47	Info3	It's my pleasure. I hope I was in some way helpful to you.	-

Appendix 4: Fourth interview transcript

Line	Person	Content	Theme
1	Researcher	Hello, Info4. Thank you very much for accepting my invitation. Before we start this interview we would like to ask you if we can record this call?	-
2	Info4	Yeah, hem could you send me the recording?	-
3	Researcher	Yes, sure. Is it ok if we use your name and company's name in our thesis?	-
4	Info4	Yes	-
5	Researcher	Ok, thank you.	-
6	Researcher	We would like to start with some introductory questions. First of all, can you please tell us briefly about Campus RX and your role as CEO of Campus RX?	-
7	Info4	Yeah, I am the CEO of the company we started about three years ago, low over three years ago. And, although we service everyone, basically any age over the age of two can be covered, our folks demographics is college and university students. We saw that they were underserved demographic and we wanted to help and reach out, especially to the smaller universities in rural areas, because their availability to seek medical advice is few and far between. So, we felt that the virtual clinic if you will, gave them great benefits. So we've had a lot of great interest and we've got, you know, several thousands members and continuing to grow.	Cont-Serv Cont-Pat
8	Researcher	Um, can you tell us about when you first heard about the ability to do visits virtually between patients and doctors and what virtual visits represent for you in general?	-
9	Info4	Um, well I heard about it a little over three years ago, probably four years ago, and was very interested. I'd never heard about it before. So, I started researching due diligence and found that there were really just a couple of companies, um, doing that at the time. And, saw a great opportunity, because you know, asking around, nobody had ever heard about it before. So, and then I found a friend, who actually was the CMO for one of the larger companies and got to talk with him. And that increased my interest. So, we eventually got	INIT

		to the point where we should know there's a lot of demographics out there that could use this service. So, we put the company together and call it Campus RX.	
10	Researcher	That's very interesting. Can you tell me does Campus RX offer something different to other applications that have virtual visits?	-
11	Info4	Well, now, you know, three, four years later, there are several companies out there that offer top medicine, I would say, you know, most of them are basically the same. I think everybody's got their own interest in, you know, what types of members they are looking for. We obviously have focused on colleges and universities. But, I think, you know, boils down to pricing. So, there's different fee schedules. A lot of companies, in fact, I would say, most companies now will charge just a little bit upfront, let's say to a business or corporation, you know they may charge them, I don't know, 50 cents. And then when a member needs to speak to a physician, they'll be charged roughly \$45, on average, I would say. With our model we require just a little bit more upfront and then we will give free consultations and as many as they need. So, someone can speak to a doctor or a master counselor, and as many times as they want during the month and never be charged a fee, as long as they pay that monthly. They can do it as many times as they want and it goes up to seven family members as well. So just for that one, one single fee, everyone's covered, and they have unlimited access to doctors and counselors.	Cont-Serv
12	Researcher	Um, so would you say that cost is one of the benefits of virtual visits in general?	-
13	Info4	Oh, yeah, by far, because you know, today for people who have health insurance, you know, everybody gets high deductibles to bring their premiums down. But when you go to the doctor, and on average, a doctor's visit is about \$130, you're going to pay the entire amount until you reach your deductible. So, you know, for as little as depending on the size of the university, you know, for as little as \$5 a month, \$10 our retail prices 24 95 for individuals and families. I have health insurance, and I use Campus RX almost 100% of the time. Now, they will be situations where you have to go to somebody, you know, have them be able to put them be able to put their hands on you, x-rays so on and so forth, take blood. But nine times out of ten when we go to the doctor, it's for routine type things,	Ben-Cos

		<p>so there's really no need to go. So, it saves time and it saves money. So, you know, I've looked at health insurance, normal health insurance as for the big text, if you're going to be admitted to a hospital or you got to have some sort of a surgery or something like that. That's where that comes into play. Like I say, most of the time these things can be done over the phone, a doctor can ask just simple diagnostic questions and figure it out and then prescribe medication if necessary. So, I think it's a great benefit whether you have insurance or not.</p>	
14	Researcher	<p>Can you give us an example of a visit that would occur between a patient and a doctor? And the types of services that Campus RX offers? What can be diagnosed virtually?</p>	-
15	Info4	<p>Yeah, pretty much any ordinary acute illness. So, let's say a student is in their dorm room. It is 11 o'clock at night. He has got a sore throat, cough or fever. The student can request a consultation with a doctor through phone or online and within an average of 19 minutes, a doctor would call the student back, ask questions, make diagnosis if possible and prescribe medication. There are instances where the doctor would say, you know, this isn't something that I could diagnose over the phone you need to go see somebody. I would suggest going to your primary care physician or the urgent care facility or the worst case just go to the emergency room. But, you know, they're going to ask you serious questions that allow them to make a determination and give you certain things to do. Um, and then prescribe medication if necessary, to the pharmacy of your choice. And if you are out of town or out of state, the same would apply. So, the closest pharmacy, they just go ahead and send the prescription to that pharmacy.</p>	Cont-Serv
16	Researcher	<p>Do you consider virtual visits a new technology or service? Or is it a new way of working?</p>	-
17	Info4	<p>I don't consider it new. But there's still, you know, so many people in the country don't even have any idea what telemedicine is. You know, when we first started the company a little over three years ago, people would ask me, you know, what do you do? And I'd say telemedicine company and they'd say; Well, what is that? And, so then I'd have to go in an explanation. Now when they ask what do you do; telemedicine company, they would say; Oh you know, I think I've</p>	Nov-Serv Nov-Tech

		heard of that or I've used that. So, it is just a matter of education. Most people do not know, even today that it exists. But, I believe within the next year, two, three years, you know, people will become educated on telemedicine, and most people will have it.	
18	Researcher	In your perception, has technology, service or physicians' way of working changed due to the use of virtual visits? What is the difference between face to face and virtual visits?	-
19	Info4	If I understand the question correctly, um, the technology, as far as I am concerned, has not changed. Now, we've been able to add different services, along with just medical, we've recently added behavioral health. So, if someone is depressed or you know, anxiety or needs help with whatever it may be, they can speak to a master counselor over the phone pretty much immediately. So, I would say that the technology itself has not changed, because you are basically going to speak to a doctor or physician or a counselor over the phone. The technology part of it has not changed. Now, I will say also that we're able to interface with other EMR, umm, your health records, and that has been enhanced somewhat. But really, it's just a matter of picking up the phone and speaking to a physician or a counselor.	Nov-Tech Nov-Work
20	Researcher	Um, okay. What kind of patients do you think benefit the most from virtual visits? I mean, Campus RX is mainly used for students. What other patients do you think would benefit also from virtual visits, if not all?	-
21	Info4	Well, it's really anyone over the age of 18. It's all HIPAA compliant. But anybody over the age of 18, I think would benefit immensely. Even, you know, for families, we've got a lot of families that use our service. So, for even the smaller kids, if you've got, you know, overhead kids before, a lot of times they will get sick in the middle of the night throwing up or running fever or something like that. Back before telemedicine came out, you had to make decisions what can we do? Can we wait until the morning and go to the doctor? Or do we just go straight to the ER. Now you can at least get a professional opinion from a doctor to help you make that decision. So, it's really for everyone, they will not diagnose anyone under the age of two. But on the other side of the spectrum, they're diagnosed up to, you know, the elderly. Now, it's always up to the doctor to make the decision as to whether they're going to diagnose someone or not, after they	Cont-Pat

		ask a series of questions, it's always their decision. You know, they may say, you know what, like I said before, this isn't something that I can diagnose over the phone, you need to go see someone but, people of all ages can benefit from it.	
22	Researcher	So apart from cost which you mentioned earlier, what are the other benefits of virtual visits?	-
23	Info4	It's really the cost and the convenience. You know, when you're sick, you really don't want to get up out of bed or off the couch wherever you are, and get dressed, get a car and drive, or have to make the appointment first, drive to the doctor's office and wait in a room with other sick people. So, I think, you know, the answer is really in two parts, convenience, number one, you can lay in bed, talk to a doctor and not have to move or it's a cost benefit. So, you know, you go to the doctor, you're going to spend on and \$30. Or you can lie in bed and talk to the doctor and not pay a thing. And that's it. And that's up to seven family members. So, I believe that's a huge, huge benefit for, you know, like I say, our retail price for someone who just pulls up our website, gets interested and purchases, its 2495 a month for the entire family. But as we work with colleges and universities, depending on the size, we can get the price down extremely low. And of course, that's when the university is paying for the students. But even we have plans and programs set up for colleges and universities that don't want to pay for all the students, but they want students to have access to it. So, they'll promote it, and will give students on average, I'd say \$10 a month for a student if they are paying, and that covers their family as well. So, the pricing is flexible, it just depends on the type of group and how many are in the group.	Ben
24	Researcher	How about quality of care? Many researchers see it as a benefit, whereas others disagree and see it as a challenge in the sense that the quality decreases over the phone or over video. What do you think about this?	-
25	Info4	I would disagree with that. I would say that the quality of care is as good as being in front of someone. And the reason I say that is the doctors that we network with, and we have doctors in all 50 states, doctors who have on average 15 years of experience. And most of them on their own bricks and mortar practices. So, they're doing these calls either in between patients, or if they have a cancellation, you know, they'll be able	Ben-Qua

		<p>to speak to three or four or five. Or they'll do it in their off time. Now there are some doctors who do it 100% of the time, but most of them have their own bricks and mortar practice. So, with a 15 year of average experience level, I would disagree with anybody that says differently. I think that the level of service is as good as being in front of someone. Because if you think about it, when you go to the doctor you wait in the waiting room for 30-45 minutes, you go into the examining room, you sit there for, you know, 5 to 20 minutes and the doctor comes in, he's with you for 3 to 5 minutes maybe. And they've already determined the diagnosis and they've written a prescription and off you go. So, you've seen them for, you know three, five minutes the same thing that we've done over the phone. Now again, to my knowledge, there's never been a lawsuit against any of the companies for malpractice. These doctors are not going to put their licenses on the line and diagnose something that they're not comfortable with. So, like I say, if they start a series of questions, diagnostic questions, and they're not comfortable to be able to make a good diagnosis, then they're going to tell you, they're going to say, you know what, this isn't something I can diagnose at the phone, you need to go see somebody. And I think, that's great. So, um, I don't know if that answered your question. But yeah...</p>	
26	Researcher	<p>Yeah, it does. And what do you think about time? Is it a benefit of virtual visits compared to physical visits?</p>	-
27	Info4	<p>Yep. So, when a member requests a consultation, whether that be over the phone, or, online, they'll receive a call back on average within 19 minutes. Now, in my experience, I've been using it for three years, my experience has been I get called back within 10 minutes. But on average, it's 19. Calls typically last, I'd say on average about 6 to 7 minutes. And, then the prescription gets called in by the doctor immediately. And it's ready within an hour or less, just depends on the pharmacy. But, yeah, there's your time difference right there. If you've got to call making appointments, you know, no telling when you're going to be able to get in, if you can get in, then you go down the new way. I mean, the time difference is huge. There's a huge difference in there.</p>	Ben-Tim

