MASTER THESIS

IMPLEMENTATION AND EFFECT ANALYSIS OF VIDEO CONSULTATION IN A DUTCH HOSPITAL

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Health Sciences – Optimization of Healthcare Processes

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Rijnstate

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Implementation and effect analysis of video consultation in a Dutch hospital

How does the implementation and use of video consultation affect stakeholders and different medical specialties in a Dutch hospital?

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Preface

This thesis *"Implementation and effect analysis of video consultation in a Dutch hospital"* has been written in the context of completing the Health Sciences program at the University of Twente. Within this program, I selected the Optimization of Healthcare Processes specialization.

This graduation project was undertaken at the request of the Information and Medical Technology department from the Rijnstate Hospital in Arnhem.

The initial plan was to build a model that could be used during the implementation of IT innovations to consider both the added value for the patients and the budget impact for the organization. Unfortunately, with the Corona crisis, this plan had to be changed, mainly due to the feasibility of the project. Therefore, this thesis will start with a general literature study on the current status of digital innovations in hospitals and what effects these innovations could have on patients. Fortunately, the Corona crisis also offered opportunities for scientific research. Since 'social distancing' was beneficial for the mitigation of the virus spread, Rijnstate saw opportunities to implement video consultation at an accelerated pace. A project group was appointed, with whom I was allowed to collaborate, to finalize my thesis. Therefore, the main focus of this thesis will be on the implementation and use of video consultation in a Dutch hospital.

I would like to thank several people; without whose cooperation I would not have been able to conduct this project. First of all, I would like to thank my first supervisor Prof. Dr. Wim van Harten and my second supervisor Dr. Frederik Vos for their great support and guidance along the process. Secondly, I would like to thank my supervisors Mark van der Velden and Laura Kooij from Rijnstate. I really enjoyed our periodic meetings. Thirdly, I would like to give a special thanks to the whole video consultation project team for their feedback during the weekly meetings and their support with my data collection. Fourthly, I would like to thank Marjolijn van der Lee for her help with the anonymous digital client panel. Finally, I would like to thank all the employees that were willing to answer my questions and all the patients that filled in my surveys.

When I reflect on this period, I see a time where I learned a lot, not only about the hospital and innovations but also about myself. I experienced graduating as a time that was sometimes difficult with many uncertainties, a time in which you can gain skills as a researcher, but ultimately a period which I am very proud of.

I hope you will enjoy reading this thesis.

Ilco Toebes
Enschede, October 2020

Abstract

Background and main objective

Rijnstate has developed a long-term digital strategy, in which they set different ambitions and goals. These are translated into several digital healthcare innovations. One of them is the use of video consultations for medical purposes. Rijnstate would like to employ video consultations in a broad variety of medical specialties, provided that high quality of care is assured. Due to the Corona crisis, there was an urgency to implement video consultation at an accelerated pace, to support the continuation of healthcare. This study focuses on this process, its effects on stakeholder groups, and differences between medical specialties. The main aim is to improve the implementation and ultimately the use of video consultation. Therefore, the study aims to answer the following research question: *How does the implementation and use of video consultation affect stakeholders and different medical specialties in a Dutch hospital?*

Methods

A literature study was performed, for the development of the interview protocol and the survey. A mixed-method study was performed by conducting semi-structured interviews with medical assistants, physicians, technical support staff, and implementation staff. The medical specialties that were interviewed are the bariatrics, pediatrics, psychiatry, plastic surgery, and orthopedic surgery specialty. The Grounded Theory approach was used for the coding process. Surveys were distributed to both user patients (via email address from the application) as non-user patients (via anonymous client panel) from the Rijnstate hospital. A total of 260 (13% response rate) respondents (195 users, 65 non-users) completed the survey. ANOVA tests were used to determine differences among patient groups. Smart PLS was used to build an extension on the UTAUT model for the use of video consultation.

Results

The results from the interviews showed that technical issues are the main barriers and the presence of protocols is the main facilitator. A list of present technical issues was developed and categorized on frequency. Furthermore, flexibility in scheduling and use are the main benefits, while additional tasks are the main disadvantage for medical assistants, physicians, and technical and implementation staff. The degree to which an effect influences a stakeholder is based on the activities the stakeholder performs.

The results of the survey showed that complexity in use is the main barrier, while offering personal support is the main facilitator for patients. The main benefit is savings in travel time, but on the other hand, the main disadvantage for patients is the risk that a physician misses out on health differences. However, these results affect patients from specific medical specialties more compared to others. Especially the differences between the experienced benefits vary significantly. As an example, patients from the MDL specialty answered significantly more often with (strongly) agree on continuity of care (67%), travel time (85%), and waiting time (82%) as a benefit than other patients. Another example, patients from the oncology specialty answered significantly more often with (strongly) agree on the possibility to have friends or relatives present (71%) as a benefit than other patients. An extension of the UTAUT model was developed, in which performance expectancy, affect towards behavior, and anxiety are found as significant influencing factors of the intention to use. Intention to use and facilitating effects had a significant influence on whether someone is using VC (video consultation) or not.

Conclusion

This study illustrates that implementing an innovation that changes the way of providing healthcare is a complex matter, that affects the stakeholders in different ways. This study

concludes that clear protocols should be developed, that define who should communicate and when communication should take place with the patient. Further, the usability of patient groups has to be determined. When VCs can be used depends on the nature and severity of the medical condition and the purpose and subject of the consultation. Secondly, there can be many technical issues. For instance, integrating video consultation within the EPR or MS-Teams, instead of using it via devices, would help substantially. In addition, integrating the camera within the screen, improving the audio settings, and stabilizing the internet connection would make the consultation feel more natural. Thirdly, staff members that experience 'cold feet', due to anxiety that VC does not work properly and affect their professionalism or consultation, could become enthusiastic by increasing familiarity. This could be increased by announcing success stories organization-wide. Fourthly, video instruction manuals and offering personal support for both medical staff as well as patients should increase the ease of use. Finally, regular assessment of the problems and needs of the stakeholders improves the implementation of VCs.

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Chapter 1. Introduction

Even though The Netherlands has excellent quality of healthcare, it also has the highest health expenditure per capita in Europe (Kroneman et al., 2016; Venkatesh, Morris, Davis, & Davis, 2003). In 2018 the annual healthcare costs were €100 billion, which was an increase of three billion compared to 2017 (CBS, 2019). To put the 100 billion in perspective, this amount is equal to 12,9% of the Gross Domestic Product (CBS, 2019). The average in 2017 for members of the European Union was 9,4% ("European Health Information Gateway," 2020). The total health expenditure per capita was €5,805 through government, insurances, and individual payments.

In 2017, 3,2 million citizens of The Netherlands reached the age of 65 or above. In 2040 this number will increase to 4,8 million (Stoeldraijer, Duin, & Huisman, 2017). The increase in the ratio of people aged 65 and higher compared to younger generations is called grey pressure. This leads to a smaller group of young people has to pay more for the care of a larger group of elderly. In 2015 the grey pressure was almost 30% and it is expected that the grey pressure will increase to just above 50% in 2040 (Kruijf & Langenberg, 2017). The life expectancy for men and women has been increased between 1981 and 2018 from 73 years to 80 years and from 79 years to 83 years respectively (StatLine, 2019). These phenomena show the necessity for solutions that provide higher cost efficiency of national healthcare, to ensure high-quality standards.

Many experts confirm this statement; reforms are necessary to create healthcare systems that are more efficient and effective by employing more digital technologies. This should allow stakeholders to share information beyond organizational boundaries (Laurenza, 2018).
According to Duggal et al. (2018), all of us can benefit from the digital health revolution when "*patients, clinicians, and providers must collaborate to design a forward thinking, future proof, and credible regulatory frame that can be trusted by all parties".*

Digital support or digital health has become a revolution that is currently ongoing. This digital health offers a wide variety of implementations such as telemonitoring, the use of applications of mobile phones, and electronic personal health records (EPR) (Duggal et al., 2018). Healthcare innovation is a broad concept with a plethora of options and corresponding effects. Rijnstate Arnhem Hospital is implementing video consultation (VC), which is a form of telemedicine, within different specialties of their hospital. VC is being implemented to respond to the global outbreak of SARS-CoV-2. However, some specialties already implemented VC. Some consultations of patients still have some urgency, however, the government advised to stay at home as much as possible, and strategies such as 'social distancing' are found effective in mitigating the spread of the virus. Therefore, the implementation process of VC within various specialties has been accelerated within the Rijnstate hospital (Khan, 2020; Rijksoverheid, 2020). Therefore, VC is selected as the innovation for the investigation of the influencing factors and actual effects of the implementation and use.

VCs can be deployed for different usages. VCs can be used for diagnoses and various forms of follow-up care such as lab tests, referrals, or imaging results (Gordon, Adamson, & DeVries, 2017; Wong et al., 2006). Another way of deploying VCs into daily practices is by using the application for providing treatments. This could be by performing follow-up appointments and for advice, prescription, and investigation practices. Studies already exist that show the positive effects of VCs, such as time-saving, cost-saving, and higher diagnostic accuracy in comparison with a telephone consultation. (Müller, Alstadhaug, & Bekkelund, 2016; Wong et al., 2006). Finally, there are two different variations on VC, namely one where audiovisual images are

shared live and one where the images are saved and send to the receiver (Burke & Hall, 2015). Concluding, VC can be applicable and beneficial for various usages within hospital care. However, what aspects influence the actual implementation process and usage is unknown.

Even though the patient is both user and product in healthcare processes, it should be taken into account that hospital staff also uses the innovation. Therefore, merely looking at the effects an innovation has on patients is insufficient. For this reason, the stakeholders should be included in the analysis. Additionally, some people may be less open to innovation and change, potentially causing obstructed implementation. Video consultation will be used for medical purposes, but within a hospital, there is a broad scale of medical specialties. These specialties all have their characteristics which can influence the implementation and use. Since each specialty has patients with various medical conditions and different characteristics, the effects of using video consultation may differ between medical specialties and patient groups.

Ignatowicz et al. (2019) conducted a meta-analysis, including 35 articles, to summarize the existing reviews of literature related to the use of internet video conferencing between clinicians and patients with chronic conditions. They found that the discussion sections of most reviews often suggest that further research is needed around cost, ethics and safety, and the practical challenges when implementing internet videoconferencing. Since the implementation affects the daily work of the stakeholders, this study aims to find what practical challenges the stakeholders experience. Different patient groups have varying health conditions, which may influence the usage of the application. As a possible result, these varying patient groups may experience or appreciate the benefits and disadvantages of the use in different ways. The study aims to provide an overview of the effects video consultation has on different groups of patients and what barriers and facilitators are present with the implementation and use. Concluding, the main aim is to improve the implementation and ultimately the use of video consultation. This leads to the following research question:

> *RQ: "How does the implementation and use of video consultation affect stakeholders and different medical specialties in a Dutch hospital?"*

The study aims to contribute to the current theoretical knowledge in several ways. Holmström (2018) identified three research opportunities. First, to develop explanations regarding digital innovations acknowledging the complexity of socio-material interaction. Second, regarding the specifics of the digital technology. Third, regarding the relationship between specific usage and generalization of use. Greenhalgh, Wherton, Shaw, and Morrison (2020) likewise stated that introducing video consultation includes complex changes. The findings of this study will address these issues since it will focus on the experiences of stakeholders regarding the facilitating and obstructing aspects of the implementation and usage of video consulting.

Patients will be asked to participate in the data collection of this study. This study will analyze different patient groups, with diverse medical conditions. This will eventually gain insight into the effects of VC between medical specialties. Patient demographics will be analyzed to help develop a new UTAUT model (Venkatesh et al., 2003). It is to be expected that this model can also be applied to the implementation processes of other digital healthcare innovations.

The study will also provide practical contributions to the Rijnstate hospital. Next to a general multi-year organizational strategy, Rijnstate has developed a digital strategy to become a leading organization by innovating healthcare and reinforcing the collaboration with stakeholders in the region. With their digital ambitions, they set a four-pronged aim which

includes the improvement of clinical outcome, improvement of patient experiences, reduction of costs, and improvement of work experience from employees. Findings from the research should provide support for choice elicitation regarding each of these aims. The outcomes of this study will provide insight into the added value and disadvantages for patients, barriers and facilitators when implementing VC, and other practical challenges. The knowledge gained with the research may be used to improve the usability of the VC application. The findings will provide a holistic overview since multiple stakeholders and different medical specialties are included.

This study supports the 'Rijnstate Digital Strategy 2019' and is relevant to ambitions one and two, 'Innovator and leader at the employment of digital facilities for the support of a leading position in acute and complex care' and 'Continuous digital improvement with the patients and their network of care partners' respectively. The outcomes support track three of the Rijnstate Digital Strategy 2019, which focuses on 'the innovation, transformation, and adoption of healthcare' (Rijnstate, 2019). The findings of the research may provide support for the long-term use of video consultation, long after the COVID-19 crisis has passed.

This thesis is developed with a certain structure. The next chapter provides an extensive overview of the literature that forms the theoretical framework for this study. The subsequent chapter describes the used methodology for data collection and analysis. The fourth chapter provides the found results, subdivided into a qualitatively and quantitively section. The fifth chapter provides a conclusion and a discussion on the findings. Finally, the sixth and final chapter continues with practical recommendations for the participating organization.

Chapter 2. Theory

This chapter elaborates on current developments regarding information technology innovations, the health effects of innovations in healthcare on stakeholders, and a model for technology acceptance. The chapter will conclude with a graphical summary.

Literature review approach

To develop the theoretical framework the databases Scopus, PubMed, JMIR, and Google Scholar are used as sources. The following keywords (or combinations) have been used for the selection of articles: 'digital innovation', 'health information technology', eHealth, 'value health', 'stakeholders healthcare', 'video consultation', UTAUT, effects, benefits, disadvantages, stakeholders, 'patient groups', and 'barriers and facilitators'.

2.1 Review on innovations in healthcare

2.1.1 Digital innovation

The concept of digital innovation has been receiving attention increasingly, in both research and practice in recent years. With innovation being digitized, traditional presumptions of creating value are being reconsidered (Henfridsson, Mathiassen, & Svahn, 2014; Richard J. Boland, Lyytinen, & Yoo, 2007). This idea raises the need for new developments and conceptualizations for value creation. The use of digital technology during the process of innovation or the results from innovation can be defined as digital innovation (Nambisan, lyytinen, Majchrzak, & song, 2017).

Holmström (2018) identified three challenges that are found as the most important concerns in research on digital innovation. a*) We are reifying the agency of digital innovation actors*. This refers to the overestimation of abilities from the innovation actors to change the world. Holmström states that innovation actors should rather acknowledge the complexity of how their actions interact with each other. b) *We are developing explanations of digital innovation detached from the specifics of digital technology.* Despite that digital innovation has been portrayed as re-programmable and editable, empirical digital innovation is yet to be equally thoughtful. Tactful decisions have to be made related to the specifics of the technology c) *We are developing overly specific explanations of digital innovation.* Currently, in empirical digital innovation research, a tendency is present that too much focus is appointed to one single case, or the occurrence to resist the systematic generalization of found explanations and insights.

These three challenges can be translated into three opportunities for research within the digital innovation domain. The first opportunity aims to '*develop explanations of digital innovation acknowledging the complexity of socio-material interaction in digital innovation'* (Holmström, 2018). These explanations can be transformed into new theoretical perspectives and how these digital technologies are involved and influenced by networked, knowledge-based work practices. The second opportunity addresses '*explanations of digital innovation building on the specifics of digital technology'* (Holmström, 2018). It aims to develop theory from empirical observations by including the specifics of digital technology. Third, an opportunity is to '*develop explanations of digital innovation based on an oscillation between the specific and the general'* (Holmström, 2018). In other words, most empirical digital innovation research provides overly specific explanations of digital innovation with little emphasis on generalization. An opportunity could describe how both ends of the spectrum could be constructed sufficiently.

In summary, the complexity of the interaction with digital innovation, specifics of the technology, and the relationship between specific use and generalization of use are aspects where value can be gained. The next paragraph will elaborate on how digital innovations, and especially information technologies, are present in the healthcare sector.

2.1.2 Review on digital innovations in healthcare

The next paragraph will provide an overview of two emerging fields within digital healthcare innovations. The first field is eHealth, which is defined as "*eHealth involves a broad group of activities that use electronic means to deliver health-related information, resources and services: it is the use of information and communication technologies (ICT) for health (WHO, 2020).* The second field is Health Information Technology (HIT), which is defined as *"Health information technology is an umbrella term that covers a wide range of technologies that store, share, and analyze health information"* Kruse & Beane (2018). These definitions are often used to describe the same concept or innovation.

Kruse & Beane (2018) conducted an extensive review study to analyze the current literature for the impact of health information technologies (HIT). They hypothesized that adopting HIT into healthcare organizations has a positive effect on medical outcomes. In other words, there is a positive association between the adoption of HIT and medical outcomes. They identified twelve categories of HIT, which are prescribed in table 1.

Web-based	Telemedicine	Software	Clinical decision support systems
Mobile health	Telemonitoring	Electronic ordering	Health information technology
Health information exchange	Robotics	Video Conferencing	Remote screening

TABLE 1 CATEGORIES OF HIT

They identified three categories of outcomes, namely physical, psychological, and continuity of care. Physical outcomes were found most frequently (39 out of 65). Concluding they stated that HIT has the potential to improve the quality and safety of health care services, however, they did not identify studies that demonstrated a negative impact on medical outcomes as a result of HIT adoption.

Another emerging field within medical informatics is eHealth. eHealth encompasses more than combining the internet with medicine. The "e" from eHealth stands for "electronic", among ten other "e's". These ten are efficiency, enhancing quality, evidence-based, empowerment, encouragement, education, enabling, extending, ethics, and equity (Eysenbach, 2001).

According to Shaw et al. (2017), eHealth has three overlapping domains. The first domain is 'Health in our hands'. This implies the usage of eHealth technologies to monitor, track, and inform. The second domain is 'Interacting for health', which implies using digital technologies to enable health communication between practitioners and between health professionals and clients or patients. The third domain is 'Data enabling health', which implies the collection, management, and usage of health data. Various domains can be found for the term eHealth. Cowie et al. (2016) identified seven more specific domains of eHealth, which are shown in table 2.

Telemedicine and telecare	Clinical information systems	Integrated regional and national information networks and e-prescribing	Disease registries and other non-clinical systems
Mobile' health (m-health)	'Personalized' health (p-health)	Big data	

TABLE 2 CATEGORIES OF EHEALTH

The categories of HIT by Kruse and Beane and the categories of eHealth by Cowie et al. have overlap with definitions and context, since they both apply to the use of information and communication technologies for healthcare. Therefore, these categories can be synthesized into one overview of digital innovations in healthcare.

Software is referred to as an umbrella term for knowledge-based, decision support IT programs that offer assistance, guidance, and feedback in the healthcare setting. Examples of software applications are electronic health records, medical diagnosis software, imaging and visualization, medical database software, e-prescribing software, appointment scheduling, medical equipment management, hospital management software, medical billing, and medical research (Malets, 2019). Another form of software is the use of Intranet. Intranet is a private information platform within an organization. A well-designed intranet can improve staff communication and patient care and can provide a central location for resources and organized departmental sites (Murphy, 2015). Since 'software' is intertwined and necessary in all information and communication technologies, this will be left out in the categories.

This total overview is provided in table 3. The innovations will be explained further in the next paragraph.

Telehealth (1)	M-health (1,2)	Information systems (1,2)	Web-based (1,2)	Clinical decision support systems (1)
Telemedicine and telecare (1)	Mobile health (1)	Clinical information systems (2)	Disease registries and other non-clinical systems (2)	Clinical decision support (1)
Telemonitoring (1)	Personalized health (2)	Health information exchange (1)	Electronic ordering (1)	
Remote screening (1)		Big data (2)	E-prescribing (2)	
Video conferencing (1)		Integrated regional and national information networks (2)		
		Health information technology (1)		

TABLE 3 TOTAL OVERVIEW DIGITAL HEALTHCARE INNOVATIONS. (1) BASED ON KRUSE AND BEAN (2018) AND 2. BASED ON COWIE ET AL. (2016)

2.1.3 Explanation of innovations

Telehealth

Telemedicine and telecare

According to Sly, Clarke, and Sanabria (2018), telemedicine is referred to as an umbrella term for telemonitoring, telehealth, remote monitoring, and eHealth. Telemedicine is defined as the delivery of healthcare services over distance using information and communication technologies (Mars & Scott, 2012), such as video consultations between physicians and patients. An example is the use of telemedicine to decrease the number of visits to physicians for patients with chronic conditions (Mileski, Kruse, Catalani, & Haderer, 2017).

Telemonitoring

Telemonitoring is the use of technology to monitor[1] a patient or patients from a distance, such as patients' homes. This technique is promoted as a solution for monitoring the increasing population of patients with chronic conditions. Especially alignment with existing practices within organizations and across organizations is crucial to connect all practices and make telemonitoring work in a complex healthcare system such as the current one (J. K. B. Christensen, 2018).

Video conferencing

Video conferencing provides opportunities for healthcare providers to interact with each other or with one or multiple patients. The most user-friendly system for video conferencing is Skype and Google Hangout (Budrionis, Hasvold, Hartvigsen, & Bellika, 2015). Videoconferencing can be used for various goals, such as emergency surgical telemonitoring sessions or GP-patient consultation.

Remote screening

Remote screening is referred to as the screening[2] of patients from a distance. An example could be centralized screening in a single location, which is within the hospital but remote from the patients (Kahn., Gunn, Lorenz, Alvarez, & Angus, 2014).

M-Health

Mobile health

Mobile health is referred to as digital applications in healthcare. An example is the increasing use of mobile personal health records (mPHR). This allows patients to access health information via devices, such as smartphones, digital assistants, and tablets computers. Examples of health information are clinical summaries, diagnoses, educational resources, and appointment reminders (Bouri & Ravi, 2014).

Another form is applications that promote a healthy lifestyle. A study showed a positive impact of a new web-based app on lifestyle indicators during an intervention period in comparison with a group that continued their standard lifestyle (Safran Naimark, Madar, & Shahar, 2015).

Personal health

According to Cowie et al. (2016), personal health is referred to as "wearable or implantable micro- and nano-technologies with sensors and/or therapy delivery devices to help facilitate

[1] Defined as 'to watch and check a situation carefully for a period of time in order to discover something about it'. Retrieved from: https://dictionary.cambridge.org/dictionary/english/monitoring.

[2] Defined as 'a test or examination to discover if there is anything wrong with someone'. Retrieved from https://dictionary.cambridge.org/dictionary/english/screening.

health and social care decision making and delivery". Examples are fall detectors, implantable insulin pumps, and defibrillator vests.

Information systems

Clinical information systems

Clinical information system includes several systems such as electronic medical records and systems for monitoring clinical and institutional practice (Cowie et al., 2016). Electronic medical records provide the care provider with the necessary information regarding the patient. An example of a clinical monitoring system is a system that measures vital signs such as blood pressure or heart rate.

Health information exchange

Health information exchange (HIE) is also known as the expansion of electronic data sharing. This data is typically health information from patients in medical records (Simon, Evans, Benjamin, Delano, & Bates, 2009). The following terms of HIE have been defined by The Office of the National Coordinator for Health Information Technology (Williams, Mostashari, Mertz, Hogin, & Atwal, 2012):

1. Directed exchange: Sending and receiving secure information electronically between care providers.
2. Query-based exchange: Provider-initiated requests for information on a patient from other providers.
3. Consumer-mediated exchange: Patients aggregating and controlling the use of their health information between care providers.

Big data

Big data is a term for the integration and analysis of large-scale data sources. These data sources can be heterogeneous and usually have a high amount of data. The data is characterized by a broad range of data types and sources (Cowie et al., 2016). In an ideal situation, these data are linked to one person, to provide a holistic view of a patient of factors that can affect someone's health.

Integrated regional and national information networks

These networks are the foundation for building a successful regional and national healthcare delivery system. These systems share healthcare-related information between providers in a specific area or country electronically, according to specific standards (Fuller, 1997). An example can be sharing patient data between specialists that both treat the same patient.

Health information technology

Health information technology is an important tool for improving healthcare quality and safety. It entails various technologies, which vary from simple dashboards to advanced decision support. It is defined as: *"the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision making"* (Alotaibi & Federico, 2017).

Web-based

Web-based

Web-based innovation comes in many forms. These innovations could be patient portals for scheduling appointments. Traditionally, medical appointments are made with schedulers over the telephone or in person. There is a growing trend for the adoption of web-based appointment systems, since positive changes such as reduced no-show rate, decreased staff labor, decreased

waiting time, and improved satisfaction was found. Patient portals are also used for distributing information (Zhao, Yoo, Lavoie, Lavoie, & Simoes, 2017).

Electronic ordering
Electronic ordering is a process of electronic entries within a system or network to order products or services. It increases efficiency and reduces transcription errors. In a study that investigated the effect of electronic ordering on the delivery time of a certain painkiller and subsequent patient outcomes it was found that electronic ordering resulted in patients that received their medication faster, had less pain, and required less medication (Urban, Chiu, Wolfe, & Magid, 2015).

Disease registries and other non-clinical systems
These systems are used for educational purposes, supporting public health, patient/disease-related behavior, and healthcare management (Cowie et al., 2016)

Electronic ordering
Electronic ordering includes systems that are used for ordering products and materials. (Kruse & Beane, 2018)

E-prescribing
E-prescribing includes two systems. It includes systems that are used for prescribing medication to patients and systems for referring patients to other specialists (Cowie et al., 2016).

Clinical decision support systems
Clinical decision support
A clinical decision support system (CDSS) is a health information technology that is designed to provide physicians with assistance with clinical decision-making tasks. This could help with the diagnosis, based on the patient's data. For instance, a CDSS can build linkages between the observed clinical data and golden standards. However, the clinical interpretation of these linkages is still necessary. The data in the CDSS should have rigorous, peer-reviewed scientific evidence to establish its safety, validity, reproducibility, usability, and reliability (Shortliffe & Sepúlveda, 2018).

This section illustrated that there is a plethora of options to innovate within the hospital sector. These options may affect or benefit patients in varying ways. The next section will provide a brief overview of the effects that innovations may have on patients and which other stakeholders are involved with the implementation and use of video consultation.

2.2 Effects and stakeholders of digital innovations in a hospital setting

2.2.1 Effects

Value is an abstract term that may be interpreted in various ways. Conflicting goals of stakeholders may result in a different interpretation of value. Some stakeholders may have the goal to achieve better quality, others may strive for cost containment. Others may weigh value in time savings, safety improvements, or increased patient satisfaction (Rudin, Jones, Shekelle, Hillestad, & Keeler, 2014). However, it should be considered what is the value for the patient is because ultimately, the patient is both the user and product in healthcare processes. Porter and Teisberg (2006) state that: "Achieving high value for patients must become the overarching

goal of health care delivery, with value defined as the health outcomes achieved per dollar spent".

