MASTER THESIS

Implementing Video Consultation in health care

Influential factors in the adoption of video consultation among tuberculosis nurses working at the municipal health service in the North East region of the Netherlands.

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PREFACE

This thesis is constructed as part of the Master Health Sciences with a focus on Innovations in public health at the University of Twente. The assignment was carried out at the GGD Twente in Enschede, the Netherlands. I have learned a great deal and I would, therefore, like to show gratitude to the people who have supported me during the final period of my studies.

Firstly, I would like to thank my university supervisors M.R. Vollenbroek-Hutten and A.J. Konijnendijk for their constructive and valuable feedback that helped shape my thesis. Annemieke and I discussed the foundation and method of the study. Her input and guidance added substantially to the credibility and quality of the study. Apart from her contribution to my thesis, she also introduced me to the academic world of Implementation Science.

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Lastly, I would like to offer recognition to all colleagues of the GGD Twente who I came into contact with. They have provided me with a welcoming place to work and valuable experiences. Everyone treated us as 'one of their own' and involved us in all aspects they perceived as enjoyable or educational.

I hope you will enjoy reading this thesis.

Lauren Faye Ancion

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ABSTRACT

Introduction Tuberculosis (TB) is an infectious disease which can easily spread and has a high mortality rate if no treatment is given. The continuous strengthening of the surveillance and screening of Tuberculosis (TB) is necessary to keep control of this infectious disease in the Netherlands. All patients with TB or a latent TB infection (LTBI) will be treated by a TB-nurse working at a municipal health service. The nurse monitors the health of the patient and the medication adherence to take correcting measures if necessary. The current treatment could be complemented with eHealth technologies, such as Video Consultation (VC). VC could make it easier for patients and nurses to contact each other and could, therefore, benefit the treatment. VC would save both parties time and travelling and could, thereby, reduce health care costs without negatively impacting the patient-centred approach. Adding VC to the consultation options will change the way nurses treat their patient. Additionally, it leads to the introduction of a technological aspect to the treatment. Even if the technology works flawlessly, poor implementation could still lead to rejection by users. Therefore, careful and thorough implementation of new technologies is important. Insights into the innovation process could prevent rejection and optimize implementation. The innovation process describes the overall process of initial acquaintance with an innovation up until the complete integration. The current study concentrated on the adoption phase, which refers to the initial acquitting and processing of information about the innovation and deciding on whether to use the innovation (i.e. behavioural intention). Data on the implementation and use of VC in TB/LTBI treatment is currently lacking. This study aims to answer the following research question: What are the facilitating and impeding factors that influence the adoption of VC by TB-nurses in the Netherlands?

Methods This study made use of semi-structured individual interviews with TB-nurses of the eight municipal organisations in the North East region of The Netherlands. These organisations participate in an eHealth pilot study where VC is added to the consultation options. A theoretical framework was constructed based on the Fleuren framework and was complemented with elements from other models. The factors of the framework were divided into four categories: the innovation, the user (i.e. the nurse), the organisation, and the socio-political context. With the use of the theoretical framework, an interview guide was set up to examine the facilitating and impeding factors influencing the adoption of VC in their treatment of patients with TB. The interviews were fully transcribed, coded, and analysed based on the theoretical framework. When topics were mentioned that did not fit the framework, they were added afterwards. Additionally, relations between nurses and between factors are examined.

Results The results show several factors that are relevant for the adoption of VC. Factors related to the innovation are: complexity, compatibility, relevance for the client, and perceived usefulness. Factors related to the user are: support, self-efficacy, knowledge and experience, awareness of the content of the innovation, need, and attitude. Factors related to the organisation are: a formal ratification by management, staff capacity, time available, materials and resources, unsettled organisation, and readiness of the organisation. The factor of the socio-political context is not directly relevant for adoption. In addition to the theoretical framework, the factor of job security is found.

Conclusion It can be concluded that many factors influence the adoption of VC among TB-nurses. Which factors influence the adoption can differ per nurse and per organisation. Targeted actions per factor need to be undertaken in order to facilitate adoption and eventually optimize implementation, of which recommendations are made in this study. Additionally, recommendations are made for the upscaling of VC in the Netherlands. Overall, the introduction of VC to the working method is a valuable addition for the TB-nurses. It provides the nurses with more options to conduct a consultation, but should not serve as a replacement of the current consultation options. It is important to obtain the cooperation of the IT department and to provide a secured VC application. When VC is adopted it has the potential to increase efficiency in the nurses' work but more research is required to provide insight into the benefits for the nurses and patients, influential factors in the continuation of the innovation process of VC, increased efficiency, and cost-effectiveness.