28	Researcher	Now that we discussed benefits, what do you think are the challenges physicians face when using virtual visits?	-
29	Info4	Good question. But off the top of my head, I'd say basically education, getting people comfortable with being diagnosed over the phone, you know, especially the older demographic, there may not be comfortable with that, because they've always gone to the doctor. So, you know, I think it's more of an education thing. I think as technology continues to evolve in all different areas, you know healthcare is making leaps and bounds using technology. And I think it's just getting people comfortable with using that type of technology. I think that's the biggest challenge. Once people, I've always said if you use it one time, you'll never want to lose it. And that's I can attest to that I would if my company was to ever go away, I would search out another company, and I would subscribe to that. I'd become a member for somebody else, because I never want to lose my ability to use telemedicine.	Chall
30	Researcher	Um, you mentioned technology. Do doctors face challenges with the technology? I am sure in rural areas maybe network infrastructure isn't great. So, quality could be poor, whether it can be sound or visual quality.	-
31	Info4	Really any challenge that someone's got when they're using technology, it doesn't always work perfectly. There are glitches that happen, but we always, you know, we're always able to solve them. So, it's just any normal things that you deal with, with your phone or your computer, there's always going to be some challenge with that type of technology. But, as technology evolves, things get easier and easier. And we're not running into those challenges as we used to.	Chall-Tech
32	Researcher	How about using the phones, biometric systems to measure heart rate and certain measurement like that, that could be used during virtual visits. Does Campus RX provide something like this technology, or do you plan on doing this on the future?	-
33	Info4	Well, I am very aware of the other technologies that are being utilized today. I am involved with some other companies that are utilizing that type of technology and saying that, most people will begin to use that. It will be emphasized by doctors and hospitals. Like, you know, things like a weight scale oror	FOpp-Rrd

		<p>sensor...or blood pressure, you'll have real time data and that will be able to be given to the doctor immediately. So, that, you know, again those are things that normally you'd have to go to the office and have someone do those things. But, there's technology and devices out there right now that are being utilized. And I think that's all about saving time and saving money. You know, this country, United States as well as every country in the world, there's a huge problem out there right now, with taking care of the chronically ill, the elderly. And they're scrambling to figure out how they're going to pay for it, how they're going to take care of these people. So, there's technology being developed, as we speak on a daily basis that is addressing these needs. In fact, I am associated with another company that has developed the world's first artificially intelligent virtual caregiver that is going to revolutionize whole health care as we know it. And I would say, for the next five years, it's going to be a whole new world and healthcare. Technology is just being developed so fast. And done so well, that every country in the world would benefit from it, because everybody's scrambling right now to figure it out. And there's a lot of people, a lot of smart people working on it.</p>	<p>FOpp-Cust</p>
34	Researcher	<p>You mentioned real time measurements and also the use of AI, which are two technologies we have explored throughout our research. Can you tell us more about them? I mean, how they are used in your other company "Electronic Caregiver"? Can you tell us if Campus RX could ever use these technologies to improve virtual visits?</p>	<p>-</p>
35	Info4	<p>Yes, in fact electronic caregiver has telemedicine built into their model. So, probably another call to get into that in depth and really get you to understand what they've developed, but an artificially intelligent virtual basically becomes a companion and a caregiver at the same time. Think of having a face and body that appears on a tablet around the home and is able to watch over you 24/7. And has the mentality of a nurse, practitioner or even a doctor but also has the tools of machine learning, so it's constantly learning about your daily activities and the way that you react to certain things. They can detect things, they can help people with medication, adherence to medication plans, nutrition, their gait, the way they walk, the risk of falling if they show signs of, or they've had a mini stroke, or if they're showing signs of Parkinson's disease. I mean</p>	<p>FOpp-Cust FOpp</p>

		it's amazing what has been developed in that area. And that is the thing that is going to change home health care, not only US, but around the world, because what they've developed is probably at least three years ahead of anyone else in developing this type of product. Her name is Addison and she can speak up to 42 languages, so it's going to be a worldwide product.	
36	Researcher	So the future looks bright!	-
37	Info4	Very, very. You know, who knows, who knows, we all might be living until the age of 120 -130 here very soon. And, we'll be able to stay in our homes as well. That's the key, aging in place. You know, the buzzword these days is people don't want to go to hospitals, people want to stay to in their homes and they want to age where they are comfortable. And this is a way to help do that. Now, at some point, depending on someone's age and illness, or whatever, we may have to go to these types of places. And you know, there's been a lot of improvements in those areas as well. For me, I want to live on my own as long as I can, I don't want to go anywhere else. So, this is a way to help do that. It's a way to cut costs, it's a way to accomplish a lot of things. And I think, you'll see that over the next couple of years, Addison is going to be released to you very shortly. So, you'll see the impact of that very quickly. But, there's companies out there developing all kinds of devices that are going to help people live longer, live better, and stay in their own homes.	-
38	Researcher	So, with this surge of devices and the technology that is always evolving, do you think virtual visits will ever be able to replace traditional face to face visits?	-
39	Info4	They will never be able to replace face to face. What virtual visits will do is be able to cut down the number of times you need to do that. You'll always need hands on people, you'll always need a caregiver at some point, you'll need a family member or you know, a health care company to assist you to diagnose, to take care of you to rehab and you know, all sort of things. But, it's only going to enhance healthcare but we never want to see that go away. I believe that, you know, we'll always need to see someone face to face. But if we can cut down the number of times we have to do that, that's going to help in a huge way.	-
40	Researcher	So cutting down the number of times would mean that we would need to expand virtual visits to more than	-

		just what they do now, which is diagnosing for common cold, sore throat, skin diseases. So, what can be done to make them do even more by the use of real time measurements and these types of technologies?	
41	Info4	As I said, these technologies are being utilized today. There's different kinds of virtual visits. You could be looking at, on your computer, kind of like a FaceTime, or Skype or something like that and interacting with the physician. The data that's collected, gets immediately through the web and goes right to them. So, they've got the data right there in front of them. Maybe they are at their office and you are at home. So, that technology is being used right now. Technology is changing so fast, in all different areas. I don't know if that helps answer that question or not.	FOpp-Rrd
42	Researcher	Yes, this is really good. One challenge that we wanted to ask about classified by us as external challenges in terms of regulations, laws. How difficult is getting approved for all this?	-
43	Info4	Well, for us Campus RX, we partnered with a physician network, so we didn't have to deal with it. Now, I know these doctors in the network have to be qualified, and have all the normal licenses they normally would, but they also have to take another couple of steps to conduct these examinations over the phone or video. So, every state by itself has to sign off on it. Some states, I believe it was maybe last year, two years ago, some state wouldn't let you speak with a doctor just over the phone and had to be like a FaceTime or Skype. Or you had to actually go to the doctor the first time. And then they would allow, you know, either telephonic or video conference. So, each state is a little bit different. But as we speak today, there's a couple of states that do require just video. So, the rules are different between all the states. For the most part rules are the same but there are a couple of nuances that particular states require.	Chall-Ext
44	Researcher	So, do you have doctors per state, in the sense of doctors in every state that deal with people within the state? Because I think in the US, you need to be licensed to work in your state. You cannot diagnose patients from other states, am I correct?	-
45	Info4	Yes, you are, for the most part. Here is an example. Let's say, I live in Nashville, Tennessee, if I get sick, I am going to speak to a Board Certified physician in the	Chall-Ext

		state of Tennessee. Now, let's say I go on vacation to California, and I get sick out there. Well, I call up Campus RX, I 'll speak to a Board Certified physician licensed in the state of California, that way they are able to prescribe medication if necessary. So, you'll speak to a doctor who is Board Certified and licensed in the state that you are calling from. We have got some doctors who are licensed in more than one state. So, you may speak to a doctor who, you know, if I was in Tennessee, may speak to a doctor in Kentucky, but they're licensed in the state of Tennessee. And the reason is so they can prescribe medication if necessary.	
46	Researcher	We are thinking of mostly challenges dealing with devices that can enable real time measurement. So, what requirements would be needed to accomplish that? Are there any technological, economic or privacy and ethical issues when using such devices?	-
47	Info4	Here, at Campus RX we do not offer those options right now, we do not use those devices. We offer just a normal diagnosis over the phone. So, I really couldn't address that question.	Conx
48	Researcher	If I can ask you, what are the constraints that impeded you from using these devices?	-
49	Info4	I think it's just another level of care that's provided that we are, you know, we are just not that point yet. Yeah, there's some costs that go along with that, you've got to provide the intimate and the inventory of these types of products. You've got to be able to, you know, be able to teach or coach, educate people on how to use them. And when you are dealing with, you know, students they tend to not have chronic illnesses. They are more acute, you know, cold, cough, flu type things, the younger demographic that don't require to use those things very often. So, we just don't see that's a part of our business as of yet now. We are constantly evolving. We may do that down the road, but for now, it really doesn't. It doesn't benefit us, at least in the demographic that we are focused on.	Conx
50	Researcher	Do you have any other comments you'd like to add?	-
51	Info4	I am happy that you guys are doing your due diligence in this area. I think, you know, as we've talked about before, it's really just a matter of educating people and letting them know that this is something that is out there. Like, I say, most people don't even know that it	Cont-Pat

		exists. Once they've used it one time, I guarantee they'll never want to lose it, because it's just a valuable service. And cost effective and time effective, that we just need to get the word out to educate people. And it's coming, we are doing our best to reach out to colleges, universities, you know, people in all areas. We work with truckers, as well. Truckers are another demographic that because they're always on the road there, they're moving and they get sick, but they're not making money unless they are driving. This allows them to speak to a doctor in any state that they are in over the phone. This allows them to speak to a doctor in any state that they are in over the phone. And so, this is another demographic, there are a lot of under-served demographic that we look at to help people who can really use the service. So, I think what you are doing is great. And we're doing our best to get the word out and educate people on telemedicine and behavioural health as well.	
52	Researcher	Thank you very much for giving us the time.	-
53	Info4	My pleasure. It's been great. Really great questions. I would be interested to read your thesis, once it's completed, if that's available. You mentioned that you are recording this, if I can get a copy of this, I would appreciate it.	-
54	Researcher	Yeah, definitely we will send you a copy and once we are done with the thesis, we will send you a copy of that as well.	-
55	Info4	Yeah, that'd be great. And, you're welcome to call me anytime, to follow up, if you have any questions. If I can help, I'll be happy to do so. Thank you very much.	-
56	Researcher	Thank you very much Have a nice day.	-
57	Info4	You too. Bye.	-