A current trend in healthcare is the Value Based Healthcare (VBHC) delivery by M. Porter. VBHC addresses a different approach to value delivery. It focuses on a shift from "What is the matter with you?" to "What matters to you?". VBHC determines the outcome that matters to the patients while considering the costs of delivering these outcomes. In other words. It forms a link between outcome measurement and costs. VBHC by Porter states the following "In fact, we cannot afford not to pursue high quality because it is the only way to make health care affordable" (2008) (p.145). According to Porter (2010), the term value should be defined around the customer. In hospital settings, patients are both the product and the customer. Since value is determined by which results are achieved, rather than necessary inputs, the outcomes are a measure for value in healthcare. A challenge that emerges with this philosophy is a shift from volume to value. The denominator of the value equation is referred to as the total costs of the full cycle of care for the patient's medical condition. It does not refer to the costs for the services of an individual. Outcomes, the nominator of the equation, are related to a specific condition and are multidimensional (Porter, 2010).

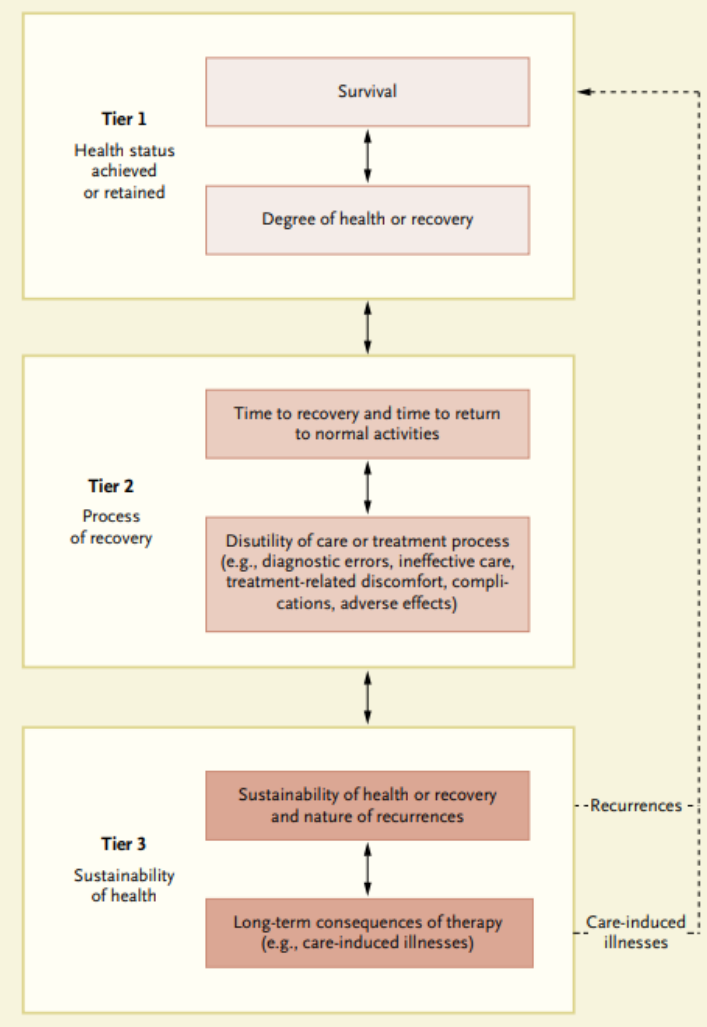

FIGURE 1 THE OUTCOME MEASURES HIERARCHY

Porter (2010) defined a model called 'The Outcome Measures Hierarchy' (see figure 1), that schematically displays the three tiers of health outcomes. The model is divided into three tiers, all having two levels. Tier 1 describes the achieved health status and describes the health retained for patients. The first level is called Survival, which can be measured for a specific medical condition over different time frames. The second level regards the phase when people are freed from their disease and relevant aspects of functional status. Tier two is related to the recovery process. The first level is relevant to the aspect of time, which can be specified to a specific phase of care. The second level refers to discomfort, repetition of treatment, complications in the short-term, and error and their consequences due to the treatment process. Finally, tier three refers to the sustainability of health, in which the first level refers to long-term complications or relapses of the initial medical condition. The second level entails problems that are present in the new health status as a result of the treatment.

Despite that the patient is both the user and product in healthcare processes, it should be considered that hospital staff is also using that innovation. Therefore, merely looking at the effects an innovation has on patients is insufficient. The following section will continue with the stakeholders.

2.2.2 Specification of groups

Greenhalgh, Wherton, Shaw, and Morrison state that "Organizational case studies have shown that introducing video consultation is a complex change that disrupts long-established processes and routines" (2020). Therefore, analyzing what the effects are on the implementation and use of all direct stakeholders is crucial.

Mantzana et al. (2007) stated that with the adoption of information systems in healthcare there are multiple stakeholders. The stakeholders are the acceptors, providers, supporters, and controllers. Since VC is an application to transfer information, patients are appointed to the acceptors and physicians to the providers. Supportive staff such as the consultation hour assistants can be appointed to the supporter. Finally, the technical support staff and staff involved with the implementation can be appointed to the controller group.

However, there are groups between the stakeholders. As an example, within a hospital, there is a broad scale of medical specialties with divergent characteristics. Some medical specialties are more innovative than others. A distinction that can be made is the difference between the so-called 'early and late adopters' (Escobar-Rodríguez & Romero-Alonso, 2014). The innovators (2,5%), early adopters (13,5%), and early majority (34%) form the first half of the innovativeness continuum. The late majority (34%) and the laggards (16%) form the second half. In general, the first half is open to change and the second half is more reserved in adopting new technologies, and tend to be more skeptical about innovations. These differences might influence whether the implementation will fully succeed or not.

Healthcare is a rather heterogeneous sector, especially in the types of consumers and various types of required services. As an example, "patients with the same type of chronic disease vary significantly depending on the disease severity, age, and socioeconomic status" (M. Christensen & Remler, 2007). Christensen and Remler also state that the need for ICT from patients is likely to be more disease-specific. These disease-specific needs may influence whether the expected benefits are experienced by the patients.

When patients are regarded as the users, variations in characteristics are defined as moderators by (Venkatesh et al., 2003). These moderators are gender, age, experience, and voluntariness of use. An example that they found for gender is that the determinant of attitude is more salient for men. Age was found as a moderator for perceived behavioral control with older people. With perceived usefulness experience was found as a moderator. Voluntariness was found to have a direct effect on the intention to use a certain application. In other words, patient characteristics seem to be moderators for the intention to use a technology or innovation.

Multiple stakeholders are involved with the implementation and use of video consultation. Therefore, the next section will provide a more extensive overview of the influencing aspects and effects on the stakeholders.

2.3 Overview influencing aspects and effects of VC on stakeholders

2.3.1 Overview influencing aspects and effects on staff

Physicians and medical staff

Benefits

When local access to the consultation is granted, appointments are easier to keep. As a result, the consultant has less difficulty with patients who fail to keep their appointments (Mahnke, Jordan, Bergvall, Person, & Pinsker, 2011). In a survey from James & Balas (2006) 70% of the physicians perceived IT as a potential/an option to increase their productivity. Sheikhtaheri et al. (2018) found that participants within that study agreed on statements regarding the use of VC such as the reduction of costs and errors, reduced workload, and increased service. James and Balas support this by indicating that 60% of the physicians state that IT tools have the potential to reduce costs (2006).

Disadvantages

VC has the potential to be used fully as an alternative to face-to-face consultations. However, Hedqvist and Svensson (2019) stated that VC can contribute to human interaction between patients and nurses, but it cannot replace it. This is supported by Hjelm (2005), who stated that there is an inability to perform a physical examination. Especially for diagnoses where palpation is necessary, this is a considerable disadvantage. Hjelm (2005) also found that depersonalization is a drawback of VC. Depersonalization is referred to the fact that elderly patients do not accept that the physician is seeing and listening to them properly. Using VC might not feel 'real' to them. Some consultations can contain potentially sensitive context. The physicians and medical staff have to deliver this news or talk about sensitive context. They could experience struggles by delivering this news in an appropriate manner (Donaghy et al., 2019).

Barriers and facilitators

James and Balas (2006) found that a key barrier to the implementation of clinical IT applications is that the payoffs from the applications are uncertain with the physicians. In other words, the assurance that the application will offer an added value. On the other hand, whenever healthcare providers believe the application will offer added value, it is more likely that they will use the application. This added value is regarded as the perceived value.

Another barrier is the complexity of usage (James & Balas, 2006). Applications that are more complex need more time and effort to learn how to use. In other words, the amount of effort people needs to invest in it to learn it.

Whenever colleagues are using an application and encouraging another colleague, those colleagues are more inclined to use it than those without that specific social influence. Another case could be whenever a supervisor is supporting the physician or support staff to use the application. On the contrary, whenever someone is discouraging a colleague, those colleagues may be less inclined to use it.

In the survey from James and Balas (2006) was found that almost a third of the physicians stated that a barrier to implementing technology can be assigned to a lack of a strategic plan. Table 4 provides an overview of the aspects that are found for the physicians and medical support staff. This table is graphically shown in Appendix I.

Benefits	Disadvantages	Barriers	Facilitator
Increase in productivity	Depersonalization	Complexity of usage	Perceived value
Increased service	Inability to perform a physical examination	Lack of a strategic plan	Social influence
Reduced workload	Struggles with sensitive context	Perceived value	
Reduction of costs		Social influence	
Reduction of errors			

TABLE 4 OVERVIEW INFLUENCING FACTORS EFFECTS PHYSICIANS AND MEDICAL SUPPORTIVE STAFF

Technical support and implementation staff

Benefits

According to Sheikhtaheri et al. (2018), a barrier to technical and implementation staff for the implementation is that additional education is necessary. However, this could also be considered as a benefit, since it is an opportunity for personal development.

Disadvantages

In many articles, the problem of software issues is mentioned. However, when scaling up innovations software systems potentially have to be updated or upgraded. These updates or upgrades may intervene with other systems or programs (Donaghy et al., 2019). In other words, updating one system may result in necessary updates in other systems. Therefore, implementing an application can result in more work after implementation.

Barriers and facilitators

The study from Sheikhtaheri et al. (2018) found barriers related to the technical stakeholders, namely the shortage of computer equipment and a lack of funds. These statements are supported by Lin et al. (2018). On the contrary, sufficient provision of technical facilities and funds could support the implementation. Table 5 provides an overview of the aspects that are found for the technical support and implementation staff group. This table is graphically shown in Appendix I.

Benefits	Disadvantages	Barriers	Facilitator
Opportunity for personal development	Additional work after implementation	Lack of technical facilities	Sufficient technical facilities
		Lack of funds	Sufficient funds

TABLE 5 OVERVIEW INFLUENCING FACTORS AND EFFECTS TECHNICAL SUPPORT AND IMPLEMENTATION STAFF

2.3.2 Overview influencing aspects and effects on patients

Benefits

Burke (2015) states the following advantages of teleconsultations increased access for the medically underserved, and enhanced care through faster and more accurate assessment that can be provided by telephone consultation. Johansson, Lindberg, and Söderberg (2017) also state that VC provides quicker access to specialist care for the patient. Hall-Barrow, Hall, and Burke (2009) stated that those hospitalized children are more often able to receive care in their local communities, resulting in less disruption to the family. In other words, this study shows that video consultation offers possibilities for the family to be together with the patient.

Dharmar et al. (2013) state that the use of telemedicine consultations for pediatric patients in rural emergency departments results in higher patient satisfaction and higher quality of care. Sheikhtaheri et al. (2018) provide a table with participants' attitudes regarding teleconsultation.

58.3% agreed with the statement that the application could improve quality. Next to that, 68.3% agreed with the statement that it facilitates continuity of care.

James and Balas (2006) state that communication allows physicians to deliver better care and expects that VC will aid patients in regards to responsibility for their own health. Tensen, van der Heijden, Jaspers, and Witkamp (2016) conducted a literature review on the current status of telemedicine applications, such as VC, within dermatology. They found that it reduces patients' travel time and waiting time. Next to that, it avoids unnecessary dermatologic visits and serves underserved patients by improving access. Donaghy et al. (2019) concluded that VC is time-saving in comparison with traditional face-to-face consultations. This was especially the case when formal physical examinations were not required. They also found that VC provides reassurance and improved communication.

Disadvantages
Donaghy et al. (2019) conducted a study regarding the acceptability, benefits, and challenges of VC according to patients. They provided several disadvantages that are related to the patient. One example is the potential risk of missed diagnoses and health differences, which is caused due to the absence of physical presence.

Another disadvantage that they mentioned is the potential slight delay in the conference. This could result in a conversation that feels unnatural to the patient since the patient may have to wait before saying or asking something (Donaghy et al., 2019). They noted the sensitive context that a conversation may have, such as the sexual health condition of a patient. Physicians sometimes have to deliver potentially upsetting news to a patient, which would be more appropriate to deliver in a face-to-face consultation, since these could be emotional moments for the patients (Donaghy et al., 2019).

Thirdly, Donaghy et al. (2019) stated that patients could experience more uncertainty whenever they are waiting in the virtual waiting room. This uncertainty could be higher than when the patient would be in a physical waiting room. Hedqvist and Svensson (2019) conducted a study on coordinated care planning with video conferencing. They found that communication with the patient is affected and that it loses proximity. In other words, it can disrupt the possibility of seeing each other as a person, which could enhance the uncertainty.

Barriers and facilitators
Barriers and facilitators will be based on the UTAUT model by Venkatesh et al. (2003). The implementation will succeed if ultimately the application will be used. This model estimates the intention to use an application. Therefore, the aspects of perceived value, effort expectancy, and social influence are appointed as both barriers and facilitators. They are appointed as both barriers as facilitators since the effect can be positive or negative on intention. Second, the determinants of facilitating conditions can be divided into a lack of knowledge and a lack of technical provisions, which both are barriers. Third, anxiety and self-efficacy can play an obstructive role. Finally, attitude towards technology, which is referred to as whether someone thinks using an application is a good idea, may support the use (Venkatesh et al., 2003).

Table 6 provides an overview of the aspects found for the patient group.

Benefits	Disadvantages	Barriers	Facilitators
Less travel time	More uncertainty	Perceived value	Perceived value
Less disruption with family	Infeasible for emotional moments	Effort expectancy	Effort expectancy
Less waiting time	Unnatural conversations	Social influence	Social influence
More self-responsibility	Loss of proximity	Self-efficacy	Attitude towards technology
Continuity of care	Lower diagnosis accuracy	Anxiety	
Better communication		Lack of knowledge	
Higher quality		Lack of technical provisions	
Offers reassurance			
Better access to healthcare			

TABLE 6. OVERVIEW INFLUENCING FACTORS AND EFFECTS ON PATIENTS

Effects on varying patient groups

In addition to differences between the stakeholders, further comparisons can be made. The potential differences between patient groups can be further investigated. Atherton et al. (2018) conducted a case study to find the potential of alternatives to face-to-face consultations and to find the impact on various patient groups. They found that there are multiple types of patients who are potentially suitable for alternatives to face-to-face consultations. However, they found that the differences between patient groups were fewer than anticipated. Nevertheless, they did have some concerns about different potentials to increase health inequalities. They noted the following question for further research: “For which patients and for which conditions are different forms of alternatives most efficient and effective?”. These differences could be between medical specialties or between patient demographics.

To conclude, figure 2 provides a graphical overview of the effects on the stakeholders. This figure will be used in the results sections to present which of the found aspects are confirmed in this study. To quantitively test specific parts of this figure a model for the acceptance and use of technology will be used, which will be elaborated upon in the next paragraph.

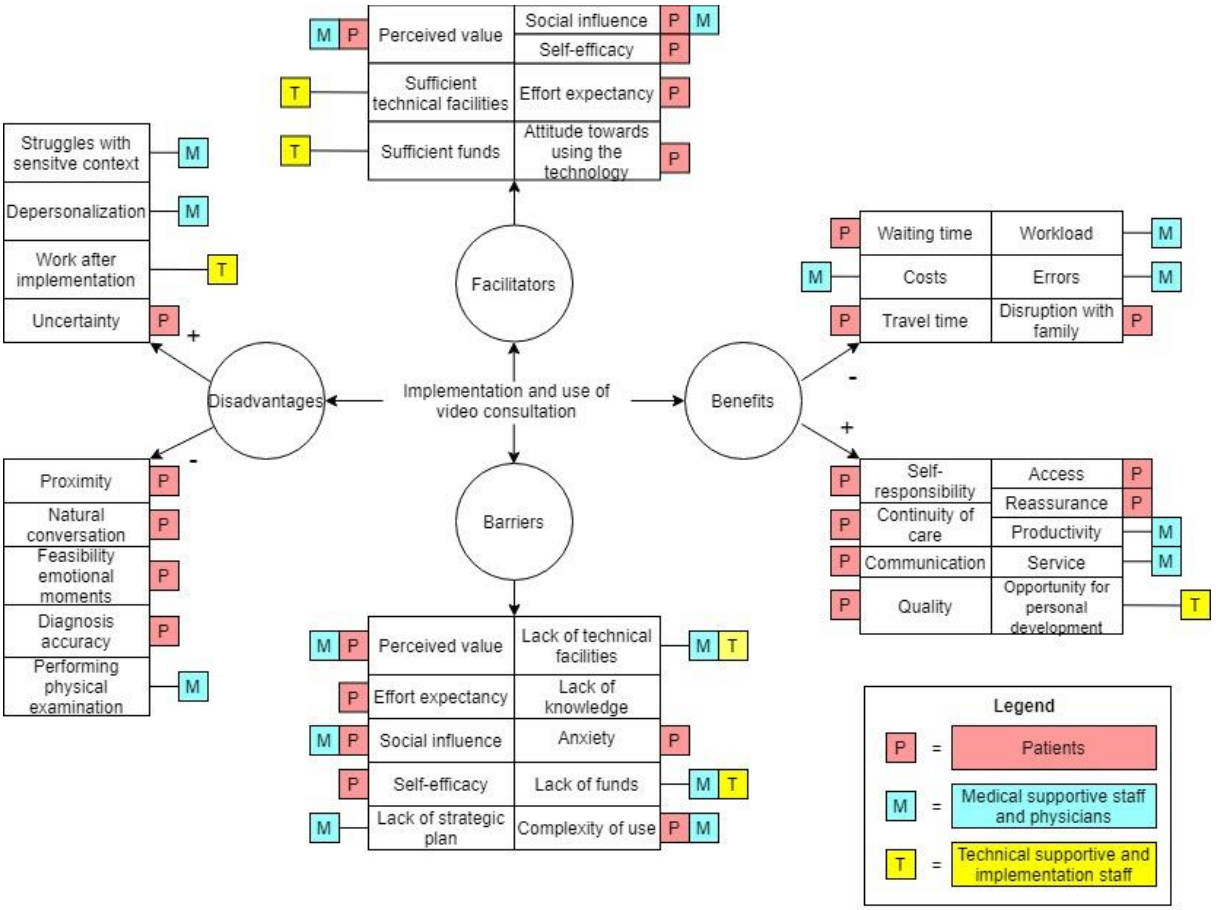

FIGURE 2 TOTAL OVERVIEW EFFECTS ON STAKEHOLDERS.
(-) REPRESENTS A DECREASING EFFECT AND (+) AN INCREASING EFFECT

2.4 Unified Theory of Acceptance and Use of Technology (UTAUT)

2.4.1 Development of the model

Figure 3 presents the basic concept of models that explains the acceptance of information technologies (Venkatesh et al., 2003). The UTAUT model is developed on this basic concept. The UTAUT model is constructed from eight competing models and theories that describe individual acceptance. The eight models reviewed are the theory of reasoned action, the technology acceptance model, the motivational model, the theory of planned behavior, a model combining the technology acceptance model and the theory of planned behavior, the model of PC utilization, the innovation diffusion theory, and the social cognitive theory. These models and theories all have their constructs and definitions (Appendix H). These models have many similar determinants with the final UTAUT model. Venkatesh et al. (2003) tested the UTAUT-model and they concluded that UTAUT outperformed the eight individual models. In other words, UTAUT provides a better tool for assessing the likelihood of success for new technology introductions than any of the other eight competing models.

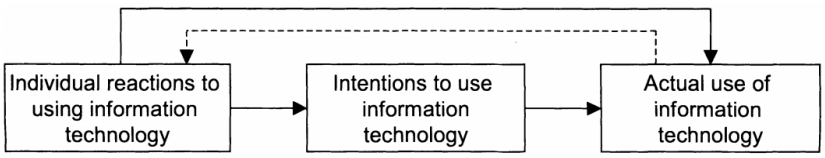

FIGURE 3 BASIC CONCEPT UNDERLYING USER ACCEPTANCE MODELS

2.4.2 Model definitions

To assess the factors that indirectly or directly predict the behavioral intention to use a certain type of technology and/or the actual use of that technology, the model called Unified Theory of Acceptance and Use of Technology can be used. This model provides:

"a useful tool for managers needing to assess the likelihood of success for new technology introductions and helps them understand the drivers of acceptance in order to proactively design interventions (including training, marketing, etc.) targeted at populations of users that may be less inclined to adopt and use new systems" (Venkatesh et al., 2003) (pp. 425-426).

The model considers three determinants that have an influence on behavioral intention (the degree to which an individual believes that he or she will engage in a given behavior), namely performance expectancy, effort expectancy, and social influence. This behavioral intention accompanied by facilitating conditions could lead to use behavior for a type of technology. This model is graphically presented in figure 4. These determinants are moderated by factors such as gender, age, experience, and voluntariness of use. The definitions and how the determinants are constructed are presented in Appendix G.

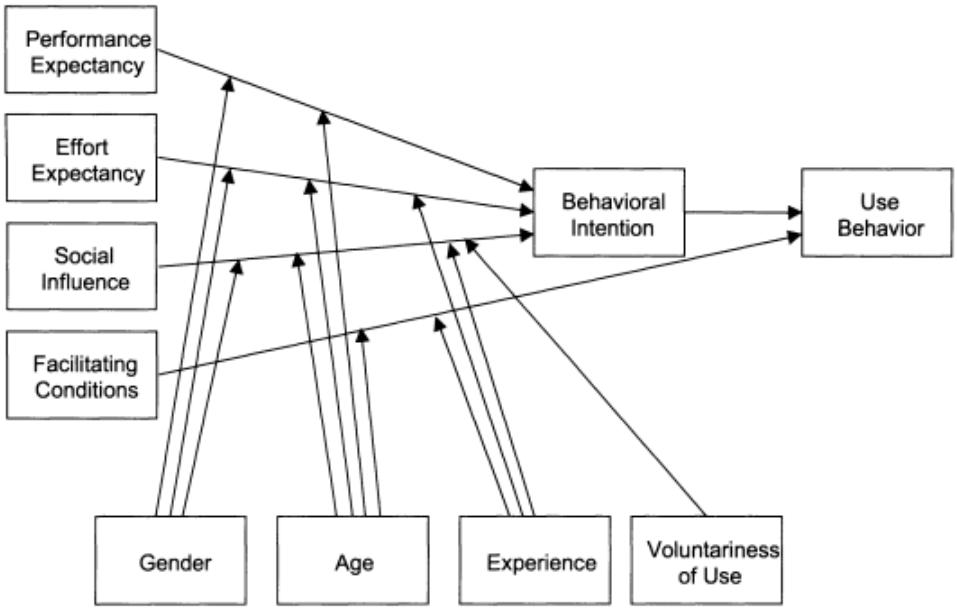

FIGURE 4 UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY

2.4.3 Empirical findings and developments

Empirical validation of UTAUT

After formulating the UTAUT, the model was empirically tested using the original data from the four organizations. Secondly, the model was cross-validated using new data from an additional two organizations. These tests provided strong empirical support for UTAUT. The model accounts for 70% of the variance in usage intention, which was a substantial improvement in comparison with the original eight models (Venkatesh et al., 2003).

Empirical findings using UTAUT

Many studies have used the UTAUT model for assessing intentions to use a certain technology. An example is a study conducted by Jewer (2018). Jewer adapted the UTAUT model to the context of patient acceptance and the use of an emergency department wait-time website. Jewer compared the modified UTAUT with the original UTAUT. The study found that the modified

UTAUT produced a substantial improvement in variance explained in behavioral intention compared when using the original UTAUT (66% versus 46%).

Zhang et al. (2019) identified the determinants of patients' intention to use diabetes management apps based on an extended version of the UTAUT model. They found that performance expectancy and social influence are the most important determinants. Secondly, they found that perceived privacy risk also has an impact on behavioral intention. Their study supports the use of UTAUT in explaining patients' intention to use a type of technology. However, the role of context-related determinants should not be mitigated.

Apparently, despite that UTAUT is a unified model, there is room for modification and extension of the model with other determinants. Venkatesh et al. (2003) support this statement by stating that future research should examine possible extensions of their study with other contexts.

Developments

Attitude towards using the technology, self-efficacy, and anxiety were determinants used in the eight models and theories for estimating UTAUT. However, these determinants were not included as direct determinants for behavioral intention. These determinants appeared to be significant direct determinants of intention but became nonsignificant in later tests. However, these aspects could still be relevant for setting hypotheses in this study, since it is a different context.

Attitude towards using the technology is a determinant that was not included in the UTAUT model, however possibly still relevant. (Venkatesh et al., 2003). This is defined as someone's overall affective reaction using an application or system and constructed from intrinsic motivation, affect towards use, and affect towards behavior. Since the context is medical, the affect towards use and intrinsic motivation, which refer to whether using it is fun or interesting, are less relevant. The affect towards behavior, defined as whether or not someone thinks that using a system is a good idea, could support the implementation since patients are more inclined to use it.

Self-efficacy is defined as the extent to which someone could complete a task using a system. For video consultations, it might be that patients think they cannot use the system without any sort of help, which prevents the use of the system. On the contrary, if patients are convinced, they can use the system on their own, they are likely more inclined to use the system.

Anxiety is defined as whether or not the system is intimidating or if the user is scared to hit a wrong button (Venkatesh et al., 2003). This anxiety could prevent the use. Whether these aspects are present with the implementation and use of video consultation can be analyzed quantitively with patients.

2.5 Hypotheses & research model

2.5.1 Hypotheses

The second focus of this study is to explore whether the UTAUT model by Venkatesh et al. (2003) can be extended based on the context of the implementation of video consultation. The next section will elaborate on the constructs of the aspects and determine what aspects could be added.

The model presents determinants that influence behavioral intention that influences usage. Behavioral intention is whether someone intends, predicts, or plan to use the system in the next months. Use behavior is whether or not someone uses or used it.