Appendix 5: Fifth interview transcript

Line	Person	Content	Theme
1	Researcher	Good morning Doctor. How are you doing?	-
2	Info5	I'm fine I'm fine How are you?	-
3	Researcher	Thank you for agreeing to do this with us before I start Is it okay if I record this.	-
4	Info5	Yeah	-
5	Researcher	Let us start then. Can you tell me about your role as a remote physician?	-
6	Info5	I have been doing remote medicine since 2014. I practice medicine in more than one place and usually I get phone calls from previous patients or patients spread all over the state or all over the continent. That made me be in care of patients that are not directly under my eye. I finished medical school. I practiced almost every discipline from emergency room to surgery, burn unit, paediatrics. I have many backgrounds which helps patients even though I will not pursue it till the end, but at least I have very good approach on all different specialties, and I know where to start and I tell them when they need to get more help.	-
7	Researcher	Can you tell me when you first heard about virtual visits and what was your impression in the beginning?	-
8	Info5	It was the medical society of New Jersey, during their yearly celebration, they approached me and they said you speak another language? I said yes they said we are recruiting physicians to help and it would be a good idea if we can add somebody who can speak Arabic. I said I'd be more than happy and then I talked to them and since then I started becoming more and more involved with them.	-
9	Researcher	What did you think about virtual visits at first? What was your perception of the ability to speak to patients through text and video? Did you not have any fears about it or how efficient it was	-

		about not being able to have hands on experience with the patient?	
10	Info5	I kind of, I feel for my patient I see what's there need. I see a lot of situations when I see a mother have a kid and one of them sick and you have to drag all three of them and go to the doctor's office. How inconvenient is that? And I found that we human beings when we find things are inconvenient over and over then we start to find ways around. That's what made me have this expectation that this process will grow because its more convenient for the patient. This is one aspect. The other aspect is that in some places that have pretty limited resources in medical care, and if this opportunity is available, it will be a very big prosper for them. So that gave me a good impression that this move will be strong and grow and grow more than anybody expected.	INIT
11	Researcher	Do you think virtual visits are a new technology or a new service	-
12	Info5	I think it's both	Nov-Tech Nov-Serv
13	Researcher	Um... Can you elaborate on that?	-
14	Info5	It's a new service because some places do not have the service or they have very limited resources and they will have access to it. It will open up for different training, so like the medical assistant will be trained to handle where should this device go on the patient, where does the ear-piece or ophthalmoscope go on the patient and this way it will facilitate the approach of physician remotely. A new technology instead of having the device in my hand and I do exactly what I want, I will be getting used to listening to the heartbeat through a speaker.	Nov-Tech Nov-Serv
15	Researcher	Can you walk me through a virtual visit been a patient and a doctor? How you would conduct the call with the patient?	-
16	Info5	There is too many ways and everyday I discover that there is another way. Some of them are limited like one company I talked to has three templates and the patient fills most of the templates	Cont-Serv Cont-Diag

		and this is appropriate to send a message to the doctor and whenever the doctor has time he can respond to that. So it is asynchronous. The patient and the doctor do not communicate at the same time. The one I practice with mostly is either by phone or by video and the patient sitting in front of me I give them a chance to talk to say everything they want to say and then I asked specific questions to make my diagnosis. Then I make a decision what's the next step and the I pursue it with the patient. This is the one that I practice the most. With HealthTap, there is an extra step about ordering labs and ordering x rays. I'm so excited about that. That will be really great when I will be able to do it	Nov-Work
17	Researcher	When dealing with diagnosis, some diseases are a bit tricky to diagnose virtually. Can you tell me what diseases you usually diagnose and what other diseases that you find difficult to diagnose virtually?	-
18	Info5	Me personally, I don't know if whatever I say applies to everybody or not. It depends on how comfortable and experienced the physician is. There are certain words and sentences the patient uses and this can matter a lot in a diagnosis. So you have to really pay attention and not interrupt the patient and let them talk as much as they can. Every single sentence and every single word they say it has a value in the diagnosis. In certain emergencies I say I don't know what is the extent of the emergency but I don't think it's a good idea that we treat this over the phone or video.	Cont-Diag
19	Researcher	Some diseases such as diabetes or cancer things are impossible to diagnose virtually. Do you think the emergence of devices that connect to smartphones and send data to the doctor in real time such as digital stethoscope, pressure monitors, eye-examiners, and digital thermometers can help diagnose more virtually?	-
20	Info5	Absolutely and that's why I'm saying about the medical assistant. Their role so far is to put the patient in a room. I expect with training in the future, the role will be how to use instruments with patients so the doctor who is remotely somewhere else can get this information and now it patients after being discharge from the hospital, they go	FOpp-Rrd

		home with a scale, with monitors for oxygen and heart rate and all this information is transmitted on a daily basis to avoid having this patient admitted to the hospital again. So once you found that his weight has increased significantly or his oxygen started to be disturbed, then you can catch it early on before it gets worse and they need to be admitted again.	
21	Researcher	So the devices are used to monitor patients after they leave the hospital and are more for preventive care. How about diagnosis though? Can these devices be used so that we can diagnose more than the common cold more, sore throats and other diseases that can be currently diagnosed virtually? How close are we to achieving this? I mean do you currently use this in diagnosis or is it still being developed?	-
22	Info5	I don't use it but I was in a conference about 2 years ago and I did explore it and I did look at ophthalmoscopes and otoscopes that can be used remotely. There is one that has been there for 15 years now, the retina exam for people with diabetes. They have been trying to convince primary care to have this equipment in the office and they take the information and send it to the ophthalmologist and the ophthalmologist is able to read it and confirm if it is the diabetes effect on the retina or not. This has been on the market for a while.	FOpp-Rrd
23	Researcher	You say it's been on the market, but what conditions are needed be in place so that these devices can be used even more are used by doctors that conduct virtual visits?	-
24	Info5	I think the biggest factor is reimbursement. If a physician found that he is reimbursed because I think some physicians may be dragging their feet because they are scared of the financial impact on their practice. But once reimbursement is good and will be acceptable then youll find that this will flourish more and more.	Conx Chall
25	Researcher	You brought me to in an interesting part of our research which is challenges and we talked about reimbursement. What about the relationship between patient and doctor? There is a conflict within researchers about and whether virtual visits	-

		decrease this relationship, or the bond will not be as strong as it is when a doctor physically meets the patient and has his hands on him. What are your thoughts on this?	
26	Info5	I think it is a talent from the doctor and once the doctor will be in this situation they will develop it. The patient does feel if you care about them even if you're not next to them they feel it and they will get it. And the patient can see if you are standing next to them, but your mind is completely away from them. If you care, the patient or feel it no matter where you are.	Chall-Beh
27	Researcher	There's another thing about behaviour and challenges with doctors and the statement that virtual visits empower patients which takes away the authority that doctors traditionally had. Do you agree with this statement?	-
28	Info5	I'm not sure if I am the best person to answer that because in my practice all along, usually I like to inform my patient and the patient that likes to understand and discuss every decision. It does not make me feel uncomfortable because a patient who is empowered is a better patient for me.	Chall-Beh
29	Researcher	From your talks with other doctors do you feel that is a factor that makes them not really want to adopt virtual visits?	-
30	Info5	I haven't had a chance to talk to other physicians. I cannot speak on their behalf but that was never raised. I've never talked to anybody that shared that with me.	-
31	Researcher	What about external challenges such as regulations and laws?	-
32	Info5	Yes that would be an issue. I think with time they will be overcome because of the quality and positive impression from the people in that field will prevail and the movement will be accepted and the laws will be in its favour.	Chall-Ext
33	Researcher	So what kind of laws right now make it difficult for you?	-
34	Info5	Where you are licensed and are you physically in this place or is the patient physically in that place.	Chall-Ext

		You have to be licensed where the patient is and you have to be licensed where you are if you are. This is a factor and there is some regulation about it. That's why if I think about it and if I'd like to have a private practice virtually, its kind of a challenge because of what you said about laws. These companies though have people who guide them through the laws and that wouldn't be a problem for them.	
35	Researcher	What about technological challenges? Are there any technological challenges you face with virtual visits?	-
36	Info5	Yes, the efficiency of the stethoscope, the efficiency of the otoscope and would you leave it for the medical assistant to put it or will it become so cheap to the point that the patient will have it at home. I don't know where that will end. I will not be surprised if one day all this stuff is in the patients home like the thermometer. I will not be surprised if this stuff will one day be part of the household.	Chall-Tech
37	Researcher	Have you ever had a problem in talking to patients relating to technology like the sound quality or video quality that made it difficult to do your work?	-
38	Info5	To some extent yes. Unfortunately it is reflected on the doctor because if the quality of the voice is not very good or there's a problem with the internet then at the end of the visit the patient is complaining about the doctor not about the connection.	Chall-Tech
39	Researcher	Do you get any IT support when there are problems with anything relating to technology?	-
40	Info5	I faced a couple of those because most of the time I try to save time. I try to manipulate and see how I can handle it as much as I can without wasting more time trying to reach out to technical support.	Chall-Tech
41	Researcher	These were challenges. Can you tell me of the benefits of virtual visits?	-
42	Info5	Its very convenient for the physician, very convenient for the patient.	Ben

43	Researcher	What about quality of care? There has been debate about whether virtual visits are as good in quality as traditional visits. Do you think quality of care can be a benefit of virtual visits or is it exactly the same as traditional visits? What are your views on this?	-
44	Info5	Im not sure who is holding the big impact here. If I do a consult and I feel that I did not do a good job, whether in the office or virtually, I think I should not do it again. So I don't think that the problem is the method of carrying it as much as being honest in doing it. If I am honest in doing virtual care, the patient will feel it and there are patients that say ok ill come back to you to see the results of what we did today.	Ben-Qua
45	Researcher	So do you think virtual visits can increase the quality of care and the healthcare sector in general?	-
46	Info5	Absolutely.	Ben-Qua
47	Researcher	What about time? Is time a benefits of virtual visits?	-
48	Info5	It's a challenge because once the patient has access to that, they will demand it 24 hours a day and that will pose big pressure on the physician. Like one o'clock in the morning two o'clock in the morning expect that and the quality of life will be deteriorating again.	Chall
49	Researcher	What about in the consultation? Does it take more or less time than a traditional visit?	-
50	Info5	So far because it's very limited and the patient knows that there is a very good chance that they will not see you again, the time is very short, but if things move to the point that the patient will be saying this is my doctor, then the patient will open up and talk more about personal life and as a doctor you will know the patient more.	Ben-Tim
51	Researcher	Do you think virtual visits are expensive and they pose a budget on the healthcare sector or do you think they save money?	-
52	Info5	My impression is that they save money because the reimburse the physician. If I look at it I'm	Ben-Cost

		seeing the same procedure done in the hospital, Urgent Care, or in the physicians office. Healthcare systems already have a huge amount of money for each one of them because they know the hospital supports so many employees and then the surgeon center supports many. So the less the physician is spending the money youll be willing to take this money and healthcare will be better.	
53	Researcher	Which patients benefit the most from virtual visits?	-
54	Info5	On the surface I would say the younger generation because they are in a hurry but eventually everybody. As I told you the mother that has three children or the father that his daughter or son has to take time off to take them to the doctor so eventually this elderly man or lady will benefit. I think its across all patients but at the meantime, it benefits younger generations.	Cont-Pat
55	Researcher	What is the future of virtual visits? What do you think needs to improve them?	-
56	Info5	Regulations. Regulations have to be more simplified and encouraging.	Conx
57	Researcher	How about technologically? What do you think is the next thing?	-
58	Info5	If we can get the families to have these small equipment in the house, that will help a lot. Now they have the thermometer, if they can get more of that stuff that will be great. And of course reimbursement which we have mentioned before.	FOpp-Rrd
59	Researcher	How about technologies such as artificial intelligence and using it to tailor solutions to specific patients? Have you heard about that?	-
60	Info5	I heard about that. I don't know because this technology does not feel the emotions or the stress of the patient. If the patient says I have this pain that comes around during my finals. The technology will only pick up on the start of the sentence when the patient says "I have this pain" leaving out the important part of the sentence where the patient says during my finals. This part completely changes the sentence. How the patient says it is important as well. If the patient says it laughing it	FOpp-Cust

		is not the same as the patient saying it not being able to finish the sentence. The same sentence can make a big difference in the meaning.	
61	Researcher	Can you tell me about what Teladoc and HealthTap plan to do in the future? What kind of initiatives that they're currently looking into?	-
62	Info5	I am not in a management position so I don't know what they have planned, but I expect each company has to progress otherwise they will not exist anymore. My general impression is that any business has to keep growing otherwise they will not be there.	-
63	Researcher	As a doctor, how do you think they can grow? What do you as a physician want to be done?	-
64	Info5	To be able to order labs and x-rays and be able to have a set schedule so the patient can follow you.	-
65	Researcher	Do you have any other comments?	-
66	Info5	I think this will have an impact on training medical school and training residents and it will cause big changes.	-
67	Researcher	Thank you very much for giving us the time to do this doctor.	-