The first influencing dimension from the model is performance expectancy. This dimension is constructed out of five aspects: extrinsic motivation, job-fit, relative advantage, outcome expectations, and perceived usefulness (See Appendix G). Extrinsic motivation refers to the perception that performing an activity is instrumental for achieving the values that are distinct from the activity itself. In the context of video consultation, this refers to the thought that they have to use video consultation to achieve the same process and outcomes as if they will have a physical consultation. This is comparable with relative advantage, the degree to which an innovation is perceived as better than its precursor. Since, in the current situation, physical consultations are limited possible, making video consultation a substitute instead of an alternative. Therefore, the relevance of using the factors extrinsic motivation and relative advantage within this study is low. Job-fit is irrelevant since this refers to an individual's performance. Outcome expectations refer to the expectations that patients have related to the consequences of their actions. For example, if patients expect that using video consultation results in better outcomes. The focus would be on the potential better outcomes, rather than the expectation itself, therefore outcome expectations will not be used within this study. Finally, the perceived usefulness refers to the enhancement of a system on the job performance. In the context of consultations, this job performance is related to the value video consultation has to the patient. Whenever the patient considers video consultation as invaluable, the patient is likely not using the application. On the contrary, whenever the patient considers the application as valuable, they will likely be using the application. Besides, a comparison can be made if someone thinks the application works equal to or better than normal consultations. If the application has perceived equal value to traditional physical consultations, the assumption has been made that this negatively affects the intention to use VC, since patients are used to visiting the hospital. Therefore, the following hypotheses are set:

- *H1a: Perceived value increases the intention to use VC*
- *H1b: Perceived usefulness increases the intention to use VC*
- *H1c: Perceived added value increases the intention to use VC*
- *H1d: Perceived equal value decreases the intention to use VC*

The second dimension is effort expectancy (Venkatesh et al., 2003). The three constructs of this dimension are perceived ease of use, complexity, and ease of use. All of them refer to the degree to which an innovation is difficult to understand and use. Whenever the end-users think that using the application is too difficult, this dimension will possibly prevent them to use it. On the contrary, if users consider the use of the application as easy, this will support the use. As mentioned before, having end-users using the application is crucial for the implementation. Therefore, the following hypotheses are set:

- *H2a: Perceived ease of use increases the intention to use VC*
- *H2b: Perceived complexity decreases the intention to use VC*

The third dimension is social influence (Venkatesh et al., 2003). This dimension is constructed from the subjective norm, social factors, and image. The former two refer to the influence that people in the environment of the patient have on the behavior of the patient. The latter refers to one's image or status. Since the context is medical, status or image is less relevant. Since people can be influenced by their relatives, patients are likely more inclined to use it whenever they are encouraged by 'important' people from their environment. If patients are discouraged by their environment, then it might the case that people are less inclined to use the application. Therefore, the following hypotheses are:

- *H3a: Social encouragement increases the intention to use VC*
- *H3b: Social discouragement decreases the intention to use VC*

The fourth dimension, that was not a direct determinant of intention of use but possibly still relevant, is the attitude towards using the technology (Venkatesh et al., 2003). This is defined as someone's overall affective reaction using an application or system and constructed from intrinsic motivation, affect towards use, and affect towards behavior. Since the context is medical, the affects towards use and intrinsic motivation, which refer to whether using it is fun or interesting, are less relevant. The affect towards behavior, defined as whether or not someone thinks that using a system is a good idea, could support the implementation since patients are more inclined to use it. Therefore, the following hypothesis is set:

- *H4: Affect towards behavior increases the intention to use VC*

The fifth dimension, that was not a direct determinant of intention of use but possibly still relevant, is self-efficacy. Self-efficacy is defined as the extent to which someone could complete a task using a system. Concerning video consultations, it might that patients think they cannot use the system without any sort of help, which prevents the use of the system. On the contrary, if patients are convinced, they can use the system on their own, they are likely more inclined to use the system. Therefore, the following hypotheses are set:

- *H5a: Perceived self-efficacy increases the intention to use VC*
- *H5b: Perceived self-inefficacy decreases the intention to use VC*

The sixth aspect that was not included in the model, but mentioned in the article, is anxiety. Provided supportive examples are whether or not the system is intimidating or if the user is scared to hit a wrong button (Venkatesh et al., 2003). This anxiety could prevent the use. Therefore, the following hypothesis is set:

- *H6: Anxiety decreases the intention to use VC*

The final dimension is facilitating conditions (Venkatesh et al., 2003), which is constructed from perceived behavioral control, facilitating conditions, and compatibility. Since compatibility is more relevant for how the system works with other systems, it is not relevant enough to set a hypothesis for patients. Perceived behavioral control is referred to as self-efficacy, that is already been discussed separately. Concerning facilitating conditions, it might the case that some patients are willing to use video consultation; however, they do not have the

technical provisions or knowledge to do so, or they want the hospital to offer them the technical resources or support to do so. Therefore, the following hypotheses are:

- *H7a: Sufficient technical provisions increase use behavior of VC*
- *H7b: Offering technical provisions increases use behavior of VC*
- *H7c: Offering technical support increases use behavior of VC*

In respect to the moderating factors, Venkatesh et al. (2003) found that the effect of effort expectancy is stronger with women, with higher age, and with limited experience. They found that the effect of performance expectancy is stronger with men of lower ages. Thirdly, they found that the effect of social influence is stronger for women, with higher age, and with limited experience. Thus, the moderators have different effects on various demographic groups. The aspect of voluntariness of use will not be measured, since the innovation is used for medical purposes. We assume that whether or not using the application is done voluntarily is less relevant. Therefore, the following hypotheses are set:

- *H8a: Gender moderates the effect of UTAUT determinants*
- *H8b: Age moderates the effect of UTAUT determinants*

2.5.2 Research model

As mentioned in paragraph 2.3 regarding the UTAUT model, there is room for modification and extension of the UTAUT-model with other relevant determinants. Eight hypotheses are set in the previous section, based on studies used for the development of the UTAUT model. Therefore, figure 5 shows the hypotheses for the hypothesized extension of the UTAUT model. This model will be tested in this study with patients for the application of video consultation.

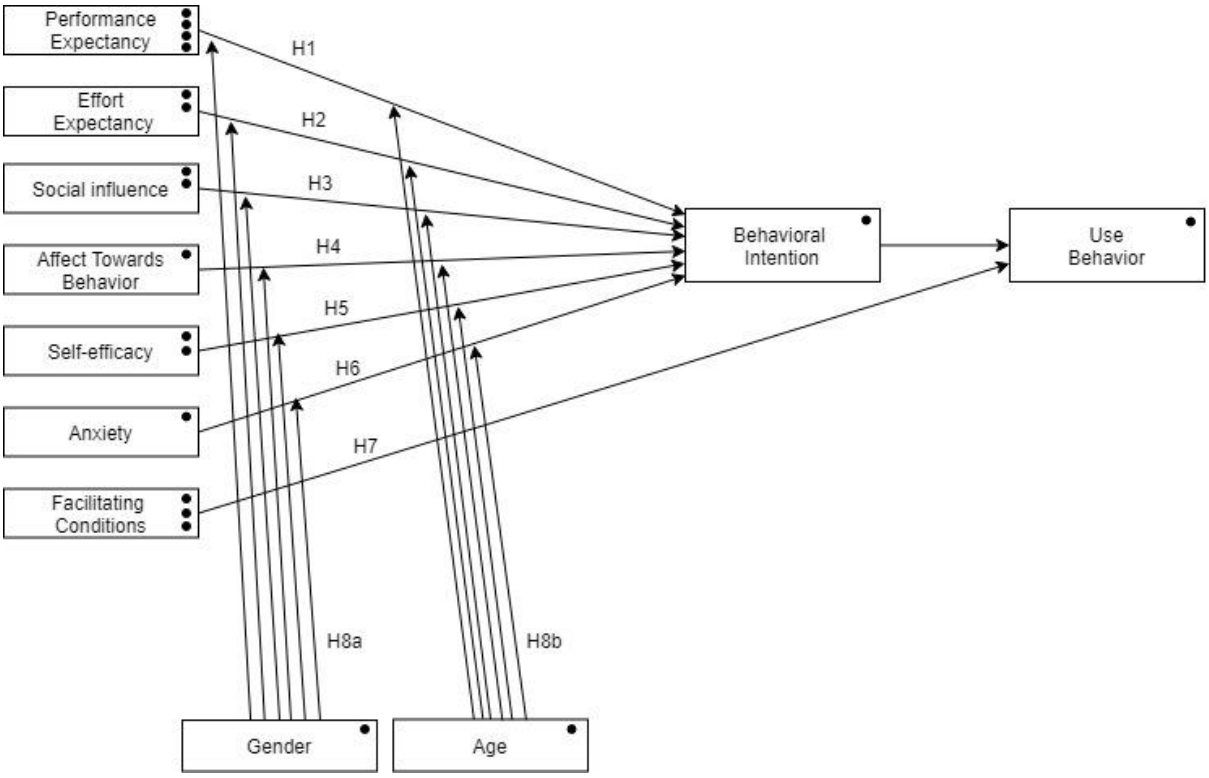

FIGURE 5 (HYPOTHESIZED) EXTENDED UTAUT FOR VIDEO CONSULTATION.
THE NUMBER OF BULLETS REPRESENTS THE NUMBER OF SUBDIMENSIONS TO MEASURE.

Chapter 3. Methodology

3.1 Research design

3.1.1 Case study research

Conducting a case study is most suitable for a *"comprehensive, holistic, and in-depth investigation of a complex issue (phenomena, event, situation, organization, program individual or group) in context, where the boundary between the context and issue is unclear and contains many variables"* (Harrison, Birks, Franklin, & Mills, 2017).

The hospital environment is known for its complexity, due to the number of stakeholders including patients. The implementation of innovations affects many stakeholders and various variables are included. Table 7 provides a brief overview of which stakeholder groups are involved in this study. The next section will provide more information about the organization where the case study will be conducted.

Medical	Technical
Physicians/specialists	Technical support staff
Medical support staff	Implementation staff
Patients	Suppliers

TABLE 7 BRIEF OVERVIEW OF STAKEHOLDER GROUPS IN STUDY

3.1.2 Organization for case study

Rijnstate is a hospital group that provides hospital care with top clinical quality. Rijnstate's goal is to have a leading position in terms of acute and specific complex care. Hospitals from the Rijnstate group are located in Arnhem, Zevenaar, Velp, and Arnhem-Zuid. The location where the research will be conducted is Arnhem. All acute and complex care is provided at this location, with a large and modern operating room complex and a renewed Intensive Care Unit.

Rijnstate wants to offer the best possible care and quality for acceptable costs. This method is also called 'worth driven care' (in Dutch waardegedreven zorg) and can be compared with VBHC that has been developed by the Harvard Business School in Boston. The switch to VBHC has been made in 2017 within Rijnstate.

3.2 Data collection and analysis

3.2.1 Data collection

Since VC is not implemented organization-wide within Rijnstate hospital, but rather at certain medical specialties. These specific specialties will be the scope of the study. The application which is used for video consultation within Rijnstate is FaceTalk. The current usage (28-6-2020) of all the specialties is presented in Appendix B. Semi-structured interviews (See Appendix C-D-E) will be conducted with physicians, supportive staff, and technical and implementation staff from the specific specialties. Semi-structured interviews are the selected method since they give direct access to informants and aims to understand how informants experience the focused problem and provide a deeper understanding of the social phenomena (Longhurst, 2009).

Finally, surveys are sent to patients. This survey is developed with the Qualtrics software from the University of Twente. Digital links (Appendix F) are distributed to patients in an informative letter (Appendix J). The questions are based on the UTAUT model of (Venkatesh et al., 2003) and the articles used for the development of figure 3. The statements with

corresponding categories are presented in Appendix L. The survey will take about 10 minutes, which indicates an adequate length to prevent substantial levels of a respondent break-off. Surveys will be used since they give access to large groups of respondents in a short period of time due to their low costs. It also provides the possibility to identify differences among those groups (Gürbüz, 2017).

The respondents for the interviews will be asked to participate via the internal mailing system of the hospital (See Appendix K). The selection will be in cooperation with an ongoing implementation project for video consultation. The inclusion will be based on the following criteria: the specialty has already implemented the use of video consultation and is using or has used it within the Corona crisis period. If the respondents for the interviews agree to participate, they will receive an invitation to a meeting. Five medical specialties have been appointed to this study by the implementation project group.

The informative letter (Appendix J) will be distributed to users of video consultation, which includes information such as the aim, content, information about the use and storage of their data, and the anonymous link to the survey. The informative letter will be distributed via the mailbox of the video consultation project. Also, an internal anonymous customer (patients) panel of Rijnstate will be used for the distribution of the survey. This panel will also include non-video consultation users, which could be used to compare with the results from the video consultation users. The distinction between whether the respondent is a user or not will be made within the survey. The distribution of social media for the survey will not be used, since the focus is on patients that use video consultation. Preliminary investigation suggests that Rijnstate has around 2200 patients that are using video consulting, which imposes a potential sufficient response rate.

Before starting the data collection, the interview and survey questions are to be tested whether or not they are understandable for the stakeholders. To do so, a sample test is conducted where one respondent of each stakeholder group is being asked to read through the questions and determine if the questions were stated clearly and they understood the questions or not. One physician gave suggestions for improvement on the questions for the physicians and medical support staff. A functional manager gave comments on the questions for the technical and implementation staff group. No patient specifically from Rijnstate was asked, but the questionnaire was read and commented upon by relatives of the researcher.

Other data collection methods

Next to surveys and interviews there are other methods to conduct data collection with. The following section will elaborate on why other methods are less suitable.

Experimental design will not be suitable for this study, due to its nature to manipulate an independent variable. This research aims to identify the barriers and facilitating effect with implementation and the effects of innovation, rather than manipulating relations. Observations are not applicable since the focus is on the effects of VC rather than the behavior of participants during a relatively short time frame (Hennink, Hutter, & Baily, 2020).

Another form is by using focus groups, in which usually seven to ten persons per group are appointed. In essence, it involves gathering a group of people who are asked about their attitudes regarding a specific theme or topic. A risk with focus groups is the phenomenon of someone ‘hijacking’ the discussion. This could be someone which an outspoken opinion regarding the subject, removing someone’s else possibly relevant opinion. In situations such as

a hospital where specialists sometimes have a high word, using this method may not be as suitable as individual interviews (Hennink et al., 2020).

Data collection can also be conducted by the collection of relevant documents and records (Bowen, 2009). However, the aim is to gather information regarding the opinions of patients, which is often not documented sufficiently and therefore to be documented with surveys. Besides, innovations are implemented by involved people, but this process is not documented sufficiently to answer the research question. Therefore, personal opinions should be investigated in more depth.

3.2.3 Data analysis

Qualitative data

The interviews will be transcribed and coded with the program ATLAS.ti, according to the Grounded Theory from Glaser and Strauss (1999). The coding process will have three phases. Open coding, phase one, is about labeling concepts and applying codes from the text. Blair (2015) doubts if open coding exists because people are likely to start from their perspective and experience. In the second stage of coding, categories referred to the coded data of the first phase will be developed based on the relationship between open codes. Selective coding is the last and final phase of the data coding analysis. In this phase, one category is appointed as the main category and all other categories will be related to this main category (Blair, 2015). After the coding process, the selective codes will be used to form categories that form the basis of the qualitative result section.

Quantitative data

The surveys from the patients will be analyzed with the statistical program SPSS. The scoring model that will be used to determine the weights of the factors is a Likert-scale. A Likert-scale is a five-point scale that ranges from strongly disagree to strongly agree (Allen & Seaman, 2007) will be used. The first analysis will be conducted using the Descriptive menu to calculate frequency distributions. Means will be calculated for each of the variables. To determine statistical differences between the user and the non-user group, an F-test is executed. A threshold of 0.05 will be used for significance (Chen, Xu, Tu, Wang, & Niu, 2018).

Demographic information and usage of video consultation will be requested within the survey to determine differences in patient groups. This includes gender, age, level of education, the main specialty for treatment, frequency of use of internet and VC, and the main purpose of use (diagnosis, referral, advice, etc.). These differences will be determined with frequencies of provided answers. Wilk's Lambda will be calculated to determine whether or not there is any variance not explained by the independent variable (which is ideal). The independent variable is the medical specialty that patients provided. Next to that, a two-sided Analysis of Variance (ANOVA) will be run, which assesses differences among group means. The minimum recommended group size is 20 respondents. Cronbach's alpha will be determined for internal reliability. Values above 0.7 are considered reliable (Tavakol & Dennick, 2011).

Thirdly, answers from patients on statements regarding the barriers and facilitators will be used to develop an extension of the UTAUT model by using the software SmartPLS. This is a software with an easy graphical user interface and is seen as a second-generation Structural Equation modeling (SEM) technique (Hair, Sarstedt, Pieper, & Ringle, 2012). This program can statistically test the set hypotheses on for example significance and enables complex relationships with multiple observed latent variables to be modeled (Wang, Henseler, Chin, & Vinzi, 210).

A one-sided test will be used since the coefficient is assumed to have a positive or negative sign, which is also reflected in the hypothesis. If no assumptions are made, a two-tailed test would be recommended (Kock, 2015). The R^2 will be calculated to determine the degree of how good it fits. This is defined as how much variation in the response is explained by the model. In other words, the higher the R^2 the better. The f Square (effect size) will be calculated, in which values of 0.02, 0.15, and 0.35 suggest small, medium, and large effects on the relationship between aspects, respectively (Henseler, Ringle, & Sinkovics, 2009). Finally, the Standardized Root Mean Square Residual (SRMR) (model fit) will be calculated. A value of less than 0.10 or 0.08 is considered a good fit. Henseler et al. (2014) introduce the SRMR as a goodness of fit measure for PLS-SEM that can be used to avoid model misspecification (Henseler et al., 2014).

Chapter 4. Results

This chapter shows the results of the studies. First of all, the results from the semi-structured interviews with different stakeholders will be presented. Secondly, the findings from the survey, that is distributed to both users as non-users of VC from Rijnstate, will be presented. Thirdly, the findings from the interviews and surveys will be compared. A fourth section is dedicated to the extension of the UTAUT model with the set. Sections one and two will both end with additional findings.

4.1 Findings from the interviews

4.1.1 Numbers and respondents

In total, an amount of fourteen interviews were conducted with 3 different stakeholder groups. Physicians (n=5), medical supportive assistants (n=4), and staff involved with technical, implementation aspects (n=4), and a supplier (n=1). The specialties that were selected for the interviews are orthopedics surgery, pediatrics, plastic surgery, psychiatry, and bariatrics. The respondents of the technical and implementation staff group had the job descriptions of 'functional manager', 'information manager', 'supplier FaceTalk', 'information advisor', and 'manager office healthcare innovation'.

The selection of the medical specialties for the interviews is based on an ongoing video consultation project with around eighteen specialties. Five specialties have been appointed by the project team to the researcher. These specialties are selected based on diversity in use. As can be seen in Appendix A, the frequency and growth in use differ between the specialties. Besides, some of the specialties did experience accelerated growth of use and some of them did only at a smaller rate.

To the fourteen transcripts, a total of 1391 (duplicates included) open codes have been appointed. These open codes have been categorized into a total of 44 groups. These groups will be the basis for the elaboration of the variables.

4.1.2 Main findings

Table 8 provides an overview of the most important findings from the interviews. 'Most important' is defined as the frequency statements are made regarding the findings. These frequencies are provided in **bold** for each aspect. Not all findings affect all stakeholders. Therefore, each aspect will be elaborated upon individually and described which stakeholders the aspect influences most.

Barriers	Facilitators	Benefits	Disadvantages
Technical issues **(112)**	Presence of protocols **(149)**	Offers flexibility **(70)**	Additional tasks **(60)**
Lack of facilities **(48)**	Familiarity **(88)**	Time and cost savings **(66)**	Less interaction **(31)**
Anxiety for innovation **(40)**	Guidance **(59)**	Usage for various applications **(31)**	Inability to do physical examinations **(24)**
Lack of digital skills **(35)**	Adaptive power **(25)**	Continuity of healthcare **(14)**	Experienced as disadvantageous **(20)**
Old habits **(33)**	Social influence **(4)**	Better than telephone consultation **(9)**	Can cause stress **(15)**

TABLE 8 MOST IMPORTANT FINDINGS INTERVIEWS. THE **BOLD** NUMBER BETWEEN THE BRACKETS REPRESENT HOW FREQUENT THE ASPECT WAS MENTIONED

Barriers

Technical issues

Technical issues are a subject that all of the respondents mentioned at least once, often more frequently. A broad-scale of answers is provided regarding technical issues. Categories are made in terms of how frequent the aspect is mentioned in the interviews, indicating main and niche issues (Table 9).

Frequently n>20	Regularly n>5 <20	Occasionally n<5
Not integrated EPR	Inability to share screens	Firewall issues
Scheduling appointment in two systems	Low-resolution camera	Maximum number of participants
Unstable internet connection	Inability to watch someone straight in the eye	Empty form specialist in ERM
	Log-in necessary in the application	Log-in codes not matching or in the spam box
	Interrupted by unannounced updates of device or application	Interruption from other apps running in the background
	Extensive interface of the application	Insufficient use of delay notifications
	Audio does not work properly	

TABLE 9 TECHNICAL ISSUES MENTIONED IN INTERVIEWS

A stable internet connection is often considered a basic facility; however, this is not always the case. The devices for the VC are connected to the WIFI system and are provided with a 4G internet card, which is also costly. The problem is that the WIFI internet connection is not as fast and stable as it should be. Also, the Rijnstate locations of Zuid and Velp do not have WIFI connection. Another problem here is that whenever the 4G network cannot be found, the device will search for WIFI connection, resulting in a small period of no connection. This can disturb the consultation. Even if the internet stability of the hospital is sufficient, there is still a chance that the internet connection of the patient is not stable. These internet issues can prevent that the implementation and use will not be as efficient as it should be. This barrier affects all stakeholders.

Lack of facilities

To have a successful implementation of the current use of VC via devices, sufficient financial resources are required. Currently, VC is used via a device, which a few of them are distributed by the Information and Medical Technology (IMT) department. However, this is limited to a small amount per department which are willing to conduct VCs. Therefore, whenever a specialty wants to scale up, they need to provide their own devices. Besides, financing those distributed devices from the IMT department also had financial hurdles, that slowed down the implementation process.

During this study, the IMT department is investigating the possibilities to have VC integrated with MS Teams or with the EMP. Therefore, sufficient facilities have to be present, such as computers with integrated video and sound options or connectable video and sound devices. This integrated system was also mentioned several times by physicians as a wish.

Even if the interested specialties have sufficient facilities, VC is an application that goes in two ways. Therefore, if the patient does not have sufficient facilities such as a device that can run the application, the consultation cannot be set. This barrier affects especially the technical and implementation staff, but can also be a barrier for patients.

Anxiety for innovation
Many of the respondents pointed out that anxiety is a barrier to implementation. This anxiety comes in various forms and shapes. Some noted that employees are anxious that the VC system will not work properly, therefore they refuse to work with it. They could also have anxiety that VC will affect their professionalism or the quality of the consultation. As mentioned before, there could also be anxiety between professionals that with VCs they will miss out on the health differences of patients. Despite that FaceTalk is a certified application, there is anxiety that there might be privacy and security issues. Many of the respondents reacted with that it is just a case that specialists get 'cold feet' whenever their basics of providing healthcare will change too much. Therefore, this barrier affects especially the physicians.

Lack of digital skills
The level of digital skills and affinity differs between both specialists as well as patients. Since specialists have to change their way of providing healthcare, they have to learn new skills. Whenever a specialist is not very skilled with digital systems, it can be a barrier to the implementation. The same concept applies to patients. Instead of walking into a consultation room, they have to log in with an application and wait in the digital waiting room. Since the planning is conducted by the medical supportive staff, this barrier affects the physicians, medical supportive staff, and patients. However, this barrier was especially noted by medical support staff.

Old habits
It became clear that some barriers are linked to aspects where people are used to the current situation. Especially some of the older patient groups are hospitalized and are used to go to the hospital. The same applies to some specialists that are more traditionally orientated. With these specialties, it is harder to implement the VC application.

Since the application of VC is something new, people have to accept the presence of it. From the interviews, it became clear that not everybody is willing to accept the use of video consultation. Even with some of the heads and managers the level of acceptance appears to be mediocre. Some of the physicians noted that there is a possibility that physicians only see the importance of physical contact. On the contrary, some respondents admitted that sometimes people have misinterpretations of VCs, with a result that some employees have an incorrect view about VC. Therefore, this barrier affects the physicians, medical supportive staff, and patients.

Facilitators
Presence of protocols
Familiarity also prevails in forms of selecting when to use and when not to use VCs. From the interviews, it became clear that VCs are not generally applicable. It differs between medical conditions, severity, and purpose of the consultation whether VCs are applicable. An example from the plastic surgery specialty *"VC can be used if the indication is a small birthmark, VC cannot be used if the indication includes something such as sexuality".* In terms of purpose, according to physicians, VCs are not sufficiently applicable to be used with the diagnosis, since visual limitations are present. Nevertheless, for updates, check-ups, positive results, pre-operative information, and other limited impactful subjects VCs are applicable. For purposes such as negative results, change in treatment, physical examination, complex matters, complaints, and any other purpose that can be mentally disturbing VCs are not sufficiently applicable.

Next to protocols with whom to use VCs, it should be clear who is communicating this with the patient. During the interviews, a physician, who has used VCs several times, said that the synchronization between the medical assistant and the physician is sometimes lacking. The physician had conducted a physical consultation, but according to the physician this consult could have been done with VC. However, the medical assistant scheduled a regular physical consultation. Therefore, synchronization and communication between the assistant and specialist are crucial in determining who is asking the patient whether a VC can be scheduled, and when it should be held. Since this facilitator is specialty-specific, this facilitator is specific to the physicians and medical support staff.

Familiarity

An addition to the webinars is the aspect of familiarity. It became clear that there is a certain level of unfamiliarity with video consultations with both patients as healthcare providers. A hospital-wide announcement that video consultation is possible, included with contact forms, should increase the acquaintances with the hospital staff. By sharing success stories from specialties within the hospital the potential specialties could see the potential advantages. Even national advertising campaigns were noted by one of the respondents, but the role of a hospital is probably marginal with this option. Since healthcare is two-sided, patients need to be informed by the possibility of video consultations. There should be room to discuss this possibility with the patients, rather than assuming the preference of visiting the hospital.

An important step in the implementation process is the start of the use. Employees must persist from this point on. Many respondents reacted with various forms of *'You just have to do it'*. Some of the specialties admitted that they had their doubts at the start, but they noted that you first have to try something before you can experience the potential benefits from it. By doing more video consultation, despite the uneasiness, people will get more used to the idea of having consultations via video, thus increasing their familiarity. Therefore, this facilitator applies to physicians, medical supportive staff, and patients.

Guidance

Guidance seems to be a major aspect of the implementation of VC since 'physicians just want to provide healthcare to their patients'. Physicians noted that they do not want to sort out everything, but merely want to be facilitated to use the application. Respondents noted various forms of guidance that could help. The most frequent option is personal guidance, where potential users are demonstrated how the process works. Another form of a demonstration is the use of video material or webinars, which interested parties can attend. One respondent came up with the idea that workshops could be organized by the supplier. Guidance should also be provided by providing (potential) specialties with user manuals, that could be on paper or digital or both. These manuals could also be distributed on the intranet. Regarding patients, personal guidance should also be offered, especially to the elderly which are often less digitally skilled.

Another way of facilitating is to make sure there is a certain level of ease of use. Physicians responded that the use should be as simplistic as possible. This includes an intuitive interface and a process that is easy to understand. Besides, usage should also be understandable and easy for patients. Since the current application of VC is on the application of FaceTalk and not all patients have a device to install this, the possibility to use a web browser variant could be beneficial.

An aspect that could support the implementation, which came forward several times is the appointment of a clear point of contact, both central as well as specific for each specialty. That

point of contact would be responsible for the application of video consultation when it is implemented. Each of these persons of the specialties could come together once in a while to talk about barriers and improvements they experienced.

These forms of guidance are based on the current process. However, with the potential upcoming changes for VC integration with MS Teams or the EMP, there is a degree of uncertainty. Some of the physicians noted that this uncertainty can be diminished by providing a clear strategic plan where to go with VC in the near future. Since this guidance can be provided by the IMT department and is required for the physicians, medical supportive staff, and patients, this facilitator applies to all stakeholders.