Appendix 6: Sixth interview transcript

Line	Person	Content	Theme
1	Researcher	Hello, thank you very much for accepting my invitation. Before starting, is it ok if I record this call?	-
2	Info6	Yes, it is.	-
3	Researcher	Ok. I would like to start with some introductory questions. Can you tell me about your role at MinDoktor and MinDoktor itself?	-
4	Info6	Have you had other interviews with people at MinDoktor?	-
5	Researcher	No, until now this is the first interview.	-
6	Info6	I will tell you I no longer work with MinDoktor. So, everything I say is from me as an individual and not representing MinDoktor as a company. So, I was with MinDoktor from 2015, and I left in December. So that was four and a half years. My position was business development, focusing on business to business.	-
7	Researcher	What kind of services does MinDoktor provide?	-
8	Info6	So, the virtual visits is the core of their services. So, it is everything that is required to conduct medical consultation with primarily a doctor for primary care, Online, primarily, since services have also been expanded to involve physiotherapy consultations, as well as consultations with midwife.	CONT-Serv
9	Researcher	When you first heard about virtual visits, what was your first impression?	-
10	Info6	My first impression was that this was the solution for tomorrow.	INIT
11	Researcher	Do you think that virtual visits represent a new technology or a new service?	-
12	Info6	Virtual visits is the same existing service but through a different medium is what virtual visits are. It can be more limited, or it can be wider depending on the secondary services, you also need to provide like the diagnostic testing linked to the consultation. So, it	NOV-Tech NOV-Serv

		depends on what digital consultations it's so there are providers that do only interviews with the patient, a consultation via video online, and not supported by a structure for diagnosis testing. But it might also be that it does do that like conductor.	
13	Researcher	Do you feel like virtual visits have changed the way physicians work?	-
14	Info6	Not in general, but it's challenging the work process, because depending on whether you employ video consultation, or if you do message consultation, like MinDoktor does, then it changes, first between synchronous consultation, which is a video consultation, both people are present in the meeting at the same time, you have to book a meeting. And so, in that respect, it doesn't change much how the doctor works. However, if you do message consultation, there's an option to conduct the consultation in an asynchronous mode so that the user, the patient will enter information that is left in the safe message box for the doctor to analyze or to read and answer. And both patients I mean, they don't do it at the same time. It's a message transaction, if you understand what I mean.	NOV-Work
15	Researcher	Yes. From my research, not all of diseases can be diagnosed through virtual visits, because of course, some of them require physical examination, so, require the patient to go and talk face to face to the doctor. Do you know what kind of diseases MinDoktor diagnosis through virtual visits and what kind of diseases cannot be diagnosed?	-
16	Info6	It's limited by some symptom areas. So, with current available technology, it cannot. Well, again, I need to alert you that I am not here representing MinDoktor. So, this is based on my experience. So, areas that are not suitable for remote consultation with current technology will be ear infections, a lot of acute conditions, certain stomach problems centred in the abdominal area, that should be avoided, because you need maybe touch feel, but that's developing also, and with the video consultation, they might be different areas that you should avoid, rather than compared to more text message based consultation.	CONT-Serv CONT-Diag
17	Researcher	What kind of patients benefit the most from virtual visits in your opinion?	-

18	Info6	Of course, the parents with children who, you know, it's difficult to move out of the home and sit and wait in line, of course, they are much benefitting. But also, anyone who is limited in moving. And who would find it difficult to be in a waiting room or physically move to have advice, medical advice, those are the primary but if you look at a little further scope, so these are primary care type symptoms. If you look at in the future, I believe that people with chronic conditions for follow up, and evaluation will benefit greatly, and whether or not they are, they have difficulty moving outside the home. Because it's a check-point, it's not critical assessment, it's a follow up of unknown condition, they will be very useful.	CONT-Pat
19	Researcher	What are some of the benefits of virtual visits?	-
20	Info6	You save time on the patient side, and you get a quick response, you don't have to move. And if you have children, they can stay, you can stay and take care of the child in your home where they need to be in bed, if they're very ill. With some of the technology that some of the providers do offer, you cannot even you know, take urine samples and simple samples that can be analyzed at a lab that the patient will send the information to, so there are certain options, you know, like throat with the samples, like you have a swab the inside of their mouth and tonsils for a new service and analysis. And you can do that. So, some things are very easily diagnosed, from a primary care perspective. To assess whether or not you need to have further examination based on just by discussion and symptoms or discussions and symptoms and analysis of diagnostic nature. So those will be the primary benefits, I think saving time. And if you use asynchronous consultations like messaging, then there's great benefits for saving time on the doctor side or the treats the care person side, do you see what I mean.	Ben-Tim
21	Researcher	Yes, it's pretty clear. Do you think that accessibility is one of the benefits of virtual visits because actually, for young people, it can be easier to access these new technologies. But for old people, it can be a problem, hence it is not that easy to access. So, what do you think about accessibility? Do you consider it a benefit or a challenge?	-
22	Info6	No, accessibility is in the Nordic countries anyway, where everyone is very digitized, even up to the 70	Ben-Acc

		years old 75 years old you know, most of them are fairly comfortable accessing such a service online. But it will decrease accessibility with age of course, and with young people, it's just great benefits. So, answer is yes and no, because some people that seem to be on the older side of the spectrum may be limited in movement. And for them, accessibility increases if you do it online. So, it depends. It's both negative and positive. But that comes from the individual and also the symptom area.	
23	Researcher	Based on my previous research, quality of care was considered one of the benefits of virtual visits for some researchers, and for some others, it was considered a challenge, so they believe that quality of care is reduced by using virtual visits. What do you think about this?	-
24	Info6	For some conditions, the quality can maybe slightly reduce, because there's you know, intangible communication that goes on between individuals, people who meet face to face touch, feel rapport based on things. So that may take away. On the other side, if you use digital visits that is text based, or you provide very good tools for the doctor to write in his medical journal, the patient records, then you have exquisite access to documentation, which is used by MinDoktor and others, I'm sure, to ensure quality and to analyze the performance of the health care provider the doctor themselves, so you have a very, you have a digital flow all the way through that ensures quality actually. So, I believe for many symptom areas, the benefits of an asynchronous consultation outweigh the negative. But for other symptom areas, for instance, like stomach problems, or some symptoms that are better detected by touch and feel or serving a patient, you know, maybe a synchronous isn't so good. Maybe digital in the form of video consultation is a very good substitute, but some symptoms are not suitable for digital consultation at all. So, it will depend.	Ben-Qua
25	Researcher	On the other side, what are some of the challenges of virtual visits.	-
26	Info6	And the technical aspect for some users, technical downtime, challenges using the technology provided that whether it be apps or video link, or whatever, so it places severe demands on just the accessibility, like you said technical side of it. Also, there is some	Chall-Tech Chall-Beh

		communication between people that disappears, it's not there in the same way it is when you're in-person or the person in the same room.	
27	Researcher	There are also some external challenges such as regulations. Do you think that regulation is a challenge that doesn't allow virtual visits to expand?	-
28	Info6	Well, there are different aspects. So that of course, it should be to protect the individual and to reduce the, you know, non-serious providers to provide services they are not qualified to do. Like, if you have false doctors, you know, so, but with the availability of digital identification, like funke you familiar with, with that works both on the provider like the doctor side, and the patient side, that you can be very certain that the person who present themselves in the consultation are the ones that they say they are. So in the Nordic countries or other areas where the digital confirmation of ID identity is certain, then I think legislation is just needing to catch up, because those are the primary concerns the quality of care, and making sure that the provider and the patient are who they say they are, because then it should work very beautifully. And it will be beneficial to the use of resources both on the patient side and on the medical side, the provider, whoever pays for it, so it will reduce costs. But the limitations over there to protect the individual. However, it is heavy, heavily influenced by the needs of the doctors or the provider to make sure they have a business, you know, so any doctor and the physiotherapist also run a business, and they are themselves the provider of their business. So, it's a protective structured law. And any painter of Health Care Services will be very mindful of the cost of educating doctors in particular. And then obligation to spend the tax money so that it benefits the population. And that's why they are so dependent on the doctor, professional doctor organizations, medical organizations, because it's a very tight link between two pays and who is responsible for the population, and the ones who provide it. So, the legislation will come in time, but that's why you see digital consultations actually working in countries that are far advanced in digital communication, maybe the tax structure is set up, to be managed digitally, all these things play in but also the medical profession, the professionals	Chall-Ext

		who are part of providing it, and their interests are ensured.	
29	Researcher	Very interesting. And what do you think about behavioural challenges such as in terms of the relationship or communication between physician and patient? Do you consider not seeing face to face the doctor a challenge in terms of communication?	-
30	Info6	<p>Yes, it is. It's not, for everyone. Some people use the personal inter communication to more extensively than they are aware of themselves. And the way of communicating doesn't translate so well, to the digital's but also and in front, the patient side. You know, you might want for instance, with the drug, people who are dependent on drugs and for abused medication, you know, they will try or they believe they can sort of get their way with new type of communication. So, the doctor or the provider needs to be very mindful of who they're talking to. And the guidelines need to be very strict, so that they, they have a protocol that they follow that makes it you know, very certain that people who are in this type of communication to thinking that it's going to be easier for them to get type B drugs, that those stopped. So those might be challenges, because you use the different set of communication skills in both the video consultation, but even more so when the communication is written, may be supported by a video just to make sure. I know that MinDoktor was very careful about it, if they felt uncertain if they did feel that the symptoms described didn't quite match the personality that they saw in the communication, they would call up, or set up a video meeting just to make sure that you know, the person and the symptoms that were described was actually what was there. So those are the challenges. And also some people, you know, you in communication as communication, you use all the tools that you have and your personality, and that goes on both the patient side and the doctor side. But you're also in strict protocols on the physician side, just to make sure that you know, very clearly what to do when and what to say to make sure that the user expectations are clear to begin with. So, they don't enter into a consultation thinking that they will have something they can't have. So, it needs to be stated both, you know, it should have a sort of flag in the app. But</p>	Chall-Beh