Adaptive power
Since using VCs changes the basic foundation of providing healthcare, a certain amount of adaptive power is necessary from all the health-related stakeholders. This includes both the provider (specialist and assistants) as well as the receiver (patient). The physicians need to change their way of thinking and adapt some of their daily practices. They do not only have to do additional tasks such as picking up and returning the device but also need to change their way of questioning the patients since body language is less visible. The patients also need to adapt their way of receiving care, because they are used to visit the hospital physically. The majority of the respondents thought that VCs are a nice additional way of offering healthcare. It is considered that VC has much potential to be integrated into daily practices.

Social influence
Another aspect is the willingness to use of the members of a specialty. This can be established whenever there is mutual support from the members of the specialty for the use of video consultation. This could be for reasons such as thinking VC has more benefits than disadvantages or just when employees support the idea of VC for medical purposes. The included specialties often had one or several front runners regarding the use of VC. For some specialties, those people functioned as a pioneer that made colleagues open to see the benefits and thus enthusiastic to use it as well. An increase in use supports an accelerated implementation. Whenever multiple people from a medical specialty start using it, the basis of support grows as well.

Many of the respondents were relatively positive regarding the use of video consultation for medical purposes. They saw the benefits of the use, but they also noted that the current application does not work as optimal as it should. Nevertheless, they see the potential the application has. VC was regarded as multiple things, namely a new nice-to-have, an invention, a replacement in some situations, the future, and proper addition to the regular healthcare. Their positive attitude towards the use of VC will support the implementation since they are more aware of the potential benefits. This facilitator especially affects the physicians, since they are the ones determining the type of consult.

Benefits

Offers flexibility

VCs offer flexibility to patients; they are freer to select their time and place to conduct the consultation. This place can be in their own trusted home environment, making the consultation less stressful. This place can also be at their work, preventing them to ask permission to leave work. However, since patients are more flexible with planning the appointment, scheduling of the appointment will be easier for the medical assistants. Also, with the introduction of VC, there are more ways of consultations to offer, making the physician and assistant more flexible. One physician noted that it is possible to work from home using VC, thus not being bound to the consultation room.

Time and cost savings

VCs are considered to be more time-efficient. The consultation tends to be more 'to-the-point'. A wide variety of benefits for the patients came forwards from the different respondents. By conducting the consultation at home travel time and costs are prevented. Since travel can be an issue for certain patient groups, VCs could offer a decrease in the no-show rate. Despite that parking costs are saved for patients; these saved costs are missed revenues for the hospital. Therefore, this benefit is appointed to physicians and patients.

Usage for various applications

VCs can be deployed for several intentions. Some examples from respondents were that VCs could be used to have an interpreter present or use VCs to supervise their trainees. Another application is the possibility to have a video with three or more persons, such as relatives or a translator. As an example, people can bring one of their relatives to the consultation without them being there physically. Another example is the possibility to have a video call between a patient and two or more specialisms, such as an orthopedist with a physiotherapist. Not only the patient can stay at home for the consultation, but also the physician can work from home with VCs. Therefore, this benefit is appointed to patients and physicians.

Continuity of healthcare

Due to the Corona crisis, there was a necessity to start using video consultation for some specialties, preventing a reduction in healthcare supply. Therefore, the hospital was obliged to offer its healthcare differently. In other words, with the implementation of video consultation, continuity of healthcare was accomplished. Since VCs can be conducted at home the waiting rooms are less crowded, thus lowering the contamination chance during the Corona period. Therefore, this benefit is specially appointed to patients.

Better than telephone consultation

A question was asked to the respondents whether they think VC is an alternative for telephone consultations or physical consultation. The answers were fairly diverse. Some thought VC is a full replacement for telephonic consultations, some thought is just another possibility to have a consult, and some other thought VCs will be an option between physical consultation and telephonic consultation. Only a few thought VCs will be a replacement for a physical consultation. However, the majority agreed that some consultation such as follow-ups and check-ups can be conducted via video consultations. Then, the possibility of seeing the patient instead of only hearing via telephone is considered an advantage. Therefore, this benefit is appointed to patients, medical supportive staff, and physicians.

Disadvantages

Additional tasks

With the implementation of video consultation, some additional tasks are added. The medical support staff is responsible for the planning of the specialist. Since video consultation in Rijnstate works with the FaceTalk application, the medical assistant has to plan an appointment twice. The assistant has to plan the appointment in the electronic personal health records and within the FaceTalk application. Also, the assistant is responsible for making sure the device is charged fully. This way seems to be more sensitive to human errors, especially with the rescheduling of appointments. Before the video consults the medical assistant has to verify the email address of the patient, find the log-in code, and call the patient if something does not work properly.

Whenever the video consult is planned, the specialist also has to do additional tasks. The video consultations are conducted via a device (often iPads), which are locked safely somewhere in the department. Therefore, whenever a specialist will conduct a VC, they have to get the device, use it, and return it afterward, which can cause some noise in the department.

Some of the respondents said that VCs are more time-efficient. However, this was refuted by some medical assistants. The consultation time may be shorter, the total time used for the consultation seems to be longer since the specialist has to get the device, log into the application, set the connection with the patient, do the consult, log out, and return the device. Therefore, this disadvantage is appointed to the physicians and medical support staff.

Less interaction

Visual limitations have several effects on the quality of the consult. With VCs, the specialist could see less properly how someone feels, behaves, and reacts. Therefore, the extent to which body language can be notices decreases the degree of interaction. Less interaction causes that cases or matters are less discussed in depth. This is caused by the fact that there is a lack of body language, which entails a large share of the communication. An aspect that supports this is the fact that you are unable to look someone straight in the eyes whenever the VC is using a non-integrated webcam. As a result, the consultation may feel more impersonal for both the provider as the receiver.

This can cause that patients are not speaking openly, with a result that the specialist may miss out on things. This could result in misinterpretations. On the other hand, the patient could also misinterpret the communication from the specialist. Therefore, this disadvantage is to be appointed to the physicians and patients.

Inability to do physical examinations

Some physicians were afraid they could not provide the same quality with a consultation via VC in comparison with a normal physical consultation. An aspect that can influence the quality is that the patient is at a different place than the specialist. Therefore, the options to conduct a physical examination are limited. Despite that this disadvantage looks like an open door, it is noteworthy mentioning, since physicians are used to the fact that they can physically examine their patients. Therefore, this disadvantage is to be appointed especially to physicians.

Experienced as disadvantageous

Patients may think conducting a VC feels impersonal, where less empathic reflection from and less communication with the specialist is possible because they have less feeling with the patient. As a result, the patient may not speak as openly when they would in a physical

consultation. Further, even if the consult is not disadvantageous for the patient, they may experience it as disadvantageous.

Some respondents noted that a VC may feel disadvantageous for patients since patients can compare the video consultation with a physical consultation. However, the majority of the respondents agreed that VC is not an alternative to physical consultations but merely an addition.

Can cause stress
Despite that patients can conduct communication in their home environment, VCs could still cause some stress with patients. As an example, this home situation could be the place a patient had a traumatic experience. Another example is that patients are not willing to share their home environment. Also, not all patients are equally digitally skilled. Whenever a patient does not understand the process, or the process simply does not work, this could cause stress with the patient, since the patient does not want to miss their appointment. Another example is that patients have to wait beforehand in a digital waiting room. Not all specialties are aware or simply do not use the function to provide an estimation of the delayed time. Whenever a previous appointment has some delays, and this is not communicated with the next patient, this can cause stress for the next patient.

4.2.3 Applicability differs between medical specialties

The applicability of VC differs between medical specialties. An example is the pediatrics specialty. This specialty works frequently with VCs, often alternating physical consultations with VCs. The applicability for the pediatrics specialty is higher since there are many youths, who are often better with digital applications. As a comparison, the applicability for the psychiatry specialty is harder. A specialist from the psychiatry specialty said the following:

> *"Especially psychiatric patients do not always have a lot of motivation to show the back of their tongue. You have to gather that with a one-to-one conversation. You lose that transfer phenomenon with distance"*

Another example is gained from the bariatrics specialty. They use video consultation in group settings. However, one of the physicians noted the following about patients that are too heavy and want to undergo surgery:

> *"Those people have to conduct three different conversations with different disciplines. I experienced that as hard, since a part of the communication is missing. Especially because this patient category knows exactly what they need to tell to be qualified for the surgery."*

Another comparison can be made between plastic surgery and orthopedic surgery specialties. The physician from the plastic surgery specialty noted that they only use VC for minor subjects, such as birthmarks, but not for sexuality. On the other hand, the physician from the orthopedic surgery specialty noted that he used VC for discussing all subjects. There are also aspects from patients that can influence the applicability. An example is whenever a patient has impaired hearing or vision. These people could have more trouble with interpreting via video consultation. Another example is whenever patients are less mobile. In those cases, video consultation may be more beneficial. These aspects imply that the use of VC is not generally applicable and requires a specialty and patient group-specific approach.

4.2.4 Additional findings

Lessons learned from the implementation

In the interview questions were asked about what could be learned from the last several months regarding the implementation of VC. These aspects could be considered whenever another application will be implemented. The immediate need for VC caused by Covid-19 resulted in people experiencing time pressure. This resulted in that things started, that maybe would not have been started without the time pressure. A physician noted the following "*In times of a crisis you become more creative".* Another physician noted that "*Everything can become liquid under pressure".* This states that physicians are open to innovations, but need to have an urgent reason to change their daily practices.

The implementation process requires a project-based and specialty-specific approach. This approach should be conducted by a team with a structure that is simple, thus without extensive and difficult job descriptions. This means that the process can start as soon as possible by visiting the enthusiastic specialties. Certain steps such as reflection and evaluation can be skipped in the short term, provided that prompt listening to what is necessary and then facilitated is executed. An application such as video consultations can be started with a product that does not 100% work accordingly to the requirements. However, providing users with a semi-finished product offers chances for experiences where refinement occurs along the way. Since the hospital is a complex organization, it is wise to use the expertise of someone that has experience in change management in hospitals. Finally, the supplier noted that they are used to being not only a supplier but also fulfilling an advisory role.

Future use of video consultation

There were some technical aspects mentioned, such as adding an anamnesis form with the VC application. With this, patients can fill in some aspects preliminary to the consult, resulting in more efficient consults. Another aspect was the communication regarding what kind of application will be used for video consultation in the future. Currently, FaceTalk is used, but a potential transition to MS Teams is ongoing. Another noted aspect was the use of 'Mijn Rijnstate', the patient portal. This portal could be used if the patient has questions regarding the VC. Finally, the functional manager noted the potential use of the SMS function of FaceTalk. Currently, patients receive an SMS with the details of the consultations via the EPR system. However, the FaceTalk application also has this function, and it may be beneficial to use this function rather than via the EPR system for some specific cases.

4.2.5 Findings related to the theory

In chapter two, an overview was provided for aspects that could be found in this study. Table 10 presents what aspects were not confirmed related to theory, factors which were confirmed related to the theory, and new aspects that were not found in theory. This table is specific to the medical support staff and physicians.

Benefits	Disadvantages	Barriers	Facilitators
Increase in productivity	Struggles with sensitive context	Perceived value	Perceived value
Reduction of costs	Inability to perform a physical examination	Complexity of usage	Social influence
Reduced workload	Depersonalization	Social influence	Presence of protocols
Reduction of errors	Additional tasks	Lack of a strategic plan	Familiarity
Increased service	Experienced as disadvantageous	Lack of facilities	Guidance
Offers flexibility		Technical issues	Adaptive power
Usage for various applications		Lack of digital skills	
Sometimes better than telephone consultation		Anxiety for innovation	
		Old habits	

TABLE 10 FINDINGS MEDICAL SUPPORT STAFF AND PHYSICIANS RELATED TO THEORY. WHITE = NOT CONFIRMED, GREEN = CONFIRMED, ORANGE = NEW FOUND IN THE STUDY

Table 11 presents what aspects were not confirmed related to theory, factors which were confirmed related to the theory, and new aspects that were not found in theory. This table is specific to the technical support and implementation staff.

Benefits	Disadvantages	Barriers	Facilitator
Opportunity for personal development	Additional work after implementation	Lack of technical facilities	Sufficient technical facilities
		Lack of funds	Sufficient funds
		Technical issues	Providing guidance

TABLE 11 FINDINGS TECHNICAL SUPPORT AND IMPLEMENTATION STAFF RELATED TO THEORY; WHITE = NOT CONFIRMED, GREEN = CONFIRMED, ORANGE = NEW FOUND IN THE STUDY

4.2 Findings from the survey

4.2.1 Numbers and demographics

The survey for the respondents that are included via the internal mailing system was closed after exactly two weeks. Within these two weeks, a total of 292 responses have been recorded. 32 respondents (11%) did not finish the survey. For data cleaning, listwise deletion is used for the unfinished responses (less than 66%), which is regarded as a safe and conservative approach to handling missing data (Musil, Warner, Klainin-Yobas, & Jones, 2002). This method is applicable since it does not involve many subjects, resulting in only a small reduction of the sample size.

Of the 260 respondents (13% response rate), 110 men and 146 women participated in the survey. Four respondents did not want to share their gender. The distribution of age and education is provided in figure 6. Answers provided for the other education category were

higher general secondary education and MMS, which is a depreciated form of education for girls, that can be compared with higher general secondary education. Out of a total of 260 respondents, 65 respondents did not have a video consultation. This group will be referred to as the non-users.

Figure 6 provides an overview of the division of age and the highest achieved education of the respondents. This distribution is rather similar to the age distribution within a hospital (Appendix M). This means that the respondent sample has reasonable representativeness.

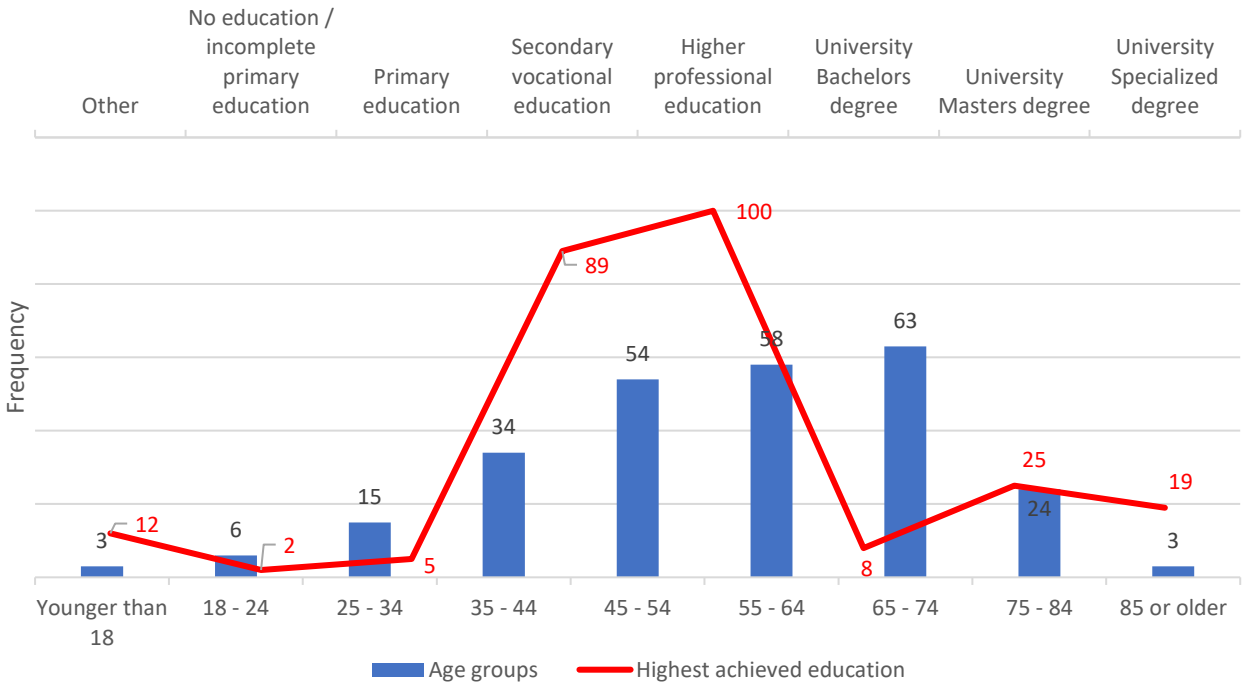

FIGURE 6 HIGHEST ACHIEVED EDUCATION AND AGE OF RESPONDENTS

Figure 7 provides the number of respondents per specialty that have participated in the survey. The specialties that are most represented are gastrointestinal liver diseases (MDL), oncology, internal medicine, and bariatrics.

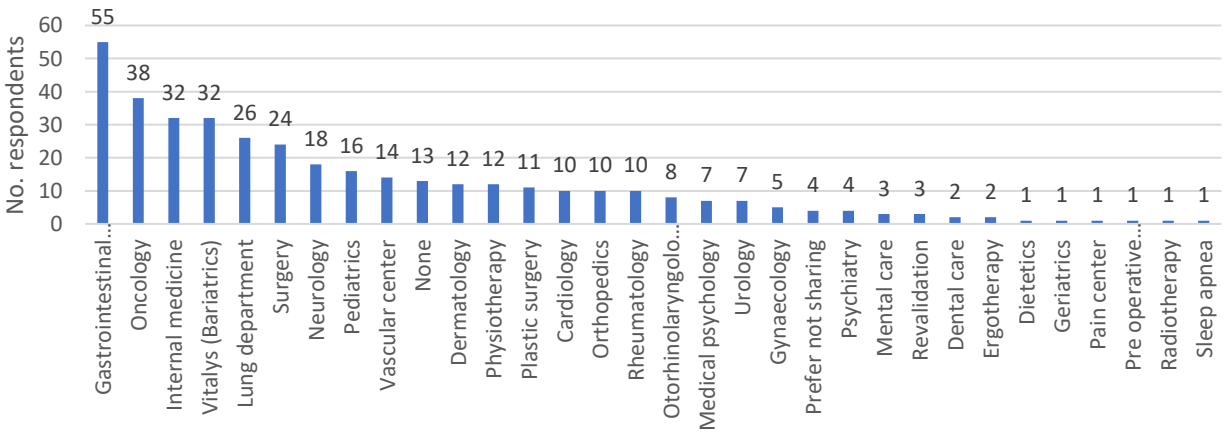

FIGURE 7 NUMBER OF RESPONDENTS PER MEDICAL SPECIALTY

In figure 8 the frequencies for the internet and video consultation use are shown. This indicates that the respondents are using the internet daily, thus having a certain level of skills and

knowledge on how to use the internet. Within the video consultation, more dispersion is shown. The 113 respondents (43,5%) use some sort of video consultation at least once a week.

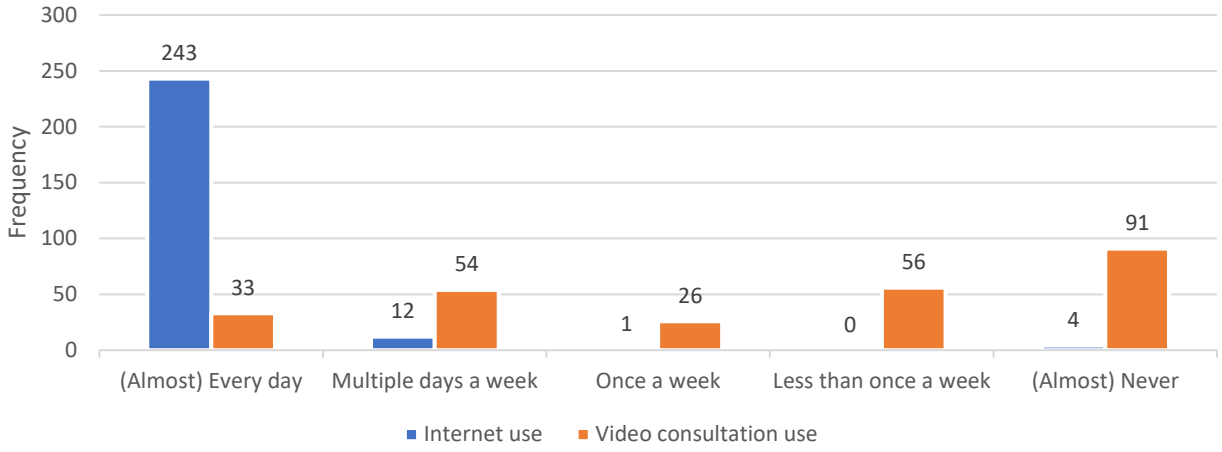

FIGURE 8 FREQUENCY INTERNET AND VIDEO CONSULTATION USE

In figure 9 an overview of the purpose of use of the consultation is provided. Video consultation is most frequently used for checkups and results of tests or investigations.

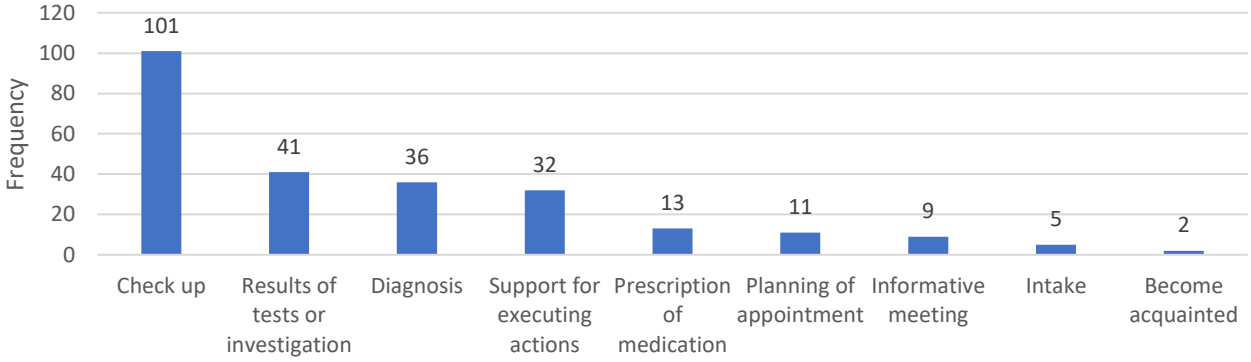

FIGURE 9 FREQUENCY PURPOSE OF USE

4.2.2 Reliability analysis

In table 12 the Cronbach's Alpha values are prescribed for each of the variables.

Variable	Number of items	Cronbach's Alpha
Benefits	9	0,820
Disadvantages	5	0,782
Barriers and facilitators	15	0,646

TABLE 12 CRONBACH'S ALPHA ON SURVEY VARIABLES

A value of 0,820 and 0,782 for benefits and disadvantages respectively indicate that these results have an acceptable internal consistency. A value of 0,646 is found for the barriers and facilitators aspect, which indicates questionable internal consistency.

A test is executed to find whether deleting one or multiple questions from the 'Barriers and facilitator' variable would provide a higher Cronbach's Alpha, indicating that a question has a strong influence on the reliability. No questions can be deleted to increase the Cronbach's Alpha

above the 0.7 value. Since this variable measure two variables and Cronbach's Alpha measures how closely the items which represent each one of the independent and dependent variables are as a group, this value below the 0,7 threshold could have been expected.

For the 'Benefits' variable, no questions can be deleted to increase the Cronbach's Alpha. For the 'Disadvantage' variable one question could be deleted to increase Cronbach's Alpha. Whenever question 18 will be deleted the Cronbach's Alpha will be increased to 0.807. Question 18 stated that with video consultation there is a risk that the specialist will miss out on health differences from the patient. However, since this question had a low score, indicating that the majority responded with 'strongly agree' or 'agree', this question was not deleted.

4.2.3 Main findings

The average scores of all the statements within the survey are shown in Appendix L. Since the survey was set on a five-point Likert scale, a value of 1 is defined as 'strongly agree', 3 as 'neutral', and 5 as 'strongly disagree'. The aspects that had a score lower than 2,5 are described in table 13 (**bold)**. The second values between the brackets are the standard deviations (*italic*) of the bold numbers. The lower the standard deviation the higher the consensus on that aspect, the higher the standard deviation the lower the consensus on that aspect. In other words, the lower the **bold** value the more people (strongly) agree to the statement, the lower the *italic* value the higher the consensus on that statement.

Barriers	Facilitators	Benefits	Disadvantages
If the use is hard for patients **(2,39)** *(1,12)*	Sufficient resources **(1,47)** *(0,89)*	Travel time **(1,74)** *(0,82)*	Risk that the physician misses out on health differences **(2,01)** *(0,69)*
When help is necessary for patients **(2,42)** *(1,10)*	Personal support from the hospital **(2,08)** *(1,01)*	Waiting time **(2,01)** *(0,97)*	
	When patients think the use is valuable **(2,19)** *(0,71)*	Continuity of care **(2,28)** *(0,87)*	
	When patients think the use is easy **(2,19)** *(1,03)*	Possibility to have friends or relatives present **(2,32)** *(0,90)*	
	Willingness to use **(2,27)** *(1,14)*	Pleasant way of consultations with physicians **(2,46)** *(1,00)*	
	When patients think the use is useful **(2,29)** *(0,79)*		

TABLE 13 MOST IMPORTANT FINDINGS SURVEY. THE **BOLD** NUMBERS ARE AVERAGE SCORES, *ITALIC* NUMBERS ARE THE STANDARD DEVIATIONS OF THE BOLD NUMBERS. 1 = STRONGLY AGREE, 5 = STRONGLY DISAGREE

High scores on statements

Some of the statements were answered with relative 'high' scores, indicating that the patients strongly disagreed with that specific statement. The statements which were answered with the 'highest' scores (highest first) were *"I am afraid that I do something wrong during a VC"*, *"The hospital should offer technical resources to patients to make use of VC"*, and *"VCs work better than normal physical consultations"*. This means that patients, in general, are not afraid to do

something wrong, that the hospital does not need to offer technical resources to the patient, and that according to patients VCs do not work better than normal physical consultations.

Consensus on statements
Some questions were answered with relatively low standard deviations, indicating a high consensus on that specific statement. In other words, patients have more similar opinions with these statements. Statements that were answered with the highest consensus (highest first) were *"With VCs, there is a risk that the physician misses out on health differences", "I am more inclined to use the VC when the use is valuable for me",* and *"I am more inclined to use VC when it is useful for me"*. Remarkable is that patients also strongly agreed with the statement regarding the risk of missing health differences.

On the other hand, some questions were answered with relatively high standard deviations, indicating a low consensus on that specific statement. In other words, patients have more diverse opinions about these statements. Statements that were answered with the lowest consensus (lowest first) were *"Using VC as an alternative to physical consultations is a good idea", "I am afraid that I do something wrong during a VC",* and *"The hospital should offer technical resources to patients to make use of VC".* Remarkable is that patients strongly disagreed with the statements that they are afraid of doing something wrong and that the hospital should offer technical resources, but that with these statements there is less consensus among the patients.

4.2.4 Medical specialties comparisons

Using Wilks' Lambda variance, significant differences in answers regarding statements influenced by the differences among the medical specialties can be determined. If the value is below 0,05 the differences in answers are appointed by the differences in medical specialties.

The minimum group size to determine differences among groups is 20 respondents. This results in the following specialties to be included in the ANOVA analysis, gastrointestinal liver diseases (MDL), oncology, internal medicine, bariatrics, lung medicine, and surgery. Therefore, the test is executed another time, only now only for those six medical specialties with more than 20 respondents. Table 14 provides an overview of the Wilks' Lambdas for both the calculations for all medical specialties as for the calculations for the medical specialties that had more than 20 respondents. Appendix O shows the full scores of the multivariate tests.