		also, the doctor needs to be aware of it and state it in the dialogue with the user.	
31	Researcher	Virtual visits empower patients. Do you feel like by empowering patients they take away the authority that doctors traditionally had?	-
32	Info6	It takes away the monopoly of authority, because it creates a better dialogue and understanding. I think that in set structure is where, you know, in societies where the doctor, the priest and a teacher were, you know, the authorities, you know, that's changing. It opens up for more egalitarian dialogue about health.	Chall-Beh
33	Researcher	Okay, that's all about challenges. Now, let's talk about future opportunities. What are some of the future opportunities of virtual visits? How could they be improved or expand in the future?	-
34	Info6	I think you see a prevalence now with digital visits being the same thing as the video consultation. That will change. Because the video consultation doesn't reduce the amount of resources that go into providing health care. And those who have been working with it for a while they know this, and they are moving in that direction. But often the buyers, the people who pay for them and source this type of consultations, they haven't really concluded on that yet. So, but this is in process, but it also requires a more stringent triage structure, you know, making sure the right patient is in the right type of consultation with the right resources.	FOpp
35	Researcher	Yeah. So, what kind of conditions or requirements need to be in place in order to make this change?	-
36	Info6	Experience, also digital exchange of information, we need the legal restrictions and the GDPR structure that we're learning, everyone is adapting to it. Now, we know and understand how to adapt it how to work with digital patient rhetoric, electronic patient records, and how to exchange information between care units, maybe it's a hospital, maybe it's an independent doctor maybe a clinic, you know, when these things are more streamlined, and we can be certain that they're safe, because we're just learning how to do this well without breaking our neck. And with the private sector, and the public sector and the individual user office versus are all giving out how to do this, and this will take a little while. So, and with	Conx

		these things, legislation will adjust also. So, I think technical proficiency, understanding of exchange of information and how to protect the individual and patient information and how to exchange data between providers to ensure that it benefits the patient. These things we are learning and they are really requirements to bend, take the benefits from an individual encounter, all the way to realize the potential.	
37	Researcher	Do you think that the future is also about innovative technology such as artificial intelligence, for example. So, you can use artificial intelligence in order to tailor solutions to specific patients do know about these new technologies that can be used to enhance or improve virtual visits?	-
38	Info6	Yes and it's being used in specialist care and analysis for medication already. Also, if AI is a buzzword, and if you use analysis, that will be text based, which is what a I'm more than anything lends itself to you understand what I mean? And then also you have the challenge of volume and dialects and socio left interpretation and using that text data. So, you have to get past the hurdle of language. So for small languages, for Albanian, Norwegian, you know, it will take a long time for AI based on exposed information will be very useful, or any way be more useful than statistical data, which works really well with health care, because for 30-40 years, most countries have gathered data and in a structured way, and that analysis is really well done. So, for a few years, yet, AI will be less significant than statistics and structured data, but where everyone is working in that direction.	FOpp-Cust
39	Researcher	Another future opportunity that we are researching is about patients having some remote real time diagnostic devices and being able to measure and to transmit in real time directly wirelessly health parameters to doctors. Since not all the diseases can be diagnosed through virtual visits, we think that this new opportunity maybe can expand the use of virtual visits also, for other diseases that cannot be diagnosed at the moment. What do you think about this opportunity?	-
40	Info6	Yes, of course, it's useful, but it's not a make or break along with AI and regular blood sample diagnostics, whatever, you know, that will help. Yeah, and it is already being provided with you know, so yes, diagnostic devices, the real time, fantastic. I think it will be very useful. And it is already happening. And I'm	FOpp-Rrd

		working with the tools that, you know, have opened up for it. So yes, absolutely, I believe. Great benefits, but I think, you know, it will have the greatest benefits on users that, you know, take up the most time in, in the doctors consultation room, which is people with, you know, chronic diseases that needs to be monitored. Yeah, for that patient group. And these devices will be making a vast difference and help use the physicians time more efficiently.	
41	Researcher	What kind of conditions do you think need to be in place in order to provide these devices in the future?	-
42	Info6	You need to have verified measurements tools, like whatever these diagnostic real time devices intake, when you taking diagnostic areas, whatever its oxygen saturation, or heart rate, or whatever, they need to be CE qualified, they need to be approved. And then there's distribution of these tools. And cost, of course, and also legislation on governing this. So, but a lot of it comes down to the cost. And also a lot of it comes down to exchange of information that is, you know, patient information in a safe way. So, these are the areas that I think is most crucial to this speaking, of course, cost is a big one. But today, you can you can get a lot of these devices, it's available. So, it's being tested again. So, cost I guess, and exchange of information. But also, you don't want a lot of big data in which you cannot use because a physician is liable for the information who does get. And that's a challenge out there.	Conx
43	Researcher	Are there privacy or ethical issues since the patient will be transmitting data in real-time to the doctor?	-
44	Info6	Oh certain, I haven't really gone into it but it would be and it needs to be a strict protocol. And that should be developed also. So along with technical, legislation, costs and distribution of these devices, you know, protocols, is very important as well, just to ensure that you've considered all the ethical parts of it.	Conx
45	Researcher	Thank you very much. It was really useful for me and my research.	-
46	Info6	Would you let me know how you use this information? Because yes, as a consultant, I'm just very concerned that the information that I provide you, that I've gained while employed by MinDoktor is	-

		used correctly. So, if I may see how you use the quotes, it would be good.	
47	Researcher	Yeah, of course. Before submitting my thesis I will send a copy to you.	-
48	Info6	Yeah, for my curiosity as well. Good luck to you.	-
49	Researcher	Thank you very much.	-

Appendix 7: Seventh interview transcript

Line	Person	Content	Theme
1	Researcher	Good morning. Thank you for agreeing to do this with us	-
2	Info7	No worries	-
3	Researcher	Okay, before I start, is it okay to record this conversation?	-
4	Info7	Well, yes, if you don't share it with anyone else	-
5	Researcher	Okay, can I use your name in my master theses?	-
6	Info7	If I can see it before.	-
7	Researcher	Sure, you can see it before. So, let's start. Um, I wanted to first ask you about your time at Min Doktor, your role there?	-
8	Info7	Alright, I was a business developer so basically expanding and building out the business.	-
9	Researcher	When you first heard about virtual visits, what was your first impression?	-
10	Info7	My first impression... umm.. that it was good! Just what was needed.	INIT
11	Researcher	And do you think virtual visits are a new technology or a new service?	-
12	Info7	A new technology?... ee. It depends if you consider a new technology in 2019 or 2013. I know that they started doing telemedicine in 2003.	Nov-Tech Nov-Serv
13	Researcher	It started since the use of telephone and radio in the 1900s. And yeah, I guess it's around 2012 these virtual visits started where you could actually use the smartphone and have a video call with the doctor. But what I wanted to ask you is do you think it's just a continuation of previous telemedicine technologies? Or this is actually something new, something that could really change the field?	-

14	Info7	Again, it depends on your point of view. From a medical perspective, it changed significantly, how you push things to the doctor, has much more information. From a technical perspective, not so much. Otherwise in terms of practice, what kind of drugs should we prescribe or what kind of treatments we do for our patients, it's still the same. It's like, Oh, now we have Min Doktor or whatever, now I will do totally different things, will not do medicine and before will prescribe some total other medication.	Nov-Serv Nov-Tech Nov-Work
15	Researcher	So, what do you think are the benefits of virtual visits?	-
16	Info7	It depends on the perspective. From the doctors' perspective, what is really good is actually the amount of data that you have access to beforehand. I mean, you get the patient to fill out a lot of stuff before.	Ben
17	Researcher	So, you don't waste time as a doctor?	-
18	Info7	Exactly. When you go the doctor, traditionally, the first thing they do is asking questions, a lot of questions... How long did you have this... Where does it hurt... Any other things that I should know about... Blah, blah, blah, blah... So the virtual visits not in itself are a precursor to the actual virtual visit... the medical industry.	Ben-Tim
19	Researcher	So from a doctor's perspective, you'd say the amount of data they have and the time saved, so saves time basically for the patient and the doctor. Yeah, I'm regarding cost, I think. I think saves expenses for patients. I wanted to ask you, in terms of the whole health care industry is the cost a benefit? Is it saving money in general or do you think there are a lot of expenses that are associated with virtual visits?	-
20	Info7	Save money?	-
21	Researcher	Yeah.	-
22	Info7	If you look at a specific virtual visit from a patient perspective, there are less expenses than a physical one. But if you look from a healthcare system perspective, doesn't save money, I mean	Ben-Cost

		on a society level. A lot of things need to happen for that to really become a reality and actually replace physical visit with a virtual visit.	
23	Researcher	Is that possible in your opinion?	-
24	Info7	Yeah, absolutely. I don't think for everything. I don't we can ever in the foreseeable future, I don't think we will have totally virtual healthcare system. Don't ever have to see a doctor physically...not going to happen...It's like with your car...you are not going to have virtual garage visits and the car is magically fixed. It's not like that.	-
25	Researcher	But do you think that one day virtual visits could rival tradition visits and just as widespread?	-
26	Info7	Yeah, I mean with technology there you can do more and more and more. If you compare the services that used to be when we started out in 2013, Min Doktor was called (cant understand) at that time, we had (cant understand) from the beginning and the others didn't have that. If you have stomach problem or whatever we can send you off to take blood test. And then the doctor has the full information they need to make a decision. Unless you have that, you can't make a decision.	Cont-Serv
27	Researcher	Yeah, so the patient can take the blood test somewhere and send it to the doctor without having to physically visit the doctor?	-
28	Info7	Yeah, I mean they still need to go physically to take the blood test but that can change in the future, of course.	FOpp
29	Researcher	Exactly. You said there's a workaround. But what we're trying to explore with this thesis is future opportunities of virtual visits, use of AI, for example, to tailor specific solutions to patients and also devices that could be used to measure efficient parameters in real time. Is Aiten Health doing any of this?	-
30	Info7	Yeah, you are working with people with chronic disease. Around 85% of the world's health care costs is for chronic disease, it's kind of the	Cont-Pat

		horrible outcome, so there is a lot of money involved. But the thing is, when you get a chronic disease, the doctors don't have time to really help you. They just have 15 minutes or whatever. They tell you, you have a chronic disease, you need to get these tools, and you need to maybe move more, eat better, some general advice. And how does that work? Well, it doesn't. For some people it does, but for most it doesn't. What we are working on is basically a combination of that healthcare...if you have a chronic disease, you actually need medical assistance, you need medicine, but what you also need is practical hands on health with your lifestyle and your habits. A lot of these chronic diseases are related to your habits, how you live your life and decisions you make on daily basis. Should I walk today or not, do I exercise enough? ... you know, those kinds of things.	Cont-Serv
31	Researcher	So, Aiten Health is more about patient monitoring, right?	-
32	Info7	What we're trying to do, like I said, we're combining health care and habits. And monitoring is part of everything. It is part of the healthcare because tells the doctor and the patient of course how their disease is doing. You can see the blood pressure is going up, you need to make some changes and that affects decision making for the doctor. It can also help the patient make better or just a different choice that will change their trend in terms of the blood pressure.	Cont-Serv
33	Researcher	Could you explain to me how the pressure is measured? Is it through the application? Or is there a device that you connect to the smartphone?	-
34	Info7	You use a device that you put on your upper arm, and then record the data.	FOpp-Rrd
35	Researcher	So, the patient enters data manually?	-
36	Info7	Most of them are actually connected. Using Bluetooth or some other mechanism.	-