Only the Benefits aspect has values below the 0,05. This indicates that the differences in answers on the whole Benefits category (green highlighted) can be significantly appointed to which medical specialty a patient is being treated. With the barriers and facilitator aspect and the disadvantage, this effect is not significantly present.

Aspect	(Wilks' Lambda) All medical specialties	(Wilks' Lambda) Medical specialties N>20
Barriers and facilitators	0,080	0,947
Benefits	0,035	0,020
Disadvantages	0,498	0,228

TABLE 14 WILKS' LAMBDA CALCULATIONS

Nevertheless, to explore significant differences in answers for each statement among the six medical specialties with more than 20 respondents, a two-sided ANOVA test was executed. This test is used for all three aspects. A significance threshold of 0,05 was used. The full table with significant differences among the six specialties is shown in Appendix N. The remarkable findings are described in table 15-16-17.

Medical specialties	What	When
MDL	Most inclined to use	The use is useful, valuable, and easy for them and they can do it without help
Bariatrics	Least inclined to use video consultation	The use is hard or when friend or friends or relatives discourage them
MDL and Bariatrics	Think that using video consultation is a good idea	As an alternative for physical consultation
MDL and internal medicine	Are least afraid they do something wrong	During a video consultation

TABLE 15 BARRIERS AND FACILITATORS - SIGNIFICANT DIFFERENCES IN SPECIFIC STATEMENTS FROM THE SURVEY

Medical specialties	Reacted significantly more frequent	With statement
MDL and Lung medicine	Strongly agree	VC is a pleasant way of having consultations with physicians from the hospital
MDL	Strongly agree	With VC they can still make use of hospital care. Less travel and waiting time are advantages of VC
Oncology	Strongly agree	The possibility to have friends or relatives present with VC is an advantage
Surgery	Strongly disagree	VCs work just as well as physical consultations. I feel more responsible for their health via VC

TABLE 16 BENEFITS – SIGNIFICANT DIFFERENCES IN SPECIFIC STATEMENTS FROM THE SURVEY

Medical specialties	Reacted significantly more frequent	With statement
Surgery	Strongly agree	With VC there is a risk that the physician misses out on health differences
Bariatrics	Agree	With VC I feel a distance with whom I am talking

TABLE 17 DISADVANTAGES – SIGNIFICANT DIFFERENCES IN SPECIFIC STATEMENTS FROM THE SURVEY

These findings do not imply that patients from other medical specialties cannot experience these barriers and facilitators, benefits, and disadvantages, it implies that certain specialties experience specific aspects significantly more than other specialties.

4.2.5 Patient characteristics comparison

Finally, 'Compare Mean with ANOVA' tests are conducted to find out whether gender, age, education, internet use, and VC use make any statistically significant differences with any of the statements. The significant differences (significance lower than 0,05) are showed in table 18. Since age and education, internet use, and VC use have more than 2 groups, the group-specific is selected on a basis of low group mean which is (strongly) agree. An example here from the table is that whenever a patient is below 18 years or above 85 years, then they are more afraid to do something wrong during a VC. Another example from the table is whenever a patient rarely uses VC, they are less inclined to use a VC whenever they need help by doing it.

Group	Group-specific	Significantly more frequent (strongly) agree on the statement
Gender	Men	I am willing to (continue) using VC's after the Corona crisis.
	Men	I feel that I am in control during a VC.
Age	Younger than 18, 35 – 74	Better communication is an advantage of VC.
	Younger than 18 and 85 or older	I am afraid that I do something wrong during a VC, such as pressing a wrong button.
Education	Basic education, secondary vocational education, and higher professional education	Better communication is an advantage of VC.
	No education/ incomplete basic education and basic education	I am afraid that I do something wrong during a VC, such as pressing a wrong button.
Internet use	Every day	I have sufficient technical resources to do a VC
	Multiple days a week	I am afraid that I do something wrong during a VC, such as pressing a wrong button
VC use	(almost) Every day	I am willing to (continue) using VC's after the Corona crisis.
		VC's is a pleasant way for consultations with specialists
		I am more inclined to use VCs whenever it is useful for me
		The use of VC offers me reassurance
		Less waiting time is a benefit of VCs
		Less travel time is a benefit of VCs
	Multiple days a week	Less waiting time is a benefit of VCs
		Less travel time is a benefit of VCs
	(almost) Never	I am less inclined to use VCs whenever I need help to do it

TABLE 18 GENDER, AGE, EDUCATION, INTERNET USE, AND VC USE ON SPECIFIC STATEMENTS FROM THE SURVEY

4.2.6 Extension of the UTAUT model

Explanation of the model.

As mentioned in the theory section, a potential extension of the UTAUT model can be developed, based on a specific context. With Smart PLS a Structural Equation Modelling is conducted to develop figure 10. The figure shows six direct influencing effects on the intention to use and two direct influencing effects on use behavior (extend to which someone uses it). Gender and age are determined as moderators. The model has a Standardized Root Mean Square Residual (model fit) of 0,064. Values below 0,08 are considered good. This indicates is that the magnitude of the discrepancies between the observed and expected correlations is small enough to say that the correlation matrix implied by our model is sufficiently similar to the empirical correlation matrix. The Smart PLS version of the model is shown in Appendix P. The hypothesized model showed that some independent variables had multiple subdimensions to measure. During the analysis, specific subdimensions did not 'load' properly on the constructs. This resulted in lower construct reliabilities; as a consequence, these subdimensions are excluded from the model.

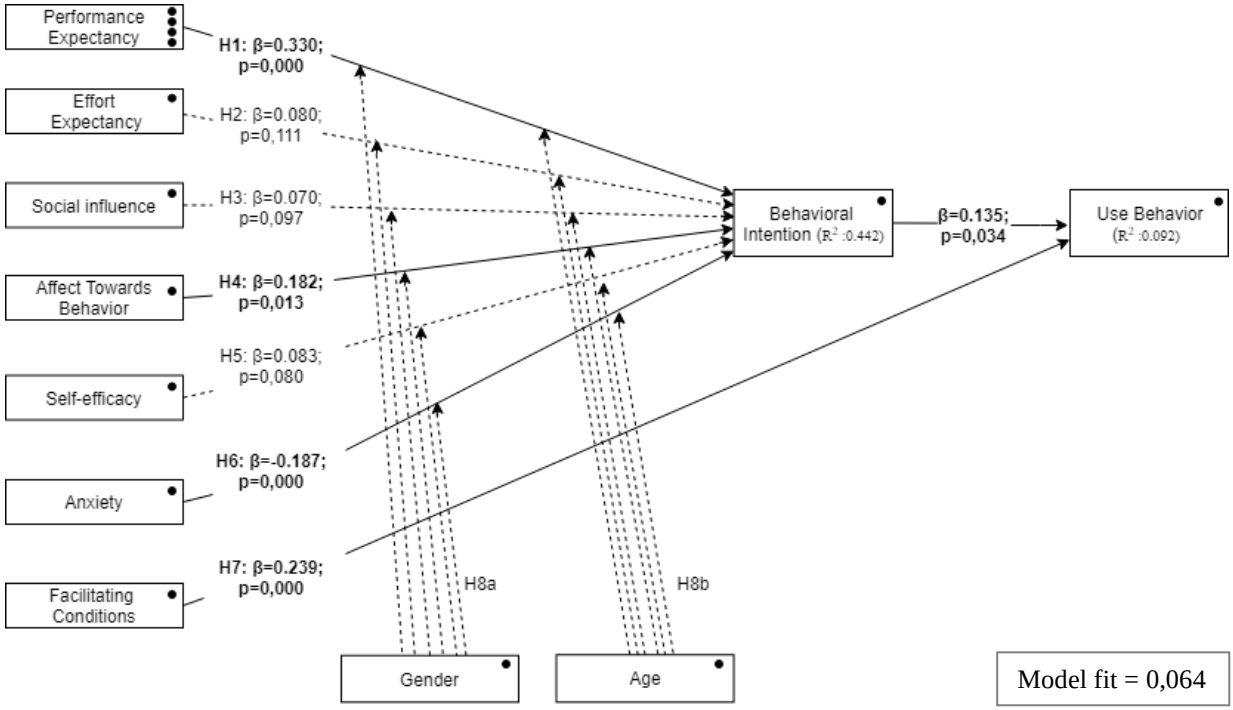

FIGURE 10 EXTENDED UTAUT MODEL. BOLD-STRAIGHT LINE = SIGNIFICANT (P<0,05), DOTTED LINE = NON-SIGNIFICANT. BULLETS REPRESENTS THE NUMBER OF SUBDIMENSIONS MEASURED.
B = PATH COEFFICIENT, P = SIGNIFICANCE LEVEL, R^2 = R-SQUARED.

Findings

The model shows that performance expectancy, affects towards behavior, and anxiety have a significant effect (straight line) on the intention to use VC. Secondly, the intention to use and facilitating conditions have a significant effect on whether someone is using VC or not. Thirdly, the behavioral intention has a significant effect on whether someone uses it or not. Effort expectancy, social influence, and self-efficacy had no significant effect (dotted line) on the intention to use VC. Table 19 shows the values of figure 10. Gender and age were found as insignificant moderators (Appendix R). The values of the f Square and the reliabilities of the aspects are shown in Appendix Q. These results show that hypotheses 1, 4, 6, and 7 are confirmed; hypotheses 2, 3, 5, and 8 are rejected.

Independent variable	Dependent variable	Path Coefficient (β)	Significance (p)
Performance expectancy	Behavioral intention	0,330	0,000
Effort expectancy	Behavioral intention	0,080	0,122
Social influence	Behavioral intention	0,070	0,103
Affect towards behavior	Behavioral intention	0,182	0,009
Self-efficacy	Behavioral intention	0,083	0,079
Anxiety	Behavioral intention	-0,187	0,000
Facilitating conditions	Use behavior	0,239	0,000
Behavioral intention	Use behavior	0,135	0,029

TABLE 19 VALUES OF EXTENDED UTAUT

Additional findings from model

Gender and age were found to be insignificant moderators in figure 11. However, another model was developed with gender and age as direct influencers of the independent variables (Appendix S and T). This model provides more practical input for the organization. The model shows significant influences from age, affect towards behavior, anxiety, behavioral intention, facilitating conditions, gender, and performance expectancy. To simplify reading the model and the table the following statements can be withdrawn from the model:

1. The higher the age > the higher the anxiety
2. The higher the age > the lower the susceptibility for ease of use
3. The higher the age > the lower the susceptibility for encouragement by friend/families
4. The more you think VC is a good idea > the higher the intention to use
5. The higher anxiety > the lower the intention to use
6. The higher the intention to use > the higher the actual use
7. The higher the facilitating conditions > the higher the actual use
8. Men > less anxious
9. Men > higher intention to use
10. The higher performance expectancy > the higher the intention to use

4.2.7 Additional findings survey

Open questions

After each part of the survey (benefits, disadvantages, and barriers and facilitators) there was room for the respondents to provide an open answer for aspects that they thought to be relevant. In other words, they could provide answers that could help the implementation or effects that are not mentioned in the statements. The answers of the patients are provided in table 20. The frequency of the statements is provided in bold behind each statement. Remarkable is how often 'Frequent technical issues' are mentioned, in comparison with other disadvantages. Next to that, the importance of clear instructions and awareness when using VCs is visible.

Barriers and facilitators	Benefits	Disadvantages
Clear distribution of information and video with instructions **(18)**	Consultation in own familiar and safe environment **(15)**	Frequent technical issues **(27)**
A clear distinction when to use VCs **(17)**	Less virus contamination risk **(10)**	Less body language **(9)**
Possibility to practice with an assistant **(9)**	Savings on travel and/or parking costs **(9)**	Feasibility dependent on the subject **(8)**
Offering personal help at home **(8)**	Less stress **(4)**	Inability to discuss images **(7)**
Proper education of staff **(7)**	Possibility to record consultation **(2)**	Anxiety about safety and privacy **(7)**
Marketing and announcements **(7)**	Environmentally friendly **(2)**	Less formality with the specialist **(6)**
Timely delivered log-in coded **(4)**	Friendly for disabled people **(1)**	Less feasible for people with less digital affinity **(6)**
Physical desk for questions about VC **(3)**		Time for adoption necessary **(6)**
Clear and findable information regarding encryption and data protection regulations **(2)**		Hard to stick to the determined time frame **(2)**

TABLE 20 ANSWERS PROVIDED BY PATIENTS ON OPEN QUESTIONS. **BOLD** NUMBERS ARE FREQUENCIES.

Use of video consultation after the Corona crisis

In the survey, a statement was provided on whether patients are open to using video consultation after the Corona crisis. 65% (strongly) agreed (67% users, 57% non-users) to this statement. 14% (strongly) disagreed (14% users, 17% non-users) to this statement (Figure 11).

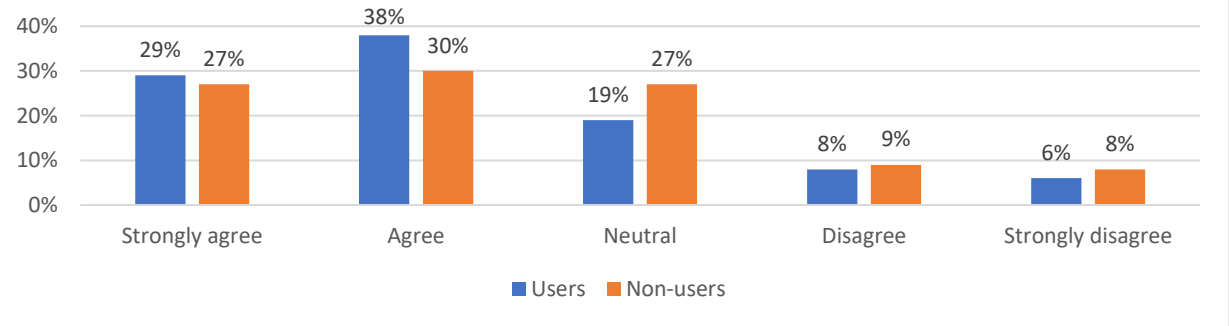

FIGURE 11 SCORES "OPEN TO (CONTINUE) USING VIDEO CONSULTATION AFTER CORONA CRISIS"

This suggests that having experience by using it supports use behavior after the Corona crisis. The reason why non-users are not using VC is unknown. No significant differences were found between the provided answers of the groups. When a distinction is made between the medical specialties some remarkable results are found. Some medical specialties had high values. The Vascular center (85,7%) (n=12), Otorhinolaryngology (KNO) (87,5%) (n=7), Pediatrics (81,3%) (n=13), Rheumatology (70%) (n=7), Internal medicine (71,9%) (n=23), Geriatrics (100%) (n=1), and the Gastrointestinal liver specialty (MDL) (78,2%) (n=43) all had values from 70% and above for the 'Agree' and 'Strongly agree' categories. Only the Psychiatry (50%) (n=2) and Pre-operative screening (100%) (n=1) had values from 50% and above for the 'Disagree' and 'Strongly disagree' categories. Regarding reliable sample sizes, only MDL and

Internal medicine of the aforementioned specialties had 20 or more respondents. Therefore, only these results are considered reliable.

Video consult as pleasant tool for consultations
In the survey, a statement was provided on whether patients think video consultation is a pleasant way of having consultations with physicians. 55% (strongly) agreed (58% users, 47% non-users) to this statement. 13% (strongly) disagreed (12% users, 17% non-users) to this statement. No significant differences have been found between the provided answers of the groups.

Importance of video consultation for a medical condition
A statement was provided on whether patients think using video consultation is important for their medical condition. 24% (strongly) agreed (26% users, 19% non-users) to this statement. 32% (strongly) disagreed (33% users, 29% non-users) to this statement. This suggests that in general VC is not important for the patients' medical conditions.

When a distinction is made between the medical specialties some remarkable results are found. 72,7% (8) of the patients from the Plastic surgery specialty respondent with 'strongly disagree' or 'disagree' to the statement. 100% (2) of the patients from the Ergotherapy specialty respondent with 'strongly disagree' or 'disagree' to the statement. 100% (1) of the patients from the Geriatrics specialty respondent with 'strongly agree' or 'agree' to the statement. However, none of those three specialties had 20 or more respondents, therefore this data is regarded as non-reliable. This indicates there is no clear distinction between the answers. Besides, no significant differences have been found between the provided answers of the groups. Therefore, there is insufficient evidence to determine that video consultations are important for a certain medical condition.

4.3 Total overview, similarities and differences between data methods

Two different data collections are conducted in this study. Interviews are conducted with the involved specialists and surveys are sent to patients. Both are asked what the barriers, facilitators, benefits, and disadvantages are for the implementation and use of VC. From the survey, an extension of the UTAUT model is developed. This section will provide a total overview of the results, and it identifies similarities and differences between the two data collection methods.

4.3.1 Total overview of findings

Figure 12 provides an overview of the findings from both the interviews as the surveys. Colors are used to identify whether the aspects are confirmed or not in the study and what new aspects are found. For each aspect, the affected stakeholders are provided.

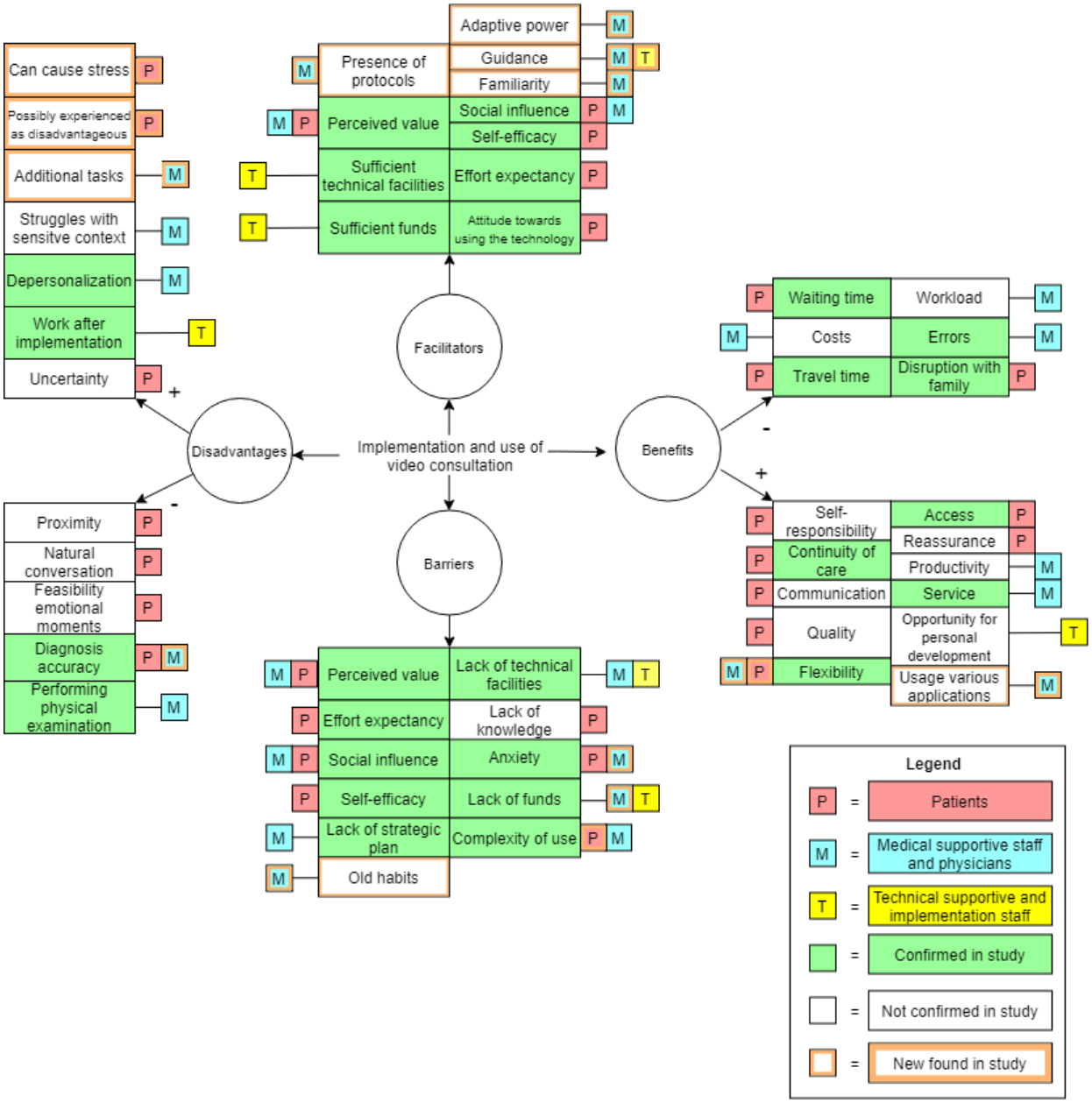

FIGURE 12 TOTAL OVERVIEW OF FINDINGS.
(-) REPRESENTS A DECREASING EFFECT, (+) REPRESENTS AN INCREASING EFFECT

4.3.2 Similarities and differences between data methods

Barriers

An aspect that came forward from both methods is the effort expectancy, such as the lack of digital skills (interviews) and a higher willingness to use when the use is easy (survey). In both methods, the frequent presence of technical issues was mentioned. An aspect that was found in the interviews was the 'anxiety for innovation' related to the medical staff. This aspect has several subdimensions, for example, that the application is not working properly, anxiety that there may be privacy and security issues, and the anxiety that the physician will miss out on health differences from the patient. The extension of the UTAUT model found that anxiety is also a significant aspect for patients that decreases the intention to use VC. According to the interviews the lack of facilities, such as devices, is a barrier. However, the results from the survey state that patients have sufficient resources to conduct a video consultation.

Facilitators

In both methods, the importance of guidance and personal support came forward. Secondly, a similarity is found between social influence by employees to see the potential benefits and the fact that patients are more inclined to use VC whenever they think it is useful and valuable. This is also found in the extension of the UTAUT model. There, the performance expectancy (e.g. useful and valuable) had a significantly positive influence on the intention to use VC. The same applies to the facilitating conditions. Also, the extension of the UTAUT model found that the more you think using VC is a good idea, the higher the intention to use it becomes. No outstanding differences have been found for the facilitating aspects between the two methods.

Benefits

In both methods, the aspects of time and cost savings came forward, alongside the benefit of continuity of care. Secondly, flexibility in planning and use was found in both methods. A difference was found in the fact that is time-saving for patients, however, this does not hold for the medical staff due to additional tasks.

Disadvantages

The main similarity is regarding the inability to conduct physical examinations. With VCs there is less room for interaction, resulting in a risk of missing out on potential important aspects. According to the interviews, there is a possibility that patients think VC feels disadvantageous. However, on average patients agreed that VC is a pleasant way of having consultations with physicians.

Chapter 5. Conclusion and discussion

5.1 Conclusion

This study aims to answer the following research question: *How does the implementation and use of video consultation affect stakeholders and different medical specialties in a Dutch hospital?* The main aim is to improve the implementation and ultimately the use of video consultation.

This study illustrates that implementing an innovation that changes the way of providing healthcare is a complex matter, that affects the stakeholders in different ways.

Staff members may experience unfamiliarity with the innovation and have certain reservations. For instance, the concern that it may affect their professionalism or quality of the consultation. Since it is a new way of providing healthcare, stakeholders experience additional work to get used to working with VC. For patients, factors such as performance expectancy, an anxiety to do wrong, and whether they think it is a good idea, accompanied by personal support, are important influencing aspects for the implementation.

When implemented, VC offers an increased level of service and physicians can use VC for multiple applications such as having another medical specialist present. However, the consultation may be less personal, with limited possibilities for physical examinations. Medical assistants experience more ease with scheduling appointments since the patients are more flexible with the time and place of the consultation. However, they will have additional tasks, such as scheduling appointments in two systems and providing instructions. Technical staff will receive more work along and after the implementation such as bugs or answering questions from staff. For patients, VC saves traveling and waiting time. It offers the possibility that friends or family are present, and in times of the Corona crisis it supports continuity of care. However, patients think that there is a risk that physicians miss out on health differences that potentially cause stress.

Specific medical specialties experience different hurdles with the implementation. As an example, patients from the bariatrics departments are least inclined to use VC when they are discouraged by friends or relatives. Besides, the usability of VC depends on the nature of the medical condition, purpose of consultation, severity of medical conditions, and subject of the consultation.

The use of VC has divergent effects on patients from different medical specialties. As an example, oncology patients value the fact that friends or families can be present more compared with other specialties. Besides, the weight of experienced benefits by the patient significantly depends on the medical specialty where they are treated. Besides, some patient groups need additional support such as the youth, elderly, and the uneducated.

To improve the implementation and use, certain IT-needs have to be met. This includes integrating VC with systems that are used in daily practice by physicians. Secondly, protocols should be developed, that include communication aspects and the usability of VC. Furthermore, familiarity should be increased and patients and staff need to be guided and supported along the process. The implementation requires a project-based approach with periodic evaluations.

Finally, when time and effort are dedicated to fulfill the needs and wishes of stakeholders, VC has much potential to be fully integrated into daily practices and provide a plethora of benefits.

5.2 Discussion

5.2.1 Findings with literature

Unified Theory of Acceptance and Use of Technology

With this study, aspects of the UTAUT model were tested regarding the influence of the implementation and use of video consultations. Some other aspects that were used within the UTAUT study, but did not end up within the model, are also tested within this study. The results of this study are in line with the UTAUT model, supporting that the determinant performance expectancy increases the intention to use. Next, it supports that the intention to use and facilitating conditions increase use behavior. Also, from the non-included determinants in the UTAUT study (affect towards behavior, self-efficacy, anxiety), affect towards behavior and anxiety are found as significant influencers of the intention to use VC.

The model shows that behavioral intention and use behavior have an R^2 of 0,442 and 0,092, respectively. This means that 44,2% and 9,2% of the variation in behavioral intention and use behavior respectively is explained by the model. A potential reason for this could be that the implementation of VC was currently ongoing and this study is conducted during the implementation. This indicates that behavioral intention and use behavior are hard to estimate since they have a relatively low R^2.

Practically, the more 'emotional oriented' factors performance expectancy, affect towards behavior (whether someone thinks using it is a good idea), and anxiety (to do wrong) are more relevant for the intention to use. The more 'practical oriented' factors effort expectancy (ease of use), social influence (encouragement), and self-efficacy (use without help) are less relevant for the intention of use. If a comparison is made between the three significant factors that influence behavioral intention it becomes clear that performance expectation has the largest influence (largest path coefficient). Anxiety and affect towards behavior have similar influences, but anxiety has a negative effect. Furthermore, affect towards behavior has a positive effect on behavioral intention. Facilitating conditions has a larger influence on whether someone uses VC than whether someone has the intention to use VC.

In terms of improvement, influencing someone's opinion of whether VC is a good idea and their perception of value and usefulness are relatively hard to change. However, improving the facilitating conditions and lowering anxiety is more achievable.

Venkatesh empirically tested the UTAUT and found that the model was able to account for 70% of the variance in usage intention. Despite that the developed extension of the UTAUT for VC has a good model fit, it only accounts for 44,2% of the variance in usage intention. Besides, the extension of the UTAUT model explains 9,2% of the variance in usage behavior, while the original UTAUT explains for 48,0%. An explanation for this difference could be that the original UTAUT included more data and more indicators for each construct, which result in more accurate loadings. As an example, only nine subdimensions for six determinants were measured in the extended version, while usage intention in the UTAUT was measured with twelve subdimensions for three determinants (Venkatesh et al., 2003).

Digital innovation

Holmstöm (2018) identified three opportunities for research in digital innovation. These focus on the complexity of the interaction with digital innovation, the specifics of the technology, and the relationship between specific use and generalization of use. This study found that complexity can obstruct the implementation. For example, the lack of digital skills of the end-users. The specifics of VC results in overall increased flexibility. This applies both to the

physician (that can use VC for several purposes) as well as for the patients (more freedom with the time and place of consultation). The relation of specific use and generalization of the technology is shown in the fact that VC cannot be used for all purposes such as diagnosis or subjects that might be upsetting.

Ignatowicz et al. (2019) found that the discussion sections of most reviews often suggest that further research is needed around cost, ethics and safety, and the practical challenges when implementing internet videoconferencing. This study found that practical challenges such as technical barriers, openness for change, and the lack of digital skills are present with the implementation of VC.

Implementation of innovations

This study found that there is some anxiety for innovation with the staff members. This anxiety comes in various forms such as that the application is not working properly, anxiety that there may be privacy and security issues, and the anxiety that the physician will miss out on health differences from the patient. This can be related to the distinction between the early and late adopters found by Escobar-Rodríguez and Romero-Alonso (2014). Despite that Rijnstate has some staff members that are in the 'innovators' and 'early adopters' category, there are also staff members in the 'late majority' and 'laggards' category. The early adopters play an important role in the implementation of innovations since they can function as pioneers that make other colleagues enthusiastic. Late majority and laggards are more skeptical and reserved in adopting new technologies.

This study found that developing clear protocols helps users to determine how and when to use VC. It will increase familiarity with the process and thus improve the expertise of the users. Fleuren, Wiefferink, and Paulussen (2004) conducted a literature study on the determinants of innovations within healthcare. 50 determinants are identified that facilitate or impede the implementation. They found that the available expertise with clear procedures, among others, have a facilitating function. A contradicting finding is that Fleuren, Wiefferink, and Paulussen state that much time available facilitates the implementation. However, this study found that time pressure causes the innovation to start and consequentially accelerate it. This was due to the urge to support the upscaling of standard care.

Patient value

Parallel and subsequentially to the implementation an important aspect should be considered continuously, namely what it adds in value to the patient. As mentioned in the theory chapter, Value Based Healthcare is a trend that determines the outcome that matters to the patients, while considering the costs of delivering these outcomes (Porter, 2010). This study found that experienced benefits vary among patients from different medical specialties. Therefore, concerning VBHC, the spent costs for VC are not always delivering the same outcomes for every patient. Porter developed the Outcome Measures Hierarchy, presented in figure 1, that distinguishes three tiers of outcomes for any medical conditions. VC is not a remedy that supports survival or any substantial health improvements. However, it does support the process of recovery (Tier 2) with its easy access to communication and provides benefits such as the presence to have family and relatives present to potentially mitigate treatment-related discomfort.

5.5.2 Strengths, limitations, and further research

Strengths

This study has multiple strong aspects. One of them is the relatively high Cronbach's Alphas with the survey. Only with the 'Barriers and facilitators' variable, a value just below 0,7 was found. However, this aspect represents two variables. Therefore, a value below 0,7 could have been expected, since measuring one Cronbach Alpha within two different variables results in a low internal inconsistency.

Secondly, within the interviews, many respondents spoke about what would be the case for patients. However, by considering these answers as the truth, it could also cause missing out on perspectives from real patients. Therefore, the researcher chose to develop a survey and gather information from the patients themselves, resulting in more reliable results than when results are solely based on the interviews.

Thirdly, merely scientific articles (especially the UTAUT model) are used from the theoretical framework for developing the interview schemes and surveys. Therefore, construct validity is assured. For the UTAUT an extension is developed based on the context of video consultations. Hereby, two new aspects, anxiety and affect towards behavior, are found as significant influencing factors for usage intention.

Fourthly, within this study, the distribution for age was representative of the distribution in a hospital.

Finally, the results of this study are strong since the research used a holistic approach while conducting this study. This is based on the fact that both qualitative as well as quantitative methods are used. Secondly, this is based on the fact that the researcher was involved in an ongoing implementation process of video consultation. Therefore, the study was guided alongside the ongoing project, and useful results were more assured to be gathered. This study focuses not only on what slows down or facilitates the implementation process, but it also has a focus on the potential effects of all the directly involved stakeholders.

Limitations and recommendations for further research

Within this study, a selection bias has possibly been developed. This was due to the selection of users for the survey. The respondents are extracted from the FaceTalk application. However, users of video consultation applications are by definition more used with technology than non-users. Furthermore, respondents are acquired via an anonymous digital client panel. These respondents are also more used to work with technology since they applied themselves to provide their opinion digitally. As a result, this study misses out on the opinion of non-digital non-users. By including a wider selection of respondents this can be prevented in future research. This means also including non-digital skilled non-users within the respondents for the survey. Also, no interviews were conducted with staff from the helpdesk or policymakers. These respondents could also be included within further research since these people are also involved with the use and implementation. Furthermore, a broader selection of medical specialties could provide new insights.

260 respondents finished the survey (13% response rate). Many statements were answered with relatively high percentages in the 'strongly agree' or 'strongly' categories. Therefore, there is a clear indication that these statements are true, but no statistical differences were found between the user and the non-user group. Therefore, the potential effect cannot be appointed directly to use. Nevertheless, these answers still gather valuable information. Only six out of the 32

mentioned specialties had more than 20 respondents. Therefore, the other 26 specialties were not included in further analysis. By increasing the sample size these differences between users and non-users could be identified and there will be a higher chance that more medical specialties have more than 20 respondents.

Within this study, multiple medical specialties were included. However, the scope of the study did not reach further than the inclusion of these specialties. In further research characteristics of the medical specialties and their patients could be investigated to appoint why certain effects are measured or not.

With the development of the Extended UTAUT model, there were specific subdimensions that did not 'load' properly on the constructs. This resulted in lower construct reliabilities; as a consequence, these subdimensions are excluded from the model. In further research, a factor analysis should be conducted before developing the model to analyze the loading of the factors.

The Extended UTAUT model shows significant effects for the affect towards behavior and anxiety determinants but not for the self-efficacy determinant. The reason for testing these determinants is that the model can be extended based on a certain context. In other words, self-efficacy may play a significant role in another context.

Finally, to increase the Cronbach Alpha in further research it should be considered to develop separate sections for the barriers and facilitator part. Within this study there was no clear distinction between this section, resulting in overlapping questions within the survey. As a result, a Cronbach Alpha below 0,7 was found for this section.

5.5.3 Practical relevance

This study used a holistic approach where stakeholders are interviewed that are involved with the implementation and use. As a result, multiple perspectives are acquired, which implies that the implementation is not a one-sided process but requires a process approach that includes all stakeholders. This study contributed actively to an ongoing implementation process of VC. The findings from the interviews were shared regularly with the project team for VC. This project team did not include the patient perspective into their implementation project. This study did include the patient perspective and provided a basis for describing the patient perspective. The study provides insights that the added value of VC is patient-specific. It concludes that the benefits are dependent on the medical condition of the patient and that differences in patient characteristics influence the implementation. Findings from the survey state that the majority is open to (continue) using VC after the Corona crisis. This is an important aspect for Rijnstate since the organization has developed the *Digital Strategy Rijnstate 2019*, in which they distinguish three tracks. First *Basis in order*, which focuses on the necessary technical facilities to keep the hospital running and in the context of this study to keep video consultation running. Currently, VC works via devices, but according to respondents, it is better to work with a VC system that is integrated with for example Microsoft teams.

Secondly *Optimization*, that focuses on the employment of new digital functionalities to improve healthcare. Examples to improve the use of VC are mainly solving the mentioned technical issues. An example is the facilitation of workspaces with screens with integrated video and audio functions. Another example is improving the ease of use by simplifying the interface and developing instruction videos.

The last track of the digital strategy is to realize real *'transformation'* in healthcare. One of the main facilitators is the development of protocols specific per specialty. By doing so, VC will be efficiently integrated into daily practices with more clarity for the specialties. Secondly, appointing someone that will be responsible for the implementation and use can support the use in the long run. Secondly, Rijnstate should remember that the use of VC is new for both the healthcare providers and the patients. People have to get used to the fact that they can also have consultations via VC. A comparison was made between users and non-users and their attitude towards the willingness to use VC after the Corona Crisis. The user group had a higher willingness to use it compared to the non-user group.

Another aspect to consider in the long term are financial resources. With the current implementation, several devices are purchased for some specialties. With the possibility to integrate VC with Microsoft teams, this will be prevented. Also, medical assistants do not have to (re)schedule two appointments anymore, which will save some valuable time. However, additional costs for screens with integrated video and sound options should be considered. Next to that, according to the medical assistants, the duration of a VC is shorter than a physical consultation. However, the total time of taking the device, setting the connection, having the consultation, and returning the device is longer than a physical consultation. In this time, other physical consultations could have been done. Integrating VC with MS-Teams or the EPR will make the use more efficient. Secondly, by increasing the volume of VCs the hospital will receive fewer parking costs. If VC will become even more implemented in daily practices, the importance of these missed costs should be investigated.

In other words, this study was actively involved and contributed to the actual implementation and improving the use of video consultation. The next chapter will elaborate more in-depth on recommendations that can be made based on the findings in this study.

Chapter 6. Recommendations for organization

From the interviews and surveys, recommendations for the organization can be derived. This section will start with aspects that can optimize the general implementation and use of video consultation, based on the findings of the interviews. Secondly, recommendations for the specialties that had more than 20 respondents in the survey will be developed. Thirdly, examples will be provided of specialties to invest in. Finally, the Rijnstate Digital Strategy 2019 will be elaborated upon.

General process-based optimization

Table 21 provides an overview of the concepts which can be improved, including the action points to do so. Each concept will be explained individually below.

Concept	Action points
Develop clear protocols	• Clarify communication with the patient • Determine usability for patient groups
Solve technical issues	• Integrate VC in daily practices/systems • Improve the natural feeling of a conversation • Stabilize internet connection
Increase familiarity	• Organization-wide announcement • Develop digital user manuals • Organize periodic Q&A or webinars (optional) • Appointing someone as a point of contact
Increase ease of use patients	• Offering personal support to patients • Create an instruction video • Dedicate additional attention to specific patient groups
Evaluation	• Regular assessment of problems and needs of stakeholders

TABLE 21 RECOMMENDATIONS FOR GENERAL PROCESS-BASED OPTIMIZATION

1. Developing clear protocols

It became clear that several problems can be solved by developing clear and profound protocols. Since healthcare differs among medical conditions these protocols should be developed specifically to and by a medical specialty. Aspects that need be included in these protocols are as follows:

A. Communication with the patient

It became clear that communication with the patient is key to using VC. Since VC is a different way of providing healthcare, this option should be prescribed to the patient by the medical assistant or the physician. Patient characteristics (Table 18) could be considered, to determine whether additional explanations or support is necessary. Whenever this is clear, it should be evident who is communicating this with the patient. In some cases, the physician determines in which way the next consultation will take place, but in some cases, the medical assistant should schedule it together with the patient. Therefore, synchronization between the physician and medical support staff is important.

B. Usability

It became clear that the usability of VC differs among various aspects. These differences are based upon differences in the nature of the medical condition, purpose of consultation, severity of medical conditions, and subject of the consultation. From the interviews, it became clear that

VC is applicable to digitally skilled patients. It also became clear that VC is applicable for check-ups, positive results, preoperative information, and other limited impact subjects. For diagnostic purposes and delivering potentially upsetting news VC is less suitable. In other words, the specialties should develop protocols or make sure everybody knows for which patients VC would be beneficial. By doing so, VC can be deployed while delivering a responsible and adequate level of quality.

2. Solving technical issues

Despite that solving technical issues feels like a truism, it appears to be an important hurdle to overcome with the implementation. As provided in the results section, an overview is developed with the stated technical issues (table 9 repeated). These issues are categorized based on frequency. By integrating VC with the EPR or with MS-Teams, multiple issues are expected to be solved. It solves the double scheduling issue, the inability to share screens, the required log-in, the extensive interface, the firewall issues, and the issue of the empty form of the specialist. When this is integrated, the organization should integrate the camera into the screen. This results in conversations that feel more natural since you can look someone straight in the eyes. With the open questions, several other issues came forward such as clear and findable information regarding encryption and data protection regulations.

Frequently n>20	Regularly n>5 <20	Occasionally n<5
Not integrated EPR	Inability to share screens	Firewall issues
Scheduling appointment in two systems	Low-resolution camera	Maximum number of participants
Unstable internet connection	Inability to watch someone straight in the eye	Empty form specialist in ERM
	Log-in necessary in the application	Log-in codes not matching or in the spam box
	Interrupted by unannounced updates of device or application	Interruption from other apps running in the background
	Extensive interface of the application	Insufficient use of delay notifications
	Audio doesn't work properly	

TABLE 9 TECHNICAL ISSUES MENTIONED IN INTERVIEWS

3. Increasing familiarity

To increase familiarity, Rijnstate can organize an organization-wide announcement. This can be executed by for example a document or a short movie. Topics to mention can be that during the Corona crisis some of the specialties chose to use VCs to provide healthcare. With this, success stories can be shared. Also, contact details on whom to approach if someone is interested can be shared at the same time. Secondly, clear digital user manuals for medical assistants can be developed. Especially how the conversation will be realized should be mentioned. Thirdly, periodical Q&As or webinars could be set up to answer questions from each of the responsible persons of the specialties. By doing so, people can learn from each other and the implementation process and final use can be improved. Increasing familiarity can also result in that staff members that experience ‘cold feet’ will become convinced of the potential benefits and will try VC themselves. Secondly, per specialty, a person should be appointed that is responsible for the implementation and use of video consultation. This person will be the point of contact in terms of questions and communication with the IMT department. If possible, this person is familiar with VC and works as a pioneer to make other colleagues enthusiastic as well.

4. Increasing ease of use for patients

Patients answered with 2,19 on a 5-point scale (1 strongly agree and 5 strongly disagree) that they are more inclined to use it when the use is easy and valuable. Therefore, effort should be dedicated to simplifying the use of patients. This can be done by offering personal support to patients which was found to have a significant positive effect of 0,239 on use behavior. Also, digital manuals should be developed for patients. However, creating a movie where it is visualized for them is even better.

Anxiety was found to have a significant negative effect of -0,187 on the intention to use. Providing information and making sure that patients can ask for help whenever they experience any form of anxiety or insecurities will result in more usage of VC.

Besides, there are some specific patient groups (Table 18) where additional attention can be dedicated to. An example is the patient group that is younger than 18 and older than 85 years. This group is more afraid to do something wrong during a VC. This also applies to patients that have no education or (incomplete) basic education.

5. Evaluation

Finally, the implementation process can be improved by implementing a formative evaluation during all stages of the implementation. This is considered as a research activity to assess the problems and needs of the stakeholders (Gemert-Pijnen, 2011). In general, this activity is performed at the start of the implementation, but it can be beneficial to conduct this activity parallel to the implementation process.

Included medical specialties

The following recommendations will be based on the medical specialties that had more than 20 respondents in the survey.

Gastrointestinal and liver diseases (MDL)

The MDL specialty was most inclined to use VC whenever they think the use is useful, valuable, easy, and when they can do this without help. If the potential benefits are communicated with these patients, they can realize it is useful and valuable. If something such as an instruction video is shared with them, it is easier for them and they can do it without help. The option of VC should be provided to these patients since they think that using VC instead of physical consultation is a good idea and a pleasant way of having consultations.

Oncology

The patients from the oncology specialty attach much value to the option of having friends or relatives present. By providing the VC option, it should be communicated that they can have friends or relatives present with the consultation.

Internal medicine

No specific significant recommendations can be made for this specialty since no outstanding results were found.

Bariatrics

For the bariatrics specialty, several aspects stood out. These patients are least inclined to use VC when the use is hard or friends or relatives discourage them. Therefore, the use should be made as simple as possible by for example offering personal support. The option of VC should be provided to them since they think that using VC instead of physical consultations is a good

idea. Nevertheless, they agreed that they feel a distance. Improving the natural feeling of a conversation, to decrease the feel of a 'distance' should be the goal.

Lung medicine
The option of VC can also be provided to patients from the lung medicine specialty since they think it is a pleasant way of having consultations with physicians. By providing the option, the patients can still choose which way of consultations they prefer.

Surgery
Patients from the surgery specialty strongly disagreed that VC works just as good as physical consultation. So, whenever VC is selected for a consultation, it should be clear that it is not instead of a physical consultation but added to. These patients also strongly think that the physician will miss out on things. Therefore, VC should not be used for purposes such as setting a diagnosis.

Medical specialties to possibly invest in
An important aspect is in which specialty Rijnstate should invest in in the future. Within the survey, the following statement was provided *'I am willing to (continue) using VC after the Corona crisis'*. With specialties where patients are willing to use VC, there is much potential for growth in use. First, the specialties with more than 20 respondents will be described since these provide more reliable results. 78% of the respondents from the MDL, 72% from the Internal Medicine, and 72% of the respondents of the Lung Medicine reacted with Strongly agree or Agree. In other words, these specialties are very willing to use VC after the Corona crisis. The surgery specialty had the lowest score, only 46% reacted with Strongly agree or Agree. However, no outstandingly high scores were found within the Strongly disagree or Disagree category have been found.

Next, scores from specialties with less than 20 respondents will be described, with the side note that these results are less reliable. 93,75% of the respondents from the pediatrics (16 respondents), 60% from the orthopedics (10 respondents), and 100% of the respondents of the geriatrics (1 respondent) specialty reacted with Strongly agree or Agree. Only the psychiatry specialty (4 respondents) had a relatively high score with the Strongly disagree or disagree category, namely 50%.

Other innovations
The aspects mentioned above can be applied to the implementation of video consultation. Yet, these recommendations could also be applied for other innovations. Especially the process-based optimization elements are generally applicable. The specific recommendations for the included outpatient clinics could be considered; though, these are specifically based on video consultations. Anxiety and the 'affect towards behavior' are new aspects found for the UTAUT model specific to the use of VC. However, these aspects may be influencing factors with other innovations. Therefore, these points could provide a basis for further research.

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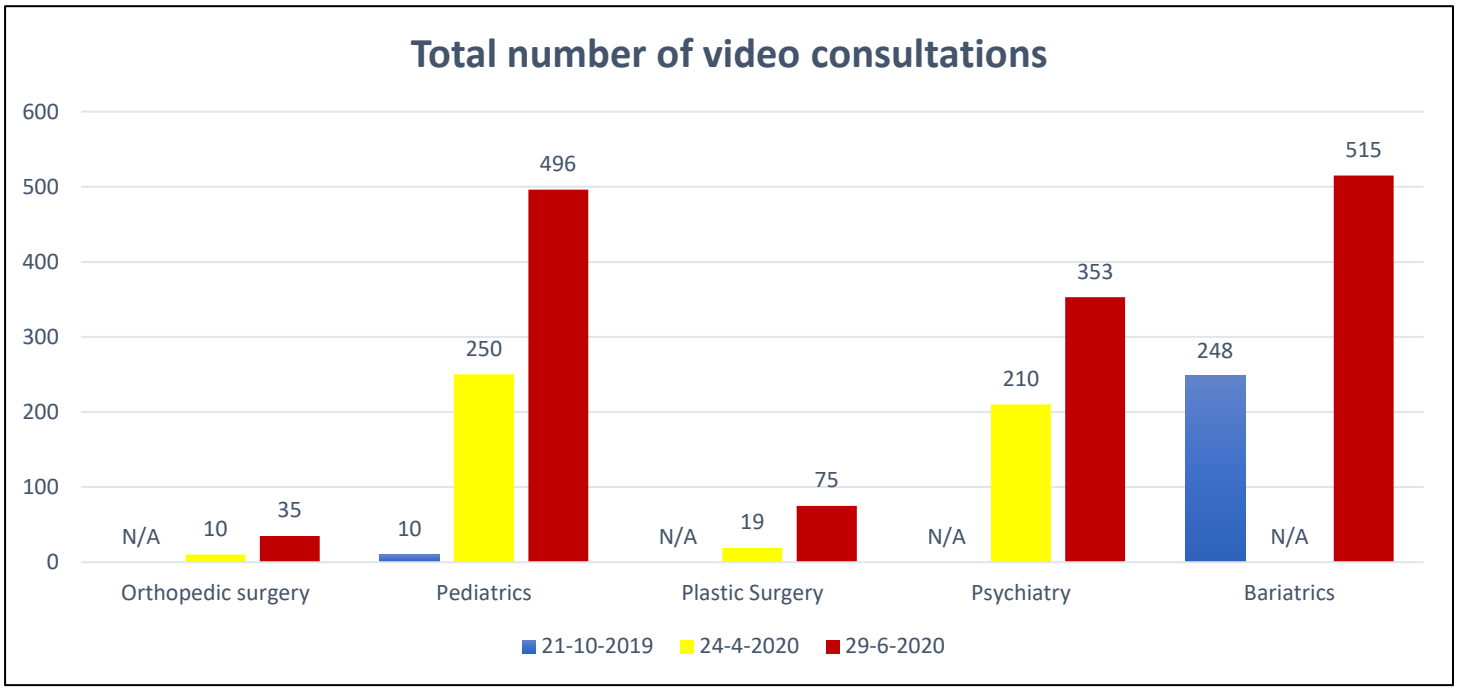
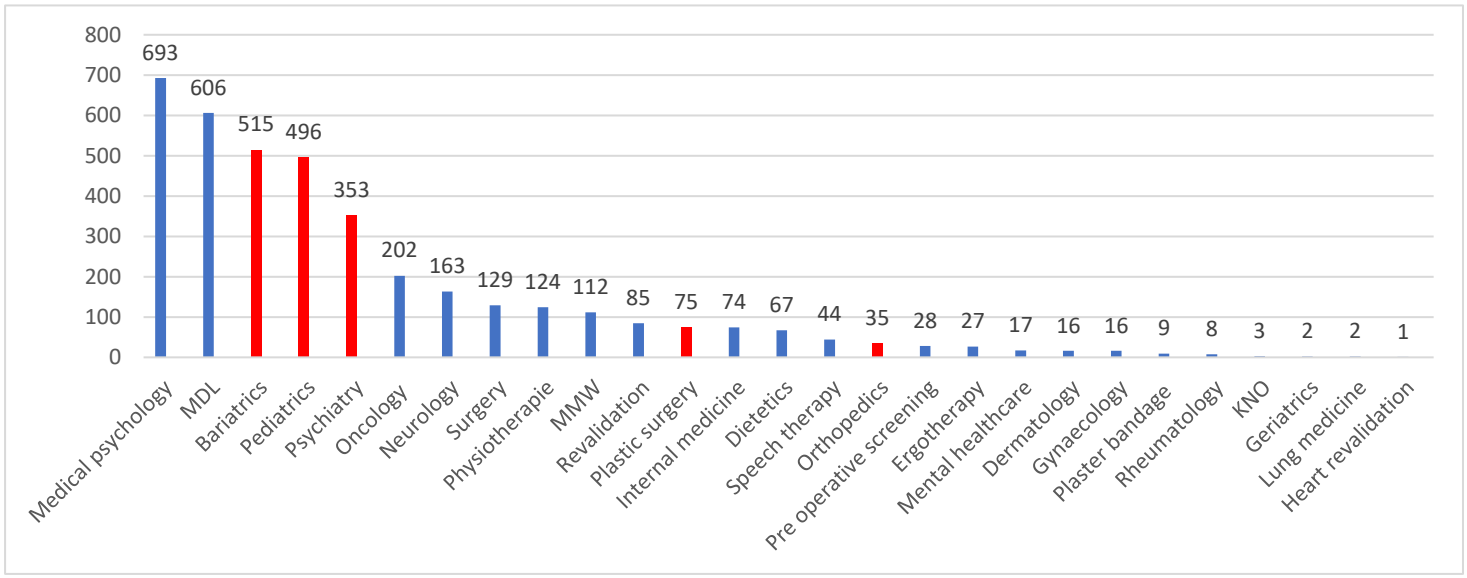
Appendices

Appendix A. Overview grow in use video consultations between selected specialties



Appendix B. Overview total use of video consultations all specialties (29-6-2020)



Appendix C. Semi-structured interview protocol physicians (Dutch)

RQ: **What are the barriers, facilitators, and effects of the accelerated implementation of VC in a hospital setting?**

RQ: Wat zijn de belemmeringen, bevorderingen en effecten van de versnelde invoering van VC in een ziekenhuis setting?

Introductie

1. Informeren over de rechten van de respondent
2. Informeren over de structuur van het interview
3. Toestemmening vragen audio opnemen
4. Aanleiding onderzoek uitleggen

Vragen:

1. Kunt u in het kort mij uw ervaringen en mening over videoconsultatie vertellen?
2. Wat is in uw dagelijks werk veranderd/gaat er veranderen door videoconsultatie?
    a. Waarvoor gebruikt u het? (Diagnose, behandeling, follow-up, etc.)
    b. Voor welk type contact vindt u videoconsult geschikt en ongeschikt?
3. Wat zijn volgens u de voordelen van videoconsultaties? (Voor u en de patiënt)
4. Wat zijn volgens u de nadelen van videoconsultaties? (Voor u en de patiënt)
5. Welke risico's zitten er volgens u aan het gebruik van videoconsultatie?
6. Welke aspecten bevorderen de implementatie van videoconsultatie volgens u?
    a. Vragen naar mening over UTAUT dimensies (performance expectancy, effort expectancy, social influence, facilitating conditions)
7. Welke aspecten maken het gebruik van videoconsultatie makkelijker?
8. Welke praktische aspecten belemmeren het gebruik van videoconsultatie volgens u?
9. Welke andere aspecten belemmeren het gebruik van videoconsultatie volgens u?
10. Denkt u dat in al deze aspecten verschillen zit tussen verschillende patiëntengroepen?
11. Door de Corona crisis is de invoering en het gebruik van videoconsultatie versnelt. Wat zouden we van deze versnelling kunnen leren? (Voor videoconsultatie of invoering van andere innovaties)
12. Hoe denkt u over het gebruik van videoconsultaties na de Corona crisis, zowel in de fase van de 1,5 meter samenleving als daarna?
13. Wat is er volgens u nodig om het gebruik te verankeren in de organisatie en om dit verder te laten groeien?

Mogelijk verhelderende vragen:

1. Kunt u voorbeelden geven?
2. Hoe bedoelt u dit precies?
3. Wat zou het voor u kunnen betekenen?

Afronding:

1. Vragen of de respondent toevoegingen of onduidelijkheden heeft
2. Respondent bedanken voor de tijd en moeite

Appendix D. Semi-structured interview protocol medical supportive staff (Dutch)

RQ: **What are the barriers, facilitators, and effects of the accelerated implementation of VC in a hospital setting?**

RQ: Wat zijn de belemmeringen, bevorderingen en effecten van de versnelde invoering van VC in een ziekenhuis setting?