37	Researcher	Okay, so the data is transmitted from the device to the smartphone wirelessly or through Bluetooth, right?	-
38	Info7	Yeah Bluetooth, wirelessly, manually, whatever. When you have this data you could do something different. Like trigger for behaviors.	FOpp
39	Researcher	And what technologies are used at Aiten Health?	-
40	Info7	It's web, databases, the normal stuff.	-
41	Researcher	Have you considered the use of AI?	-
42	Info7	Yes.	FOpp-Cust
43	Researcher	And is this your future or near future?	-
44	Info7	Both.	FOpp-Cust
45	Researcher	What else do you think in the future will improve virtual visits to make them as you said the rival edition of physical visits?	-
46	Info7	I am doing everything I can to create is that we will have the virtual visits are cheaper, but the cheapest and most effective visit is the one that doesn't need to happen. The best disease is the one you can't get. That's what everything is about for me. Yeah, you have a chronic disease and you got there somehow and that sucks...but now we can at least work really hard together, not in a situation where you get a stroke.	FOpp
47	Researcher	Interesting. Our thesis is mostly the diagnosis.	-
48	Info7	At the moment, I only work with people who are diagnosed with chronic diseases. We don't do screening, we might in the future. But then the whole 85% of the world's cost is for chronic diseases, mostly down to the horrible strokes maybe diabetes. And cost is just one thing...	-
49	Researcher	Do you think devices that can be connected wirelessly to the phone to send real time health parameters, could be used to diagnose more than the common cold, sore throat, these types of diseases?	-

50	Info7	In Min Doktor they are not using these devices to diagnose as far as I know at least. They are gathering the medical history, and stuff like that. I don't know if you have used Min Doktor?	-
51	Researcher	I haven't but I was under the impression that Min Doktor provides virtual visit with a doctor and then if possible they diagnose, if not they send you physically to see the doctor.	-
52	Info7	Yeah, they will screen you. You use Min Doktor they will tell you that you're at risk of getting a cold next week.	Cont-Serv
53	Researcher	Yes. But there are some things they cannot diagnose. They say you need hands on physician to examine you. Do you think devices that I mentioned with the technology evolving, that allow the doctor to see the patients' throat, or their ear through the phone through a device that will be connected on the patient's phone? So, you know such devices that make it possible to diagnose diseases that currently you cannot diagnose?	-
54	Info7	Yeah, absolutely. There is a tone of those. Actually, you found a few.	-
55	Researcher	Do you know what conditions need to be in place to make use of these tools?	-
56	Info7	As a doctor you need to know that the tools are working properly and giving correct data.	Conx
57	Researcher	So, awareness.	-
58	Info7	Not only awareness, you know, you need to have medical device regulation and make studies to prove that data is actually correct.	Conx
59	Researcher	Yes, this is indeed one of the challenges associated with virtual visits whether the technology is reliable. Do you think this is one of the main challenges and what needs to be done to overcome this challenge?	-
60	Info7	Yeah well its one thing. The other I would say is also the challenge of the traditional health care system	Chall

61	Researcher	What about external challenges such as laws and regulations, do you face it? For example, when rolling out the new feature in it, but someone needs to look at it from the government and usually the technologies out there for innovative solutions, but a lot of time laws posing and re-train on the rolling out of these technologies.	-
62	Info7	We can do something, but not everything.	Chall-Ext
63	Researcher	Can you give us an example of what can be done or not?	-
64	Info7	Yeah it can be done but it is really a mess	Chall-Ext
65	Researcher	And is there any workaround around this, maybe talking officials and making them understand technologies to maybe loosen up the regulations and laws so that telemedicine can evolve?	-
66	Info7	It's going to happen.	Chall-Ext
67	Researcher	Thank you very much for agreeing to do this.	-
68	Info7	I look forward to reading the thesis.	-
69	Researcher	I will send it to you as soon as it's ready.	-
70	Info7	Great!	-

Appendix 8: Eighth interview transcript

Line	Person	Content	Theme
1	Researcher	Can you please tell us more about your role as a physician at Northwestern Medicine?	-
2	Info8	Did my Internal medicine residency with a focus on primary care in 1992-95. I joined the hospital's primary care group and opened a small clinic in the city that grew over the years. I started at 80% clinical, but that went down to 60%, 50%, 40%, and finally 30% as I took on my executive roles.	-
3	Researcher	During your 25 years at Northwestern, how did telehealth evolve? Did Northwestern provide virtual visits to patients like MDLive does?	-
4	Info8	We provided phone and email visits to patients since the late 90s. We did not do video visits.	-
5	Researcher	When you first heard about virtual visits, what was your impression?	-
6	Info8	Email came out as I was ending college (1988) so it was already a natural way for me to communicate and I jumped on board quickly when I was practicing in the 1990s and encouraged my patients to communicate with me that way. I was considered one of the more aggressive physicians nationally doing this and would speak to others about it.	INIT
7	Researcher	Were you, as a physician, excited to use virtual visits with patients? How easy/difficult was it to make the switch from face-to-face visits to virtual visits?	-
8	Info8	It was a great way to stay in touch between visits.	-
9	Researcher	Can you tell us how these visits occurred? What steps were taken with the patient during these visits?	-
10	Info8	<ul style="list-style-type: none"> o Email: In the 1990s to early-2000 we just used regular email. As HIPAA came out and we were more aware of security, we changed to secure messaging, which also allowed us to send prescriptions electronically as well. We were one of the earliest users of this in 2005 when we went live with a 3rd party vendor integrated with our EMR, but when we changed from Cerner to 	Cont-Serv

		<p>Epic, we used the messaging system developed by Epic.</p> <ul style="list-style-type: none"> ○ Phone: Doctors have been doing phone medicine for over 100 years, so that was not new for us. We returned calls during the day, and patients could pager us after hours or weekends for urgent issues. We eventually started charging for after hours and noticed the phone volume went down, and patients made appointments instead. Good for our bottom line, but not good for the patient experience. 	
11	Researcher	What kind of constraints or challenges have you experienced as a physician when working with virtual visits?	-
12	Info8	<ul style="list-style-type: none"> ○ Financial alignment: biggest barrier has always been “who will pay for it”. If we need to charge patients \$50, some will do it, but many would find it cheaper to just come in. However, with higher co-pays and deductibles, we are seeing that patients find the office visits may cost \$50 or more as well. ○ Security: the technical barriers with what we are allowed to do. Rather than use common communication methods like text and Facetime, there are more rules requiring more secure technologies, which make it harder for everyone. 	Chall
13	Researcher	Have you ever encountered issues where the technology failed or was inaccurate?	-
14	Info8	Video is the only difficult one, as patients might not have good bandwidth usually. That is improving but remains an issue for underserved and rural patients.	Chall-Tech
15	Researcher	Is there any IT support available when such cases occur?	-
16	Info8	MDLIVE has a 24x7 IT support line; additionally, we have built in various options to account for video problems, such as one click option to connect via phone if the video/audio is not good via the video connection.	Chall-Tech
17	Researcher	What do you think are the differences and similarities between virtual and traditional visits?	-
18	Info8	<ul style="list-style-type: none"> ○ Virtual visits are more convenient for patients. Most patients save two hours or more of travel time, and don’t have to leave their house. 	Ben Ben-Qua

		<ul style="list-style-type: none"> ○ Most visits require good history taking and cognitive thinking, which can be done in person, over the phone or over video. ○ Virtual visits do have a benefit of being able to collect more information ahead of time – we use an automated chatbot, helping to ensure all the right questions are being asked and documented. ○ Traditional visits have the benefit of being able to collect more data like physical exam (looking in an ear), vital signs and in-office testing (eg strep test). However, each of those can now be done with home devices that can be integrated into the virtual visit as well. ○ In the end, I am very aligned with the NQF report on “How to Measure Telehealth Quality” in which they found that you should not compare a virtual visit to a traditional visit, but rather to what would have happened if the virtual visit were not available... which is usually a delay in care or perhaps not getting any care at all and dealing with the consequences. You can find this report online. 	
19	Researcher	What requirements are needed for a successful virtual visit?	-
20	Info8	At the most basic level, it is a good patient history – whether captured via an online survey/chatbot, and/or with phone or video components. The best doctors have always said “Let the patient tell you their history, they will always tell you all you need to know).	Conx
21	Researcher	Do you think virtual visits have an effect on your relationship with the patients and the connection you establish with them?	-
22	Info8	<ul style="list-style-type: none"> ○ If a doctor already has an established relationship, virtual visits are a great way to connect between visits and make that relationship stronger. Both phone and video can be helpful as we can “hear” or “see” if the patient is acting or talking differently from the baseline that we know about them. ○ If a doctor did not have a prior relationship, I have been surprised how quickly we still connect online. The doctor-patient bond is very special, sacred in many ways, and even via phone or video, it can be a very quick and powerful bond that happens as we help heal someone. Some of our patients will get so close to the first doctor they “saw” online that they will try and make future appointments just with that doctor. 	Chall-Beh

		<ul style="list-style-type: none"> ○ As we move more into virtual primary care, we expect patients to have a very long relationship with a small group of their primary doctors online. 	
23	Researcher	Do you think virtual visits are beneficial to the healthcare sector? If so, what kind of benefits arise from virtual visits?	-
24	Info8	<ul style="list-style-type: none"> ○ First, they greatly impact access to care. Due to geography, cost, time and physician shortages- many patients simply cannot get into a doctor easily. Having an online option available 24x7 has an immediate impact on access. And early access means that problems do not get worse as quickly, so quality is better. ○ Second, is the concept of correct distribution. That means patients with minor issues are less likely to clog up doctor offices and emergency rooms, and thus free up valuable provider time to take care of the patients who really need to be seen. ○ Third, by using automation along with virtualization, we can truly make routine care much more efficient and less expensive. This means less providers can see more patients for less money... something the healthcare system really needs. Our current process of making all patients go into the doctor's office for every issue is simply not affordable nor sustainable. ○ Fourth, by using automation along with virtualization, we can improve quality by ensuring routine care is done in an evidence based, consistent manner. 	<p>Ben-Qua</p> <p>Ben-Cost</p> <p>Ben</p>
25	Researcher	Are there any external constraints (such as regulations and laws) that have an effect on virtual visits?	-
26	Info8	<ul style="list-style-type: none"> ○ The biggest regulatory issue we face is that in America, doctors have to be licensed in every state in which they want to practice. So if a doctor has a license to treat patients in Florida, he cannot also help patients outside of Florida. He needs to get licenses for multiple states, which is time-consuming, expensive, and difficult to manage. ○ The other major regulatory issue is around incentives. Recent changes at the national level are making it easier to get paid for virtual visits, but we still have a long way to go. ○ Also, different states may have different regulations about how one can practice telehealth. Rules often created decades ago, and which often hinder the ability to bring telehealth to the people who need it most. 	Chall-Ext

27	Researcher	Can you tell us more about your role as CMO of MDLive?	-
28	Info8	-I oversee clinical operations of the company, which includes everything from hiring doctors to credentialing, scheduling and monitoring for quality and efficiency. I am also EVP of Product Strategy, where I oversee the direction and specification of how we evolve our product.	-
29	Researcher	How has MDLive changed since you started your role in 2018?	-
30	Info8	<ul style="list-style-type: none"> ○ We have become a much more metric driven company, where we use our great analytic infrastructure to measure everything we want to improve and create improvements around what we have learned. ○ We are evolving from simply urgent care to being able to do more primary care online, including preventive health and chronic care. 	Cont-Serv
31	Researcher	What limitations do virtual visits have and is there a way to overcome them? Is there a focus on overcoming these limitations?	-
32	Info8	<ul style="list-style-type: none"> ○ As above, the major limitations have been things like a physical exam, vital signs and testing. However, each of those have options for home based care now <ul style="list-style-type: none"> ■ Physical exam: companies like Tytocare and others make it easier to capture that information and share it online ■ Vitals signs: patients can buy many types of home devices for blood pressure, pulse, temperature and either self-report or have it integrated into the virtual care system ■ Home testing: may patients now buy these at pharmacies and share their results with us, and they will be expanding even more. ■ More extensive testing; we will soon be able to send patients to labs to get blood and other tests 	Chall
33	Researcher	We know that certain diseases such as diabetes cannot be diagnosed virtually and require the patient to be available physically. Do you see that changing in the near future? If so, what needs to be done to improve diagnosis virtually?	-

34	Info8	<ul style="list-style-type: none"> ○ Today, patients can do home glucose testing and share that with us. ○ Soon we are going to soon send patients to local labs to get the testing that can't be done at home. ○ Eventually, home testing will enable more and more sophisticated labs at home with a simple drop of blood or saliva 	FOpp
35	Researcher	Do you think virtual visits will ever fully replace traditional visits?	-
36	Info8	-I think that by 2025, over 50% of outpatient visits will be done online. In other words, virtual visits can and should replace the majority of routine care that is done appropriately freeing up office visits for those who are more complex.	FOpp
37	Researcher	Which of the constraints, i.e. technological, behavioral, or external (such as regulations) impede the expansion of virtual visits to replace traditional visits?	-
38	Info8	<ul style="list-style-type: none"> ○ More financial than anything else... once that is aligned better, it will continue to explode. ○ The other constraint is awareness.. patients need to know this is an option. Once they know, we find they come back very regularly. 	Chall Conx
39	Researcher	What are the future opportunities for virtual visits? How can they improve?	-
40	Info8	<ul style="list-style-type: none"> ○ First, we see an evolution of our products to allow for more automation of the process so our online virtualists can be more efficient and help manage more patients. ○ Second, we are seeing growing interest and use of visits for behavioral health and dermatology, which we offer to many of our current patients. ○ Third, we see an expansion to other uses cases that run from preventive care and chronic care, to specialty type care that runs from allergist to sleep clinics. 	FOpp
41	Researcher	Can you please tell me more about how MDLive record calls and how they plan on use these recordings?	-
42	Info8	<ul style="list-style-type: none"> ○ MDLIVE has had a long history of recording our calls for quality purposes, so that we can <ul style="list-style-type: none"> ■ Do random chart reviews to evaluate the quality of a provider's services 	FOpp

		<ul style="list-style-type: none"> ■ Follow up on any quality concern or complaint ○ We also are using machine learning to evaluate these recordings to understand how we can improve quality or service and care on an ongoing and even real time basis in the future. 	
43	Researcher	How close is MDLive towards tailoring solutions for specific patients via the use of technologies such as AI and machine learning?	-
44	Info8	<ul style="list-style-type: none"> ○ We already are using expert systems to capture information and present most likely options to providers... thus making it “easy to do the right thing” ○ We are using machine learning in a few ways <ul style="list-style-type: none"> ■ To help with predictive forecasting of scheduling, as we need to know how much and where to schedule our doctors across the nation in 50 states, 24x7. ■ To help with sentiment analysis, in understanding if a patient may be having a bad experience for assorted reasons. ■ To help ensure quality documentation is being done on an ongoing basis. 	FOpp-Cust
45	Researcher	What other initiatives are MDLive taking towards improving healthcare in general?	-
46	Info8	<ul style="list-style-type: none"> ○ By adding in automation, we are working to make healthcare much more efficient in a world where there are major supply/demand mismatches. ○ I believe that we don’t really have a shortage of physicians, just a shortage of using them efficiently. By helping to automate and virtualize the 80% of healthcare which is routine and repeatable, we believe we can improve access, improve the patient experience, improve quality in a variety of ways, and cut costs all at the same time. 	FOpp
47	Researcher	Do virtual visits represent a new technology or a new service? Do you think it is merely a continuation of previous telemedicine technologies or is this service a game changer?	-
48	Info8	We've been doing phone based care for 100 years, and video for 10. The general concept is not new.	Nov-Serv

		<p>The issue is</p> <ol style="list-style-type: none"> 1. Are we using IT better to ensure faster service and higher quality mechanisms? We use expert system software to interview patients and then pass that to the doctors with suggestions = more efficient, higher quality = able to scale at lower cost 2. How do we connect our doctors from all over the nation to ensure patients need to wait less than 10 minutes to hear back from them. We use a lot of predictive modeling to ensure we have the right doctors scheduled at the right times for each state across the nation. 	Nov-Tech
49	Researcher	Does MDLive use devices that can connect to smartphones and send data to the doctor in real-time such as Digital Stethoscopes, wireless blood pressure monitors, eye examiners, digital otoscopes (for the ears), and digital thermometers?	-
50	Info8	Right now- patients can self-describe results or take pics. Over the next few months we will integrate these in	FOpp-Rrd
51	Researcher	What type of patients benefit the most from virtual visits?	-
52	Info8	<p>Today- usually relatively healthy, younger (under 50) who have minor but urgent issues and it's hard for them to get into a doctor. If they don't see us, they may delay care and thus get worse.</p> <p>Tomorrow- we will expand how much we can do - and take care of chronic illness as well as do preventive care exams</p>	Cont-Pat
53	Researcher	Would you agree with the statement that 'Virtual visits empower patients, taking away the authority doctors traditionally had'?	-
54	Info8	<p>Would not say it's about authority, but about access</p> <p>Would say that it empowers them to have better access to care in the time and location that works best for them</p>	Chall-Beh
55	Researcher	Do you see the use of devices like the ones we discussed earlier happening any time soon thereby increasing diseases that can be diagnosed virtually?	-

56	Info8	<p>yes- we plan to do a lot of remote monitoring in the coming 6-12 months</p> <p>would not say it does as much for diagnosis, as much as it helps with early detection of problems, e.g. a rising blood pressure or glucose</p>	FOpp-Rrd
57	Researcher	<p>What conditions need to be in place to make use of these tools and enhance V.V?</p>	-
58	Info8	<p>Not much... this is much more about awareness than technology</p> <p>People have access via web, mobile devices or call centers... they just need to know it exists!</p> <p>Once they do, they use it on average almost 2 times a year and in any given day, 40% of our patients are repeat customers</p>	Conx

Appendix 9: Ninth interview transcript

Line	Person	Content	Theme
1	Researcher	Hello. Thank you for accepting my invitation First of all, before starting, I would like to ask you, if I can record this conversation?	-
2	Info9	Yeah, sure.	-
3	Researcher	Okay. And can I use your company's name in my master's thesis?	-
4	Info9	You can.	-
5	Researcher	Thank you. Okay. Let's start with some introductory questions. Can you please tell me about your role at Doktor24?	-
6	Info9	Yes. So, I am Chief Business Development Officer overseeing all business activities across the company.	-
7	Researcher	And can you tell me more about Doktor24? What kind of telemedicine company is it and what kind of services do you provide?	-
8	Info9	So, Doktor24 is a company offering basically two types of services. One is as a caregiver, so offering digital and online health care in primary, so for basically GP practices, primary healthcare. We have doctors, nurses, psychologists. And we have one of the major companies here in in Sweden. And the other part of Doktor24 is a health tech software provider. So, we also provide our our platforms to third party actors, for instance, of their providers, their insurance companies, healthcare regions, so that they can basically digitalize their, their care process.	Cont-serv
9	Researcher	When you first heard about virtual visits, what was your first impression?	-
10	Info9	Well, since I've been in the business for many years, I mean, they have been around for many, many years, the ability to do doctor visits that are non-physical have been around for at least 15	INIT

		years. So as such, they are they are not, I think news anymore. But I, I can come back to that.	
11	Researcher	Do you see the virtual visits a new technology or a new service, or is just a continuation of previous telemedicine technologies?	-
12	Info9	Well, I think when we talk about, how do you define virtual visits?	-
13	Researcher	The remote communication between the doctor and the patients through different means of communication such as phone, online, and video.	-
14	Info9	Okay, good, because I think the actual virtual visit is not an innovation in itself. And I and I consider that a commodity today, at what is however, innovation is digital healthcare pathways, which is much more than the actual component of communication in between a live patient and a doctor. The big innovation lies within the ability to manage set up design, really innovative patient pathways, where the actual communication between a doctor and the patient is only a small component of that pathway.	Nov
15	Researcher	Very interesting. What kind of patients do you think will benefit the most from virtual visits?	-
16	Info9	Um, well, virtual this has been being a very sort of narrow definition. I think. If I expand the scope a bit and talk about digital pathways, for sure, chronic patients. I mean, today, that's not the main target group, because there are few obstacles on the way, but more long term for sure, chronic patients will be the ones benefiting most from this.	Cont-pat
17	Researcher	Do you have a specific target group in Doktor24?	-
18	Info9	Today, we do. We have the so called symptomatic acute patients. So when you have a symptom, that you don't need to have treatment for a week to get it with the rest of the rest of the market, basically, and also family and women in the sense that they are usually the ones making the decisions for the family's health and well-being.	Cont-pat
19	Researcher	What I know is that some diseases cannot be diagnosed virtually, because they need some physical examinations. So, I wanted to know what kind of	-

		diseases can Docktor24 diagnose, and what kind of diseases cannot be currently diagnosed virtually?	
20	Info9	I think the notion that a symptom cannot be diagnosed because you need a physical component, is not actually true. Because what you can do is that you can put the physical device that you need to use for diagnosis in the hands of the patient or another healthcare personnel. And then you can still have doctor remotely, and then you do a physical examination. But to do that diagnosis remotely or virtually. So you have to be careful when you when you combine these two. So basically, the way we think about this is the type of consultations that can be done digitally only, it's about 35% of the full GP population. If you add the medical devices that are physical from the perspective of the patient, but virtual and the perspective of the doctor, you add the approximately 15 to 20% on top. And then if you add lab tests, you add another approximately 35%. So, from the perspective of a patient, they have done the lab tests physically, but still they have not been into contact with a doctor physically. So, combining all of that there is the potential to care for approximately 70 to 75% virtually if you combine physical components from the perspective of the patient.	Cont-diag
21	Researcher	Actually, that was my next question, because I explored having some other devices in order to expand the use of virtual visits. But are you currently using these devices that can transmit in real time data to the doctors?	-
22	Info9	Yes, we are piloting seven different devices focusing on one and I can't tell you exactly which one, but it's a device with which you can listen to the heart and listen to the lungs, look into the ears and into the throat of patients. And we are currently up and running with that one.	FOpp-Rrd
23	Researcher	What are the conditions that you think are important to be set up in order to have these devices in the future?	-
24	Info9	Regulations? No. Technically, no. The big barriers are mainly within ways of working on current clinical personalities such as doctors and nurses. We don't see any technical or, or regulatory barriers at the moment for these types of devices. Of course,	Conx