Introductie

1. Informeren over de rechten van de respondent
2. Informeren over de structuur van het interview
3. Toestemmening vragen audio opnemen
4. Aanleiding onderzoek uitleggen

Vragen:

1. Kunt u mij uw ervaringen en mening over videoconsultatie vertellen?
2. Wat is in uw rol in het gebruik van videoconsultatie?
3. Wat gaat er in uw dagelijks werk veranderden als videoconsultatie meer wordt gebruikt?
4. Wat zijn volgens u de voordelen van videoconsultaties? (Voor u en de patiënt)
5. Wat zijn volgens u de nadelen van videoconsultaties? (Voor u en de patiënt)
6. Welke risico's zitten er volgens u aan het gebruik van videoconsultatie?
7. Waardoor zou volgens u de invoering van videoconsultatie makkelijker gaan?
8. Welke praktische aspecten van videoconsultatie maken het gebruik moeilijk?
9. Welke andere aspecten belemmeren het gebruik van videoconsultatie volgens u?
10. Denkt u dat in al deze aspecten verschillen zit tussen verschillende patiëntengroepen?
11. Door de Corona crisis is de invoering en het gebruik van videoconsultatie versnelt. Wat zouden we van deze versnelling kunnen leren? (Voor videoconsultatie of invoering van andere innovaties)
12. Hoe denkt u over het gebruik van videoconsultaties na de Corona crisis, zowel in de fase van de 1,5 meter samenleving als daarna?
13. Wat is er volgens u nodig om videoconsultatie meer te gebruiken in de dagelijkse praktijken?

Mogelijk verhelderende vragen:

1. Kunt u voorbeelden geven?
2. Hoe bedoelt u dit precies?
3. Wat zou het voor u kunnen betekenen?

Afronding:

1. Vragen of de respondent toevoegingen of onduidelijkheden heeft
2. Respondent bedanken voor de tijd en moeite

Appendix E. Semi-structured interview protocol technical and implementation staff (Dutch)

RQ: **What are the barriers, facilitators, and effects of the accelerated implementation of VC in a hospital setting?**

RQ: Wat zijn de belemmeringen, bevorderingen en effecten van de versnelde invoering van VC in een ziekenhuis setting?

Introductie

1. Informeren over de rechten van de respondent
2. Informeren over de structuur van het interview
3. Toestemmening vragen audio opnemen
4. Aanleiding onderzoek uitleggen

Vragen:

1. Kunt u mij uw ervaringen en mening over videoconsultatie vertellen?
2. Wat is in uw rol in het gebruik van videoconsultatie?
3. Wat gaat er in uw dagelijks werk veranderden als videoconsultatie meer wordt gebruikt?
4. Zijn er rondom de invoer van videoconsultatie zaken die vanwege de versnelde invoer anders gaan dan je zou verwachten wanneer dit niet versneld zou worden ingevoerd?
5. Wat zijn volgens u de voordelen van videoconsultaties? (Voor u en de patiënt)
6. Wat zijn volgens u de nadelen van videoconsultaties? (Voor u en de patiënt)
7. Welke risico's zitten er volgens u aan het gebruik van videoconsultatie?
8. Waardoor zou volgens u de invoering van videoconsultatie makkelijker gaan?
9. Welke technische aspecten van videoconsultatie maken het gebruik moeilijk?
10. Welke organisatorische aspecten van videoconsultatie maken het gebruik moeilijk?
11. Zijn er andere aspecten van videoconsultatie die het gebruik moeilijk maken?
12. Door de Corona crisis is de invoering en het gebruik van videoconsultatie versnelt. Wat zouden we van deze versnelling kunnen leren? (Voor videoconsultatie of invoering van andere innovaties)
13. Wat is er volgens u technisch en organisatorisch nodig om videoconsultatie meer te gebruiken in de dagelijkse praktijken?

Mogelijk verhelderende vragen:

1. Kunt u voorbeelden geven?
2. Hoe bedoelt u dit precies?
3. Wat zou het voor u kunnen betekenen?

Afronding:

1. Vragen of de respondent toevoegingen of onduidelijkheden heeft
2. Respondent bedanken voor de tijd en moeite

Appendix F. Link to surveys.

The survey is developed in the Qualtrics software and is accessible by using the link below.

https://utwentebs.eu.qualtrics.com/jfe/form/SV_8iREVbiTq2m65oh

The link to the survey that is distributed to the anonymous client panel of Rijnstate is as follows.

https://utwentebs.eu.qualtrics.com/jfe/form/SV_2oan84TmxCyocEB

Appendix G. Definitions of UTAUT model factors (Venkatesh et al., 2003).

Performance expectancy	
Constructs	**Definition**
Perceived usefulness	The degree to which a person believes that using a particular system would enhance his or her job performance.
Extrinsic motivation	The perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself.
Relative advantage	The degree to which using an innovation is perceived as being better than using its precursor.
Job-fit	How the capabilities of a system enhance an individual's job performance
Outcome expectations	Outcome expectations related to the consequences of the behavior.
Effort expectancy	
Constructs	**Definition**
Perceived ease of use	The degree to which a person believes that using a system would be free of effort.
Complexity	The degree to which a system is perceived as relatively difficult to understand and use
Social influence	
Constructs	**Definition**
Subjective norm	The person's perception that most people who are important to him think he should or should not perform the behavior in question.
Social factors	The individual's internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations.
Image	The degree to which use of an innovation is perceived to enhance one's image or status in one's social system.
Facilitating conditions	
Constructs	**Definition**
Perceived behavioral control	Reflects perceptions of internal and external constraints on behavior and encompasses self-efficacy, resource facilitating conditions, and technology facilitating conditions.
Facilitating conditions	Objective factors in the environment that observers agree make an act easy to do, including the provision of computer support.
Compatibility	The degree to which an innovation is perceived as being consistent with existing values, needs, and experiences of potential adopters.

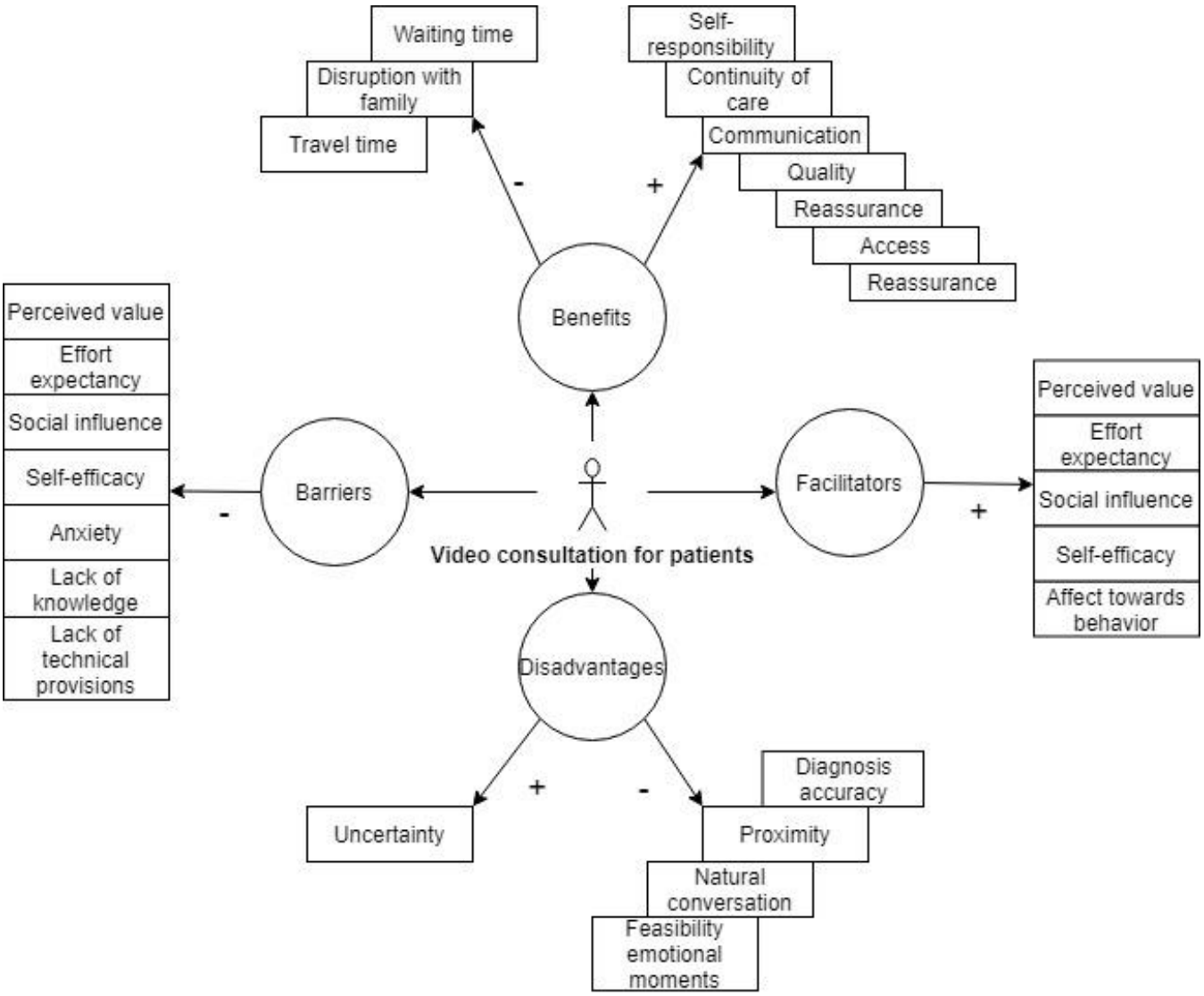
Appendix H. Models and theories of individual acceptance (Venkatesh et al., 2003)

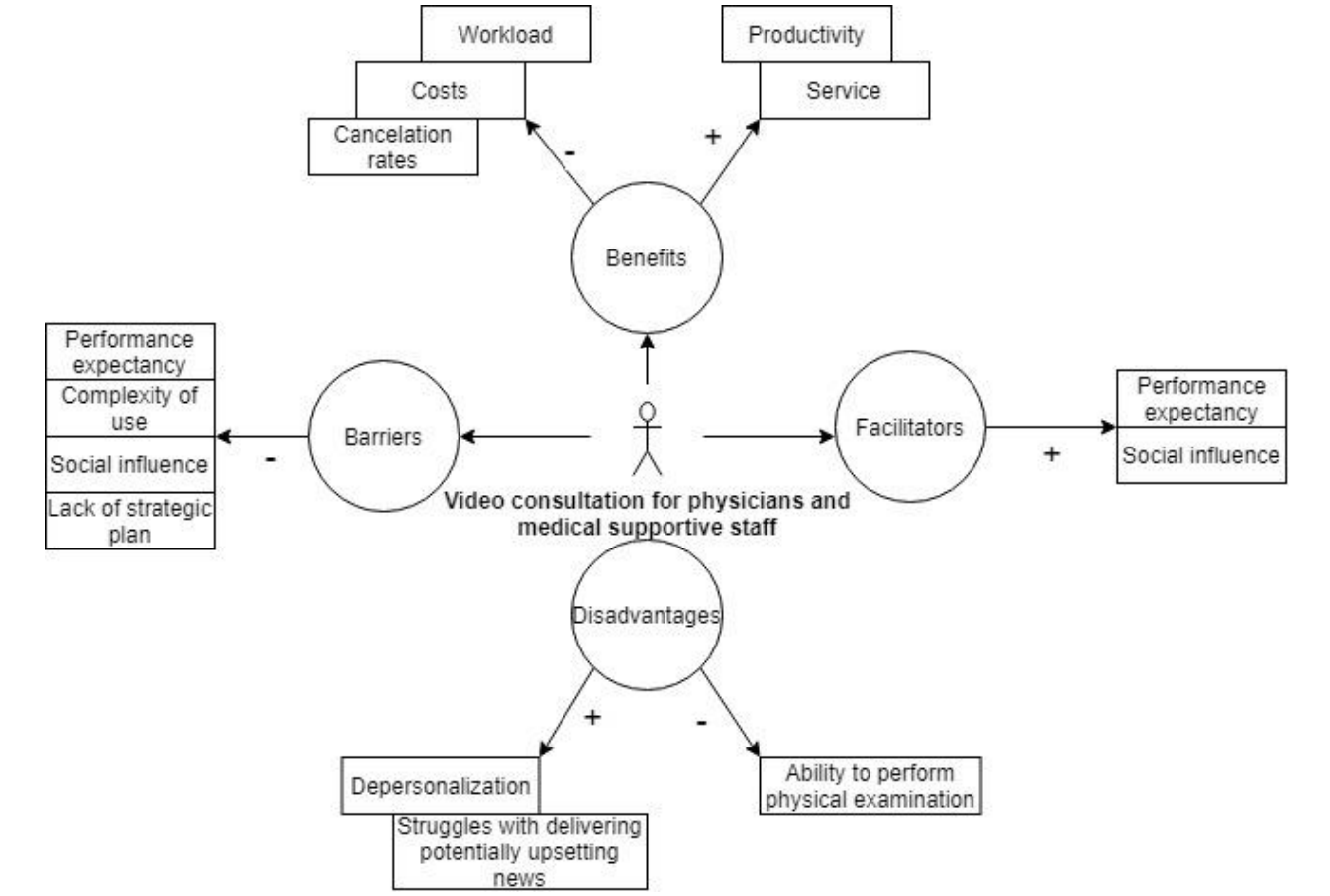
Theory of Reason Action (TRA)	**Core constructs**	**Definitions**
Drawn from social psychology, TRA is one of the most fundamental and influential theories of human behavior. It has been used to predict a wide range of behaviors.	Attitude Toward Behavior	An individual's positive or negative feelings (evaluative affect) about performing the target behavior
	Subjective Norm	The person's perception that most people who are important to him think he should or should not perform the behavior in question
Technology acceptance model (TAM)	**Core constructs**	**Definitions**
TAM is tailored to IS contexts, and was designed to predict information technology acceptance and usage on the job. Unlike TRA, the final conceptualization of TAM excludes the attitude construct in order to better explain intention parsimoniously. TAM2 extended TAM by including subjective norm as an additional predictor of intention in the case of mandatory settings.	Perceived Usefulness	The degree to which a person believes that using a particular system would enhance his or her job performance
	Perceived Ease of Use	The degree to which a person believes that using a particular system would be free of effort
	Subjective Norm	Adapted from TRNTPB. Included in TAM2 only.
Motivational model	**Core constructs**	**Definitions**
A significant body of research in psychology has supported general motivation theory as an explanation for behavior. Several studies have examined motivational theory and adapted it for specific contexts.	Extrinsic Motivation	The perception that users will want to perform an activity "because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions"
	Intrinsic Motivation	The perception that users will want to perform an activity "for no apparent reinforcement other than the process of performing the activity per se"
Theory of planned behavior (TPB)	**Core constructs**	**Definitions**
TPB extended TRA by adding the construct of perceived behavioral control. In TPB, perceived behavioral control is theorized to be an additional determinant of intention and behavior.	Attitude Toward Behavior	Adapted from TRA.
	Subjective Norm	Adapted from TRA.
	Perceived Behavioral Control	"The perceived ease or difficulty of performing the behavior". In the context of IS research, "perceptions of internal and external constraints on behavior"
Combined TAM and TPB (C-TAM-TPB)	**Core constructs**	**Definitions**
This model combines the predictors of TPB with perceived usefulness from TAM to provide a hybrid model	Attitude Towards Behavior	Adapted from TRNTPB.
	Subjective Norm	Adapted from TRNTPB.
	Perceived Behavioral Control	Adapted from TRNTPB.
	Perceived Usefulness	Adapted from TAM.

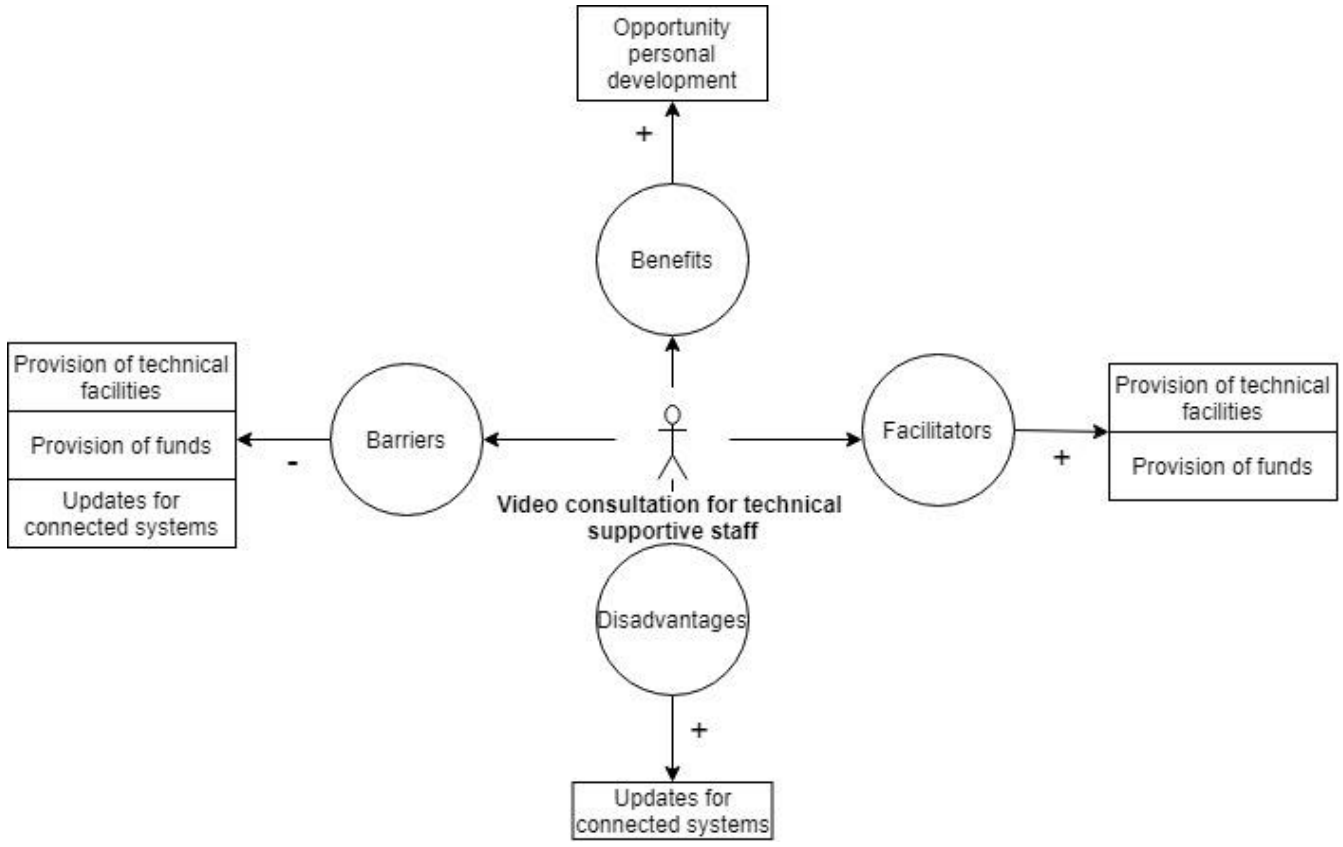
Model of PC Utilization (MPCU)	Core constructs	Definitions
This model presents a competing perspective to that proposed by TRA and TPB. The nature of the model makes it particularly suited to predict individual acceptance and use of a range of information technologies.	Job-fit	The extent to which an individual believes that using a technology can enhance the performance of his or her job
	Complexity	The degree to which an innovation is perceived as relatively difficult to understand and use
	Long-term Consequences	Outcomes that have a pay-off in the future
	Affect Towards Use	Feelings of joy, elation, or pleasure, or depression, disgust, displeasure, or hate associated by an individual with a particular act"
	Social Factors	The individual's internalization of the reference group's subjective culture, Social Factors I and specific interpersonal agreements that the individual has made with others, in specific social situations"
	Facilitating Conditions	Objective factors in the environment that observers agree make an act easy to accomplish. For example, returning items purchased online is facilitated when no fee is Facilitating Conditions 1 charged to return the item. In an IS context, "provision of support for users of PCs may be one type of facilitating condition that can influence system utilization"
Innovation Diffusion Theory (IDT)	**Core constructs**	**Definitions**
Grounded in sociology, lDT has been used since the 1960s to study a variety of innovations, ranging from agricultural tools to organizational innovation. Within information systems, these are a set of constructs that could be used to study individual technology acceptance.	Relative Advantage	The degree to which an innovation is perceived as being better than its precursor
	Ease of Use	The degree to which an innovation is perceived as being difficult to use
	Image	The degree to which use of an innovation is perceived to enhance one's image or status in one's social system
	Visibility	The degree to which one can see others using the system in the organization
	Compatibility	The degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters
	Results Demonstrability	The tangibility of the results of using the innovation, including their observability and communicability

	Voluntariness of Use	The degree to which use of the innovation is perceived as being voluntary, or of free will
Social Cognitive Theory (SCT)	**Core constructs**	**Definitions**
One of the most powerful theories of human behavior is social cognitive theory. The nature of the model and the underlying theory allow it to be extended to acceptance and use of information technology in general.	Outcome Expectations – Performance	The performance-related consequences of the behavior. Specifically, performance expectations deal with job related outcomes
	Outcome Expectations – Personal	The personal consequences of the behavior. Specifically, personal expectations deal with the individual esteem and sense of accomplishment
	Self-efficacy	Judgment of one's ability to use a technology (e.g., computer) to accomplish a particular job or task.
	Affect	An individual's liking for a particular behavior (e.g., computer use).
	Anxiety	Evoking anxious or emotional reactions when it comes to performing a behavior (e.g., using a computer).

Appendix I. Graphical representations of expectations per stakeholder.




Workload
Costs
Cancelation rates
Productivity
Service
-
+
Benefits
Performance expectancy
Complexity of use
Social influence
Lack of strategic plan
Barriers
-
Facilitators
+
Performance expectancy
Social influence
Video consultation for physicians and medical supportive staff
Disadvantages
+
-
Depersonalization
Struggles with delivering potentially upsetting news
Ability to perform physical examination


Opportunity personal development
+
Benefits
Provision of technical facilities
Provision of funds
Updates for connected systems
Barriers
-
Facilitators
+
Provision of technical facilities
Provision of funds
Video consultation for technical supportive staff
Disadvantages
+
Updates for connected systems

Appendix J. Informative letter to patients. (Dutch)

Proefpersoneninformatie voor deelname aan onderzoek

Video consultaties tijdens Corona-crisis
De belemmeringen, bevorderingen en effecten van de versnelde invoering van video consultaties in de setting van een Nederlands ziekenhuis.

Inleiding
Geachte heer/mevrouw,

Wij vragen u om mee te doen aan een onderzoek. Meedoen is vrijwillig. U ontvangt deze brief omdat u een of meerdere keren gebruik heeft gemaakt van video consultatie. Voordat u beslist of u wilt meedoen aan dit onderzoek, krijgt u uitleg over wat het onderzoek inhoudt. Lees deze informatie rustig door en vraag de onderzoeker uitleg als u vragen heeft. U kunt er ook over praten met uw partner, vrienden of familie.

1. Algemene informatie

Situatie	Uitleg
Onderzoek	Dit onderzoek is opgezet door Ilco Toebes, student aan de Universiteit van Twente. Dit onderzoek is ten behoeve van het afronden van de masterstudie Health Sciences. De opdracht wordt gefaciliteerd via en is in opdracht van het Rijnstate Ziekenhuis te Arnhem.

Voor dit onderzoek zijn respondenten vanuit verschillende afdelingen nodig. Er zullen naar verwachting 100 tot 200 respondenten meedoen.

De ethische commissie van de Faculty of Behavioural, Management and Social Science van de Universiteit van Twente heeft dit onderzoek goedgekeurd.

2. Doel van het onderzoek
Het doel van het onderzoek is het achterhalen van voor- en nadelen van het gebruik van video consultatie. Daarnaast is het doel om inzicht te krijgen in de knelpunten en kansen van de implementatie van video consultatie. Met als uiteindelijke doel om hieruit leerpunten te trekken die meegenomen worden bij de verdere invoering en het gebruik van videoconsultatie. Hierbij wordt het patiënten perspectief in de besluitvorming meegenomen.

3. Achtergrond van het onderzoek
Rijnstate Ziekenhuis heeft op meerdere afdelingen al video consultatie ingevoerd. Echter, door de Corona crisis is op andere afdelingen hier ook behoefte aan. Aangezien fysieke

consultaties in deze beperkt tot niet mogelijk zijn is de drang tot invoering sterk. Dit biedt kansen om te onderzoeken wat er meespeelt wanneer deze invoering een versnelling ondervindt en hoe Rijnstate het gebruik van video consultatie na de Corona crisis eventueel kan borgen.

4. Wat meedoen inhoudt

Als u na aanleiding van deze brief besloten hebt mee te doen, kunt op de link onderaan deze digitale brief klikken of deze overtypen in de adresbalk op internet en kan u hieraan beginnen. Deze vragenlijst zal gaan over de uw kijk op video consultatie en de invoering en het gebruik van video consultatie. Het invullen van de vragenlijst duurt 10 tot 15 minuten.

5. Mogelijke bijwerkingen/complicaties en andere/ nadelige effecten/ ongemakken

De deelname aan het onderzoek kan u geen bijwerkingen/complicaties of andere nadelige effecten/ongemakken opleveren.

6. Mogelijke voor- en nadelen

Situatie	**Uitleg**
Mogelijk voordeel patiënt	U kunt u mening laten horen over video consultatie en hiermee mogelijk het zorgproces omtrent video consultatie verbeteren.
Mogelijk nadeel patiënt	De tijd (10 tot 15 minuten) die u kwijt bent aan het invullen van de enquête.

7. Als u niet wilt meedoen of wilt stoppen met het onderzoek

U beslist zelf of u meedoet aan het onderzoek. Deelname is vrijwillig. Als u wel meedoet, kunt u zich altijd bedenken en toch stoppen, ook tijdens het onderzoek. U hoeft niet te zeggen waarom u stopt. Stel dat u stopt, maar u wilt de enquête wel hervatten op een later moment, dan kan u met dezelfde link de enquête binnen 72 uur hervatten. Hervat u de enquête niet, dan kunnen de gegevens die tot dat moment zijn verzameld, worden gebruikt voor het onderzoek.

8. Einde van het onderzoek

Uw deelname aan het onderzoek stopt als

- U alle vragen beantwoord hebt
- U zelf kiest om te stoppen
- Het Rijnstate Ziekenhuis, de Universiteit van Twente, de overheid of de beoordelende medisch-ethische toetsingscommissie, besluit om het onderzoek te stoppen.

9. Gebruik en bewaren van uw gegevens

De deelname aan dit onderzoek is geheel anoniem. Er zullen dan ook geen persoonsgegevens uitgevraagd worden. Met andere woorden, uw antwoorden zullen op geen enkele manier terug te leiden zijn naar u.

10. Geen vergoeding voor meedoen

Het invullen van de vragenlijst voor het onderzoek kost u niets. U wordt niet betaald voor het meedoen aan dit onderzoek

11. Heeft u vragen?
Bij dringende vragen en/of klachten kunt u contact opnemen met uw behandeld arts. Deze zal contact opnemen met de onderzoeker.

Dank voor uw aandacht.