		<p>there also are patient barriers, right? Some patients might not feel comfortable using these, I think if you look at the chronic patient groups, here the barriers are within mainly, I would say logistics in the sense that you have to fix the setup for how do you as a patient get hold of, for instance, a glucose meter? How is that being distributed? Who is doing the service and support when things are not working well? How do you connect that medical device to someone basically, who answers on the other side of the phone? So, a caregiver who can actually manage these types of modern devices. Those would be the main issues that we see. At least at the moment. So technical barriers, not so much I would say.</p>	
25	Researcher	<p>Interesting. What are the future plans of Doktor24 regarding virtual visits or virtual pathways in general?</p>	-
26	Info9	<p>I think there are a couple of lines on development that you can see, right. So one, I think, the most important one being the fact that we do not consider healthcare to be either virtual or physical. What we do is we build pathways for specific patients and patient groups. And then they have physical and digital components as part of that pathway. It's not really relevant anymore, I think, to talk about digital health care versus other types of health care, it's health care, and then you choose some different modes, perhaps for how we actually deliver that, that healthcare. So we usually talk about digital physical health care. So whenever something can be done digitally, we will do that. Whenever there's a need for physical component, we will have that. And so today we provide both physical and digital health care. So we're not a standalone digital provider. And I'm perfectly sure that that's going to be the future. The other developmental line is, of course, to increase the share of patients that we can take virtually. So for instance, implementing new devices with which we can we can listen to for instance, the devices that I mentioned, where we can listen to our lines, look, look, look into the air, throat, etc. and set up new service lines where for instance, the patient can take the lab tests themselves, and other types of solutions where we can sort of increase or expand the scope of diagnosis that we can manage. A third line of</p>	FOpp

		<p>development is moving from the more sort of symptomatic acute type of patients into the chronic groups saying it's the need for these type of services are by far the biggest among chronic groups. And the volumes of course, and value. And fourth line and development is around will basically move or use more of prevention, prevention and wellness. So actually avoiding people getting sick, rather than treating them when they are sick. And to be able to do this, you need to be able to manage data. And there is no there is no way in which you can be a successful provider of prevention and wellness services without digital tools. It's way too complex to do today, manually. setting those are the core areas of development for us at the moment.</p>	
27	Researcher	<p>That's really interesting. Do you actually plan or maybe currently use certain technologies such as artificial intelligence in order to tailor solutions to specific patients?</p>	-
28	Info9	<p>So, we are already doing that. So we are by far the most advanced AI company today in Nordic healthcare we have AI chatbot, which manages all incoming patient cases. So and today, our service works in the way that you cannot just enter our app or our web page and basically push the button, see a doctor, you have to talk to a chatbot first that basically collects your medical history. So, you ask your questions, you basically you can write, you know, I woke up this morning with a headache or my knee hurts or whatever, whatever you want. And then that chat bot will take you through questions, and then we'll do something which is called triage in healthcare...But based on the medical history of a patient, it will identify the type of care you need. And it was sent to self-care, digital care, physical care, or even in urgent care.</p> <p>And the reason why we've chosen this is because we believe that you need to do this to be able to be sustainable as a company and also to provide sustainable health care services. But also, because we collect the data. So by avoiding doing you know, quick video visits, which are basically dead data, we do automated chat sessions, we can do video, as well, if the patient wants to do video, but a vast majority of all our doctor visits are done by chat.</p>	FOpp-cust

		<p>And the reason for that is of course, because that's what people want. Usually they do not want to do it video meeting with someone. But also, that creates big data for us, since we do hundreds of thousands of patients into use automated.</p> <p>And that gives us an advantage when it comes to building clinical decision support tools and really understanding our customer needs and pathways.</p>	
29	Researcher	We talked about future opportunities, now let's talk about the benefits of virtual visit. What do you think are the main benefits of virtual visits?	-
30	Info9	So, they are by far much more cost efficient, they are much more accessible. When they are suitable, they are higher quality. I think one example of that is there are revisions being done on the use of antibiotics, for instance. So, caregivers are reviewed by a National Agency here in Sweden on how well we adhere to national guidelines when it comes to for instance, antibiotics usage. So, we were reviewed a couple of months ago, and for a very large patient group, which is a urinary tract infection among women. And we had 99.6% of adherence to national guidelines, which is basically unheard of the usual number is somewhere around 70% in standard healthcare. And the reason why we can be so much better is because we can automate basically everything. And basically machines never, never forget to ask questions or never do not follow guidelines. There are not many years, I think away until we will come to a point where it will be impossible to go to a doctor who is not using these types of tools that we are currently developing today. So, benefits are efficiency, accessibility and quality.	<p>Ben-Acc</p> <p>Ben-Cos</p> <p>Ben-Qua</p> <p>Ben</p>
31	Researcher	Actually, we read a lot of studies where Researchers say that quality of care is reduced when virtual visits are used. So perceive it as a challenge, not a benefit. How do you perceive it?	-
32	Info9	It all, you know has to do with that, you always need to identify the right type of symptoms and patients for each mode of providing a service. So healthcare is not different from any other service business, you have to identify and match the service delivery model with the specific customer or in this case, patient. And when you do that, you	Chall

		<p>will always identify the sort of the best mode from for someone was for some patients you need physical. For a lot of patients, you can do digital, but also I think in many of these studies, you have to look at the outcome. So, what do they actually measure? How do they How do they do they define quality? You know, is it subjective is it objective? Is the quality measured according to process metrics? Or is the quality measured according to real results? And in very few of these studies, you actually measure real patient results. So I would, you know, having studied quality in healthcare a lot, I am very cognizant, very skeptical to sort of look at studies who measure process metrics, for instance, and I know that the field of measuring real outcomes is very narrow. I would be very surprised if there are many, so high quality studies measuring outcomes for digital health care.</p>	
33	Researcher	<p>What do you think about the time I mean, the consultation time? Is it lower in the case of virtual visits?</p>	-
34	Info9	<p>Depends on what type of mode of communication you use, and how well you prepare the consultation. So if you do a very sort of simple setup, where basically the patient enters the app and there is a button that says meet doctor, and you do video, the efficiency rate is very low. So, the difference in between a physical one-one versus a video one-one is very slim, a small. We don't do that. But there are other companies who employ that model. If you on the other side of the spectrum, see if you automate the whole medical history taking, which is usually something that a doctor needs to do manually otherwise, and it doesn't matter if it's on video or physically. So, the asking questions like, you know, do you have any other illnesses? Do you have any allergies, what are your symptoms, what are pain levels, all of that, if you automate all of that, and then you also match the patient to the right mode of healthcare. And you also, as we do summarize that entire piece of information to the doctor, so when the doctor actually talks or chats, in our case, with the patient, everything, everything is prepared, we kept quite a lot of the actual consultation time. And the other component here is that when you chat with patients, you can engage with multiple patients in parallel, which you cannot</p>	Ben-Tim

		do when you do video visit which is a synchronous mode of communication and live. So, it all depends, you know, virtual visits, there is a huge span there. So, you cannot define virtual method as one size, you know, it depends on if you do chat, if you do video, if you do pre-trial, medical history taking level of automation. Very large differences.	
35	Researcher	What do you think are the challenges of virtual visits?	-
36	Info9	Today, I would say in Sweden, then it is reimbursement model, for sure, that's the biggest challenge. The reimbursement models have not, you know, kept the pace of the development, reimbursement models have not developed at the same pace as the services. And connected to that also the complexity in healthcare being reimbursed regionally while digital technology is by definition global. And, that has definitely its complications. And also, I think another challenge is that, at least from our perspective, we don't believe that virtual visits, online consultations and online care should be its own silo. But we believe it should be a part of the healthcare system as such. And that's going to be I think, a big challenge moving forward, because some companies have built their services as a standalone solution, while others have built the present part of the sort of bigger ecosystem.	Chall-Ext
37	Researcher	Do you believe that the relationship between patient and doctor could be a challenge, because it's not the same meeting of a doctor online and meeting face to face? Do you perceive it as a challenge?	-
38	Info9	I don't believe that the service delivered to the patient is either virtual or physical, I think it is an optimized model for the whole pathway of the patient. So, in essence I don't see that issue. But of course, there will be some patient groups who would really want to have a physical and also need to have a physical interface. And then they should have that I'm thinking about perhaps older patients and other the other type of more sensitive consultations. However, this is not only the interaction between the patient and the doctor, it is rather the interaction between the patient and whoever cares for the patient's ailments. So, this is the doctor, nurse, the physiotherapist, a psychologist, all of that combined. And what we see is that there's a huge	Chall-Beh

		<p>difference in quality and safety for patients. If you compare the standard step up today, where a patient goes to a doctor for 15 minutes, and that's it. So basically, during those 15 minutes, the expectation is for you as a patient to basically solve everything that you need while in a digital world, what we do is that we have an open chat channel. So, our patients can come back whenever they want during a usually seven day period. So for instance, you have an issue, you chat with one of our doctors, you get a prescription, you take the medicine and then two days later, you might have another question because you want to ask something about the drug or ask something about the symptom. We also always come back to our patients after three days and ask them how did it go? Do you feel better? How did the medicine work?</p> <p>So in many ways, the interaction and the closeness is higher when you employ digital tools rather than physical ones, because that very short physical interaction of 15 minutes cannot solve all the needs of a modern individual who is used to having a flow of communication, just like we interact through WhatsApp, or text messages, etc. So, for many patients, it's actually much closer to have a digital interaction. And also have quite a few symptoms which might be troublesome in you know, talking to someone live, like for instance, sexual infections and things like that. A lot of our patients actually think it's much better to have a chat interaction, rather than seeing someone live</p>	
39	Researcher	<p>What do you think about technological challenges? I mean, technology, of course, it's continuously improving. But do physicians still face technological challenges, such as poor infrastructure or sound, image, quote, bad quality? Do you see any challenges in the sense of technology?</p>	-
40	Info9	<p>I think the biggest challenge from a technical perspective is really integration. So, we build our own platforms, and we can create them as we want them. But the biggest hurdle is, is for us to integrate to the sort of the big health, the big healthcare system, which, quite often uses old systems and it's not that open, as we would like it to be. I think from sort of some pictures that are called perspective, I don't think that is a, that is a huge issue</p>	Chall-Tech

		<p>anymore. And then especially since the minority of our patients go through video and I don't think it'd be in the future. I think that that is that is clear in the market that video is, you know, been a commodity for long and it's not being used at all in the same volume as the chat is being used. And chat is, of course, a very sort of bandwidth friendly. So, you don't have any issues with that part.</p> <p>And I think otherwise, from a tech perspective, I think the challenge might be that providers, physicians, etc, might not be ready to use some of the technologies we use. Working as a doctor, for instance, in our platform and services is very different from working in a physical setting, since you have so much prepared and ready.</p> <p>And most of the things are automated, etc. And I think that might be a hurdle, but also a very positive thing once you learn that. But otherwise, I think from a tech perspective, integration towards other systems is the big hurdle. Sure.</p>	
41	Researcher	The last question is about external challenges when you try to implement or integrate new technologies, new face and new external challenges in the sense of regulation laws that constrain you?	-
42	Info9	I mean, yes, we do. But I would say that, at least in a Swedish perspective, the regulations are aligned to the sense that, you know, they allow these types of visits, etc, which is not the case in medical or which might not be the case in some of the EU countries. So, I think that's positive. And I think the main external factors here, lie around the reimbursement models on the incoherence in between a healthcare system, which is, in Sweden, divided into 21 regions, where their own responsibility for reimbursing healthcare and the fundamental aspect of digital services, which by definition is global, from day one overseas national. And I think here lies the big the big potential clash, that it is apparent that these two systems over time will struggle to live side by side. I'm sure that there are solutions, but I think this is where we need to work a lot. Another area is of course, the use of AI in healthcare. That space has not been, I think it is not well understood.	Chall-Ext

43	Researcher	Thank you very much. It was very interesting and indeed useful for my thesis. Thank you very much.	-
44	Info9	Thank you very much. And please send me a copy whenever you're ready.	-
45	Researcher	Sure, thank you.	-
46	Info9	Thank you.	-

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