Met vriendelijke groet,

Projectgroep Video Consultatie

Namens: Prof. Dr. Wim van Harten, Universiteit van Twente, Raad van bestuur Rijnstate
Namens: Ir. Mark van der Velden, Manager Informatie en Medische Technologie Rijnstate

(U kunt op de onderstaande link klikken of deze overtypen in de adresbalk op het internet. Hiermee zult u automatisch naar de online vragenlijst gaan. Alvast bedankt.)

https://utwentebs.eu.qualtrics.com/jfe/form/SV_8iREVbiTq2m65oh

Appendix K. Invitation professionals for participation (Dutch)

Beste (NAAM PROFESSIONAL),

Deze mail volgt naar aanleiding van het lopende project omtrent Videoconsultatie. Hierover is op 25 mei 2020 een e-mail over gestuurd door Sascha ten Hoeve. Hierin was aangekondigd dat ik onderzoek doe naar de belemmeringen, bevorderingen en effecten van de versnelde invoering van videoconsultatie in een ziekenhuissetting. Om extra belasting van specialismen te voorkomen, past dit onderzoek dan ook binnen het project van Videoconsultatie en worden de onderzoeksresultaten gekoppeld aan de praktijk. De begeleiding hiervoor vanuit de Universiteit Twente wordt gedaan door Wim van Harten.

Het onderzoek heeft als aanleiding de versnelling die de invoering van videoconsultatie ondergaat als gevolg van de Coronacrisis. Deze versnelling biedt ruimte voor wetenschappelijk onderzoek, waar niet alleen het perspectief van de professionals wordt meegenomen, maar ook verschillende patiëntengroepen worden geraadpleegd. Het doel is dan ook om leerpunten te trekken uit deze perspectieven om zo de verdere invoering en het gebruik van videoconsultatie te verbeteren. Daarnaast kan het ook waardevol zijn voor een mogelijke versnelling van andere innovaties.

Voor mijn onderzoek wil ik een aantal professionals interviewen. Dit betreft zowel de specialist als de spreekuur assistent, die direct betrokken zijn bij de uitvoering van een videoconsultatie. Het interview zal zo'n 30 minuten in beslag nemen, uiteraard in principe op basis van anonimiteit. Dit kan in overleg online plaatsvinden of op gepaste afstand binnen het Rijnstate.

Dit onderzoek is voor het afronden van mijn Masterstudie Health Sciences aan de Universiteit van Twente. Dit betekent dat ik de resultaten voornamelijk voor mijn onderzoek gebruik. Desalniettemin, mijn rapportage en aanbevelingen worden ter beschikking gesteld aan het Rijnstate en gebruikt voor de ondersteuning van het videoconsultatie project.

Indien u het interview zelf wilt afnemen, kunt u op mijn e-mail reageren en kunnen we een afspraak maken. Indien u een andere naam wilt aanleveren, dan hoor ik dat graag. Dit betreft dus voor zowel een specialist als een spreekuur assistent vanuit uw specialisme. Bij voorkeur is dit iemand die ervaring heeft met de invoering en/of het gebruik van videoconsultatie. Graag hoor ik van u.

Met vriendelijke groet,

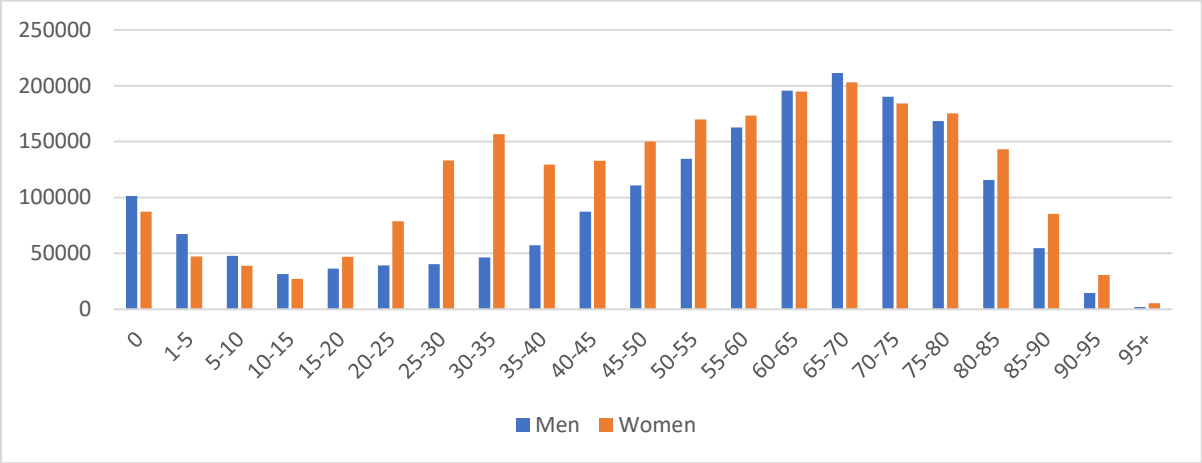
Ilco Toebes
Afstudeerder Health Sciences Universiteit Twente
Informatie en Medische Technologie

Namens projectteam Videoconsultatie
Namens Dr. Wim van Harten

Appendix L. Overview scores all statements

Category	Statements	N	Minimum	Maximum	Mean	Std. Deviation
Benefit	VC is a pleasant way of having consultations with physicians	260	1	5	2,46	1,00
Benefit	With VC I can still make use of the hospital care	260	1	5	2,28	0,87
Benefit	The possibility to have family or relatives present is a benefit	259	1	5	2,32	0,90
Benefit	VCs work just as good as normal physical consultations	259	1	5	3,25	1,09
Benefit	VCs work better than normal physical consultations	259	1	5	3,78	0,83
Benefit	I feel more responsible for my own healthcare via VCs	259	1	5	3,34	0,89
Benefit	Less travel time is a benefit of VC	260	1	5	1,74	0,82
Benefit	Less waiting time is a benefit of VC	260	1	5	2,01	0,97
Benefit	The use of VC offers me reassurance	259	1	5	2,83	0,89
Benefit	Improved communication is a benefit of VC	259	1	5	2,86	1,01
Disadvantage	With VCs, there is a risk that the physician misses out on health differences	260	1	4	2,01	0,69
Disadvantage	With VCs conversations feel unnatural	260	1	5	3,18	1,03
Disadvantage	With VCs I feel an insecurity	260	1	5	3,53	0,98
Disadvantage	VCs are not appropriate for emotional moments	260	1	5	2,54	1,03
Disadvantage	With VCs, I feel a distance with whom I am talking	260	1	5	2,99	1,01
Barriers and facilitators	I am willing to (continue) using VC after the Corona crisis	260	1	5	2,27	1,14
Barriers and facilitators	I am more inclined to use VC when it is useful for me	260	1	5	2,28	0,79
Barriers and facilitators	I am more inclined to use VC when it is valuable for me	259	1	5	2,19	0,71
Barriers and facilitators	I am more inclined to use VC when the use is easy for me	259	1	5	2,19	1,03
Barriers and facilitators	I am less inclined to use VC when the use is hard for me	258	1	5	2,39	1,12
Barriers and facilitators	I am more inclined to use VC when friends or relatives encourage me to use it	260	1	5	3,35	1,05
Barriers and facilitators	I am less inclined to use VC when friends or relatives discourage me to use it	259	1	5	3,55	1,01
Barriers and facilitators	I have sufficient technical resources to use a VC	260	1	5	1,47	0,89
Barriers and facilitators	The hospital should offer technical resources to patients to make use of VC	260	1	5	3,75	1,17
Barriers and facilitators	The hospital should offer personal technical support to patients whenever they do not understand it	260	1	5	2,08	1,01
Barriers and facilitators	Using VC as an alternative to physical consultations is a good idea	259	1	5	2,79	1,39
Barriers and facilitators	I am more inclined to use VCs whenever I can do this without any help	259	1	5	2,58	1,15
Barriers and facilitators	I am less inclined to use VCs whenever I need help to do it	259	1	5	2,42	1,10
Barriers and facilitators	I feel that I am in control during a VC	259	1	5	2,77	1,03
Barriers and facilitators	I am afraid that I do something wrong during a VC	259	1	5	3,82	1,29
Barriers and facilitators	For my medical condition it is of importance that I can make use of VC	259	1	5	3,16	1,11

Appendix M. Number of hospitalizations in The Netherlands (2012)



(Gijsen & Limburg, 2012)

Appendix N. Full group comparison specialties more than 20 respondents

Specialty(ies)	Answered significantly more often	On statement	Relative to
A	Strongly agree	I am more inclined to use VC's when it is useful for me	B, D, F
A	Strongly agree	I am more inclined to use VC's when it is valuable for me	B, D, F
A	Strongly agree	I am more inclined to use VC's if the use is easy for me	B, C, D, F
D	Strongly agree	I am less inclined to use VC's if the use is hard for me	A, C, E, F
A	Strongly agree	I have sufficient technical resources to do a VC	F
A, E	Strongly agree	Using VC's as an alternative to physical consultations is a good idea	F
B, D	Strongly disagree	Using VC's as an alternative to physical consultations is a good idea	A
F	Strongly disagree	Using VC's as an alternative to physical consultations is a good idea	A, E
A	Strongly agree	I am more inclined to use VC's if I can do it alone	F
F	Strongly disagree	I am more inclined to use VC's if I can do it alone	A, C
B	Strongly agree	I feel that I am in control during a VC	C, D
A	Strongly disagree	I am afraid that I do something wrong during a VC, such as pressing a wrong button	B, D, E, F
C	Strongly disagree	I am afraid that I do something wrong during a VC, such as pressing a wrong button	F

SIGNIFICANT DIFFERENCES BARRIERS AND FACILITATORS MEDICAL SPECIALTIES. A = GASTROINTESTINAL AND LIVER DISEASES (MDL), B =ONCOLOGY, C =INTERNAL MEDICINE, D =BARIATRICS, E =LUNG MEDICINE, AND F = SURGERY

Specialty(ies)	Answered significantly more often	On statement	Relative to
A	Strongly agree	With VC's I can still make use of hospital care	C, F
B	Strongly agree	The possibility to have relatives present with VCs is a benefit	D, F
D	Strongly disagree	VC's work just as good as normal consultation	A, E
F	Strongly disagree	VC's work just as good as normal consultation	A, B, C, E
F	Strongly disagree	VC's work better than normal consultations	A, B, E
F	Strongly disagree	With VC's I feel more responsible for my own health	A, C
A	Strongly agree	VC's have less travel time	B, F
A	Strongly agree	VC's have less waiting time	B, F
C, D, E	Strongly agree	VC's have less waiting time	F

SIGNIFICANT DIFFERENCES BENEFITS MEDICAL SPECIALTIES. A = GASTROINTESTINAL AND LIVER DISEASES (MDL), B = ONCOLOGY, C = INTERNAL MEDICINE, D = BARIATRICS, E = LUNG MEDICINE, AND F = SURGERY

Specialty(ies)	Answered significantly more often	On statement	Relative to
B	Strongly agree	With VC's there is a risk the physician misses health differences	F
A, E	Strongly disagree	With VC's I experience insecurities	D

SIGNIFICANT DIFFERENCES DISADVANTAGE MEDICAL SPECIALTIES. A = GASTROINTESTINAL AND LIVER DISEASES (MDL), B = ONCOLOGY, C = INTERNAL MEDICINE, D = BARIATRICS, E = LUNG MEDICINE, AND F = SURGERY

Appendix O. Medical specialties group comparison, Wilks' Lambda

Multivariate Tests[a] –Barriers and facilitators- All medical specialties

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,936	255,523[b]	15,000	260,000	,000
	Wilks' Lambda	,064	255,523[b]	15,000	260,000	,000
	Hotelling's Trace	14,742	255,523[b]	15,000	260,000	,000
	Roy's Largest Root	14,742	255,523[b]	15,000	260,000	,000
All medical specialties	Pillai's Trace	2,315	1,087	690,000	4110,000	,071
	Wilks' Lambda	,076	1,084	690,000	3781,805	,080
	Hotelling's Trace	2,888	1,080	690,000	3872,000	,089
	Roy's Largest Root	,435	2,588[c]	46,000	274,000	,000

BARRIERS AND FACILITATORS – ALL MEDICAL SPECIALTIES

Multivariate Tests[a] –Barriers and facilitators- Medical specialties with more than 20 respondents

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,973	708,573[b]	15,000	300,000	,000
	Wilks' Lambda	,027	708,573[b]	15,000	300,000	,000
	Hotelling's Trace	35,429	708,573[b]	15,000	300,000	,000
	Roy's Largest Root	35,429	708,573[b]	15,000	300,000	,000
More than 20 respondents	Pillai's Trace	,219	,770	90,000	1830,000	,946
	Wilks' Lambda	,799	,767	90,000	1693,696	,947
	Hotelling's Trace	,231	,766	90,000	1790,000	,949
	Roy's Largest Root	,082	1,670[c]	15,000	305,000	,056

BARRIERS AND FACILITATORS – MEDICAL SPECIALTIES WITH MORE THAN 20 RESPONDENTS

Multivariate Tests[a] –Benefits- All medical specialties

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,890	217,888[b]	10,000	268,000	,000
	Wilks' Lambda	,110	217,888[b]	10,000	268,000	,000
	Hotelling's Trace	8,130	217,888[b]	10,000	268,000	,000
	Roy's Largest Root	8,130	217,888[b]	10,000	268,000	,000
All medical specialties	Pillai's Trace	1,662	1,127	490,000	2770,000	,039
	Wilks' Lambda	,156	1,131	490,000	2659,099	,035
	Hotelling's Trace	2,090	1,136	490,000	2662,000	,031
	Roy's Largest Root	,438	2,475[c]	49,000	277,000	,000

BENEFITS – ALL MEDICAL SPECIALTIES

Multivariate Tests[a] – Benefits- Medical specialties with more than 20 respondents

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,955	661,004[b]	10,000	311,000	,000
	Wilks' Lambda	,045	661,004[b]	10,000	311,000	,000
	Hotelling's Trace	21,254	661,004[b]	10,000	311,000	,000
	Roy's Largest Root	21,254	661,004[b]	10,000	311,000	,000
More than 20 respondents	Pillai's Trace	,256	1,410	60,000	1896,000	,022
	Wilks' Lambda	,766	1,419	60,000	1634,481	,020
	Hotelling's Trace	,277	1,426	60,000	1856,000	,019
	Roy's Largest Root	,111	3,510[c]	10,000	316,000	,000

BENEFITS – MEDICAL SPECIALTIES WITH MORE THAN 20 RESPONDENTS

Multivariate Tests –Disadvantages- All medical specialties

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,788	210,859[b]	5,000	283,000	,000
	Wilks' Lambda	,212	210,859[b]	5,000	283,000	,000
	Hotelling's Trace	3,725	210,859[b]	5,000	283,000	,000
	Roy's Largest Root	3,725	210,859[b]	5,000	283,000	,000
All medical specialties	Pillai's Trace	,732	1,004	245,000	1435,000	,473
	Wilks' Lambda	,452	,998	245,000	1414,564	,498
	Hotelling's Trace	,864	,992	245,000	1407,000	,523
	Roy's Largest Root	,236	1,381[c]	49,000	287,000	,057

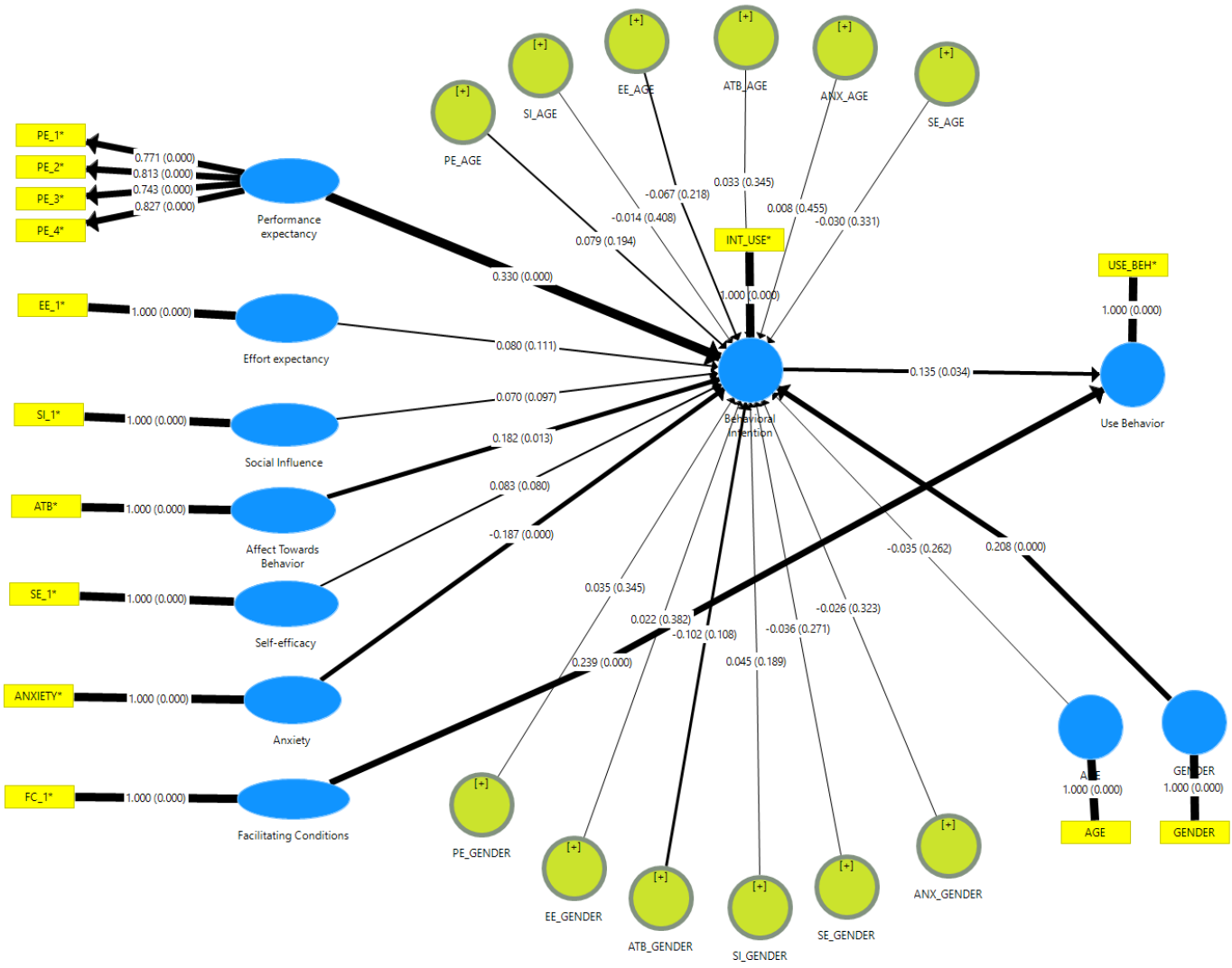
DISADVANTAGES – ALL MEDICAL SPECIALTIES

Multivariate Tests –Disadvantages- Medical specialties with more than 20 respondents

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,910	661,811[b]	5,000	326,000	,000
	Wilks' Lambda	,090	661,811[b]	5,000	326,000	,000
	Hotelling's Trace	10,150	661,811[b]	5,000	326,000	,000
	Roy's Largest Root	10,150	661,811[b]	5,000	326,000	,000
More than 20 respondents	Pillai's Trace	,105	1,183	30,000	1650,000	,228
	Wilks' Lambda	,898	1,183	30,000	1306,000	,228
	Hotelling's Trace	,109	1,182	30,000	1622,000	,229
	Roy's Largest Root	,053	2,920[c]	6,000	330,000	,009

DISADVANTAGES – MEDICAL SPECIALTIES WITH MORE THAN 20 RESPONDENTS

Appendix P. Extended UTAUT from Smart PLS with moderators



Appendix Q. Path coefficients and significance of moderators of Extended UTAUT

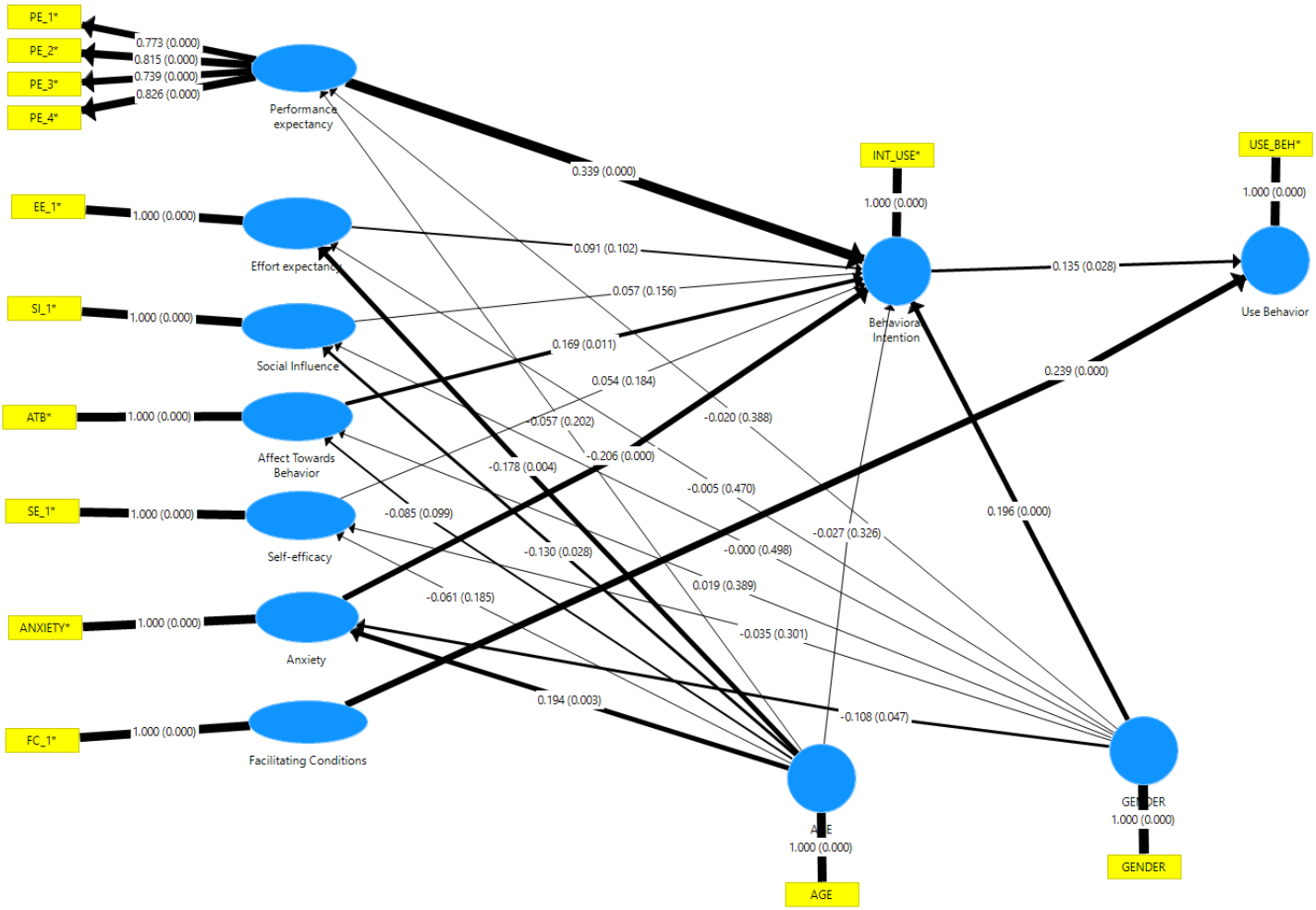
Moderator	Effect on Behavioral intention	Path Coefficient (β)	Significance (p)
Age	Performance expectancy	0,079	0,182
	Effort expectancy	-0,067	0,202
	Social influence	-0,014	0,404
	Affect towards behavior	0,033	0,347
	Self-efficacy	-0,030	0,326
	Anxiety	0,008	0,453
Gender	Performance expectancy	0,035	0,337
	Effort expectancy	0,022	0,374
	Social influence	0,045	0,188
	Affect towards behavior	-0,102	0,117
	Self-efficacy	-0,036	0,260
	Anxiety	-0,026	0,307

Appendix R. f Square (effect size) and Cronbach's Alpha of Extended UTAUT

(f Square) Variable	Effect on Behavioral Intention	Use Behavior	Cronbach's Alpha
Age	0,002		1,000
Age (moderates) Anxiety	0,000		1,000
Age (moderates) Performancy expectancy	0,004		1,000
Age (moderates) Effort expectancy	0,004		1,000
Age (moderates) Self-efficacy	0,001		1,000
Age (moderates) Social influence	0,000		1,000
Age (moderates) Affect towards behavior	0,001		1,000
Gender	0,067		1,000
Gender (moderates) Anxiety	0,001		1,000
Gender (moderates) Performance expectancy	0,001		1,000
Gender (moderates) Effort expectancy	0,000		1,000
Gender (moderates) Self-efficacy	0,001		1,000
Gender (moderates) Social influence	0,003		1,000
Gender (moderates) Affect towards behavior	0,008		1,000
Anxiety	0,050		1,000
Performance expectancy	0,091		0,798
Effort expectancy	0,007		1,000
Self-efficacy	0,008		1,000
Social Influence	0,007		1,000
Affect Towards Behavior	0,029		1,000
Behavioral Intention		0,019	1,000
Facilitating Conditions		0,059	1,000

Effect size of 0.02, 0.15, and 0.35 suggest small, medium, and large effects, respectively. Cronbach's Alpha indicates reliability, values above 0,7 are considered reliable.

Appendix S. Extended UTAUT model from Smart PLS, additional findings



Appendix T. Extended UTAUT table from Smart PLS, additional findings

Effect	Path coefficient (β)	Significance (p)
Age -> Affect Towards Behavior	-0,085	0,099
Age -> Anxiety	0,194	0,003
Age -> Behavioral Intention	-0,027	0,326
Age -> Effort expectancy	-0,178	0,004
Age -> Performance expectancy	-0,057	0,202
Age -> Self-efficacy	-0,061	0,185
Age -> Social Influence	-0,130	0,028
Affect Towards Behavior -> Behavioral Intention	0,169	0,011
Anxiety -> Behavioral Intention	-0,206	0,000
Behavioral Intention -> Use Behavior	0,135	0,028
Effort expectancy -> Behavioral Intention	0,091	0,102
Facilitating Conditions -> Use Behavior	0,239	0,000
Gender -> Affect Towards Behavior	0,019	0,389
Gender -> Anxiety	-0,108	0,047
Gender -> Behavioral Intention	0,196	0,000
Gender -> Effort expectancy	-0,005	0,470
Gender -> Performance expectancy	-0,020	0,388
Gender -> Self-efficacy	-0,035	0,301
Gender -> Social Influence	0,000	0,498
Performance expectancy -> Behavioral Intention	0,339	0,000
Self-efficacy -> Behavioral Intention	0,054	0,184
Social Influence -> Behavioral Intention	0,057	0,156

Appendix U. List of abbreviations

CDSS	Clinical decision support systems
EPR	Electronic personal health records
HIE	Health information exchange
HIT	Health Information Technology
ICT	Information and communication technology
IMT	Information and Medical Technology
KNO	Otorhinolaryngology
MDL	Gastrointestinal liver diseases
m-Health	Mobile health
mPHR	Mobile personal health records
p-Health	Personalized health
SRMR	Standardized Root Mean Score Residual
UTAUT	Unified Theory of Acceptance and Use of Technology
VBHC	Value Based Healthcare
VC	Video consultation
WHO	World Health Organization