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TERMS AND ABBREVIATIONS

Term	Explanation
Adoption	Initial acquitting and processing of information about an innovation and deciding on whether to use the innovation (behavioural intention)
Continuation	The decision of the intended professional or organisation to (dis)continue using the innovation
Consultation	A meeting with an expert, such as an medical doctor or nurse, to formally discuss their treatment and health.
Dissemination	Active spread of new practices to the intended population with the use of planned strategies
eHealth	Health care services provided electronically via the internet. Common synonyms: telehealth, telemedicine, health IT systems, digital health.
Implementation	When the innovation is put into daily practice by the intended professional (behaviour)
Innovation process	The overall process of going through an innovation from initial acquaintance with an innovation to the complete integration
Innovation strategy	A plan made by the organisation to guide and encourage the overall innovation process
North East region	The eight regions in the northern and eastern regions of the Netherlands as divided by the umbrella organisation of the Dutch municipal health services (GGD).
Video Consultation	A remote consultation with the use of an online connection that provides both audio and visual contact (see consultation)

Abbreviation	Explanation
DOT	Directly Observed Treatment
GDPR / AVG	General Data Protection Regulation (similar to the Dutch AVG law: *Algemene Verordening Gegevensbescherming*)
GGD	Dutch denomination for municipal health services: *Gemeentelijke Gezondheidsdienst*
GP	General Practitioner
ICT / IT	Information, Communication and Technology / Information Technology
KNCV-Tuberculosis Foundation	*Koninklijke Nederlandsche Centrale Vereeniging* - Tuberculosefonds
LTBI	Latent Tuberculosis Infection
MIDI	Measurement Instrument for Determinants of Innovation
QIF	Quality Implementation Framework
RIVM	National Institute for Public Health and the Environment (*Rijksinstituut voor Volksgezondheid en Milieuhygiëne*)
RTC REC North East	Regional cooperation of the North East*: Regionaal Tuberculose Consulent Regionale Expertice Centrum Noord Oost.*
SD	Standard Deviation: a quantity expressing by how much the members of a group differ from the mean value for the group
TB	Tuberculosis (Dutch abbreviation: *TBC*)
UT	University of Twente
UTAUT / TAM	Unified Theory of Acceptance and Use of Technology / Technology Acceptance Model
VC	Video Consultation
WHO	World Health Organization
WMO	Medical Research Involving Human Subjects Act (*Wet Medisch-Wetenschappelijk Onderzoek met mensen*)

1. INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by bacteria from the *Mycobacterium tuberculosis* complex and has a high mortality rate of TB if no treatment is given (1). The bacteria most commonly infect the lungs as pulmonary TB. However, they can also infect other sites of the body as extrapulmonary TB. If a pulmonary TB infection occurs, the bacteria can be present in a latent state or in an open state. The majority of the infected people have a latent TB infection (LTBI), which means the host will not experience symptoms and is not infectious to others because the number of bacteria present in the body is low. However, about five to ten per cent of the infected people will have open TB. They will experience symptoms and they can infect others. The infection is easily spread through airborne transmission. By, for example, coughing the TB bacteria are expelled into the air (2) and transferred to another person. If the immune system of a LTBI patient fails, they could develop TB and become infectious as well. If TB is not controlled properly, an outbreak could easily occur.

A global initiative to eliminate TB was initiated in 2014 by the World Health Organization (WHO). The goal is to reduce the incidence by 90% and the mortality by 95%. The Netherlands is, like other European countries, a country with a low TB-incidence. The Dutch government has organized and maintained effective strategies to control TB. These strategies have led to stable numbers of TB-patients and increased detection of LTBI patients (3), as can be seen in Figure 1. However, with an ongoing flow of immigrants from countries with higher TB-incidence, the continuous strengthening of the surveillance and screening of TB is necessary to keep control of the situation. In 2017, the majority of reported patients in the Netherlands were born abroad (74%), predominately originating from Eritrea and Morocco (Figure 1). Preliminary data for 2018, report 77% of the Dutch TB-patients to be born abroad and a slight increase in TB cases (4).

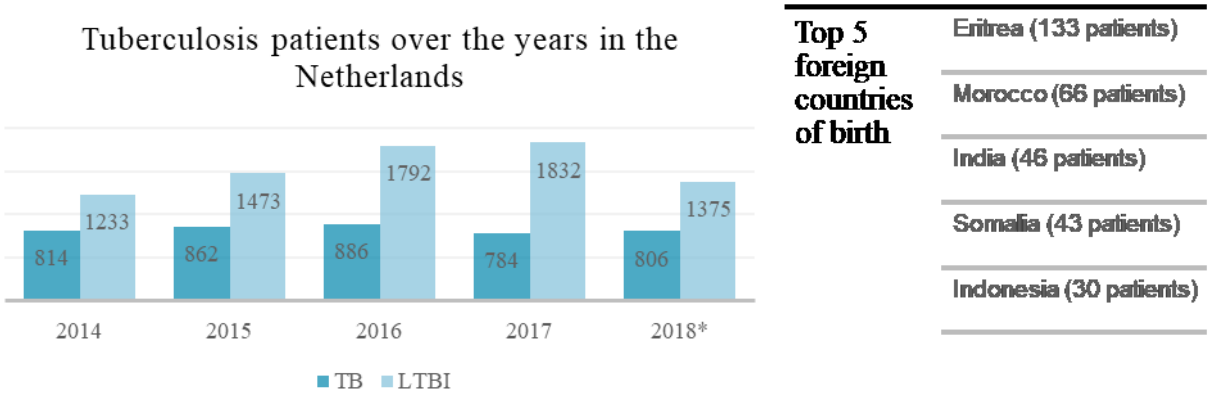

Figure 1. (left) The number of TB/LTBI cases in the Netherlands (3) *the data for 2018 is preliminary data. (right) The top 5 countries of birth of the non-native Dutch TB-patients in 2018, based on preliminary data (3).

Effective drugs exist to cure the patients, prevent drug-resistance, and limit transmission (1). In the Netherlands, TB treatment requires multidisciplinary guidance and the intake of multiple drugs. Medication adherence is crucial for the success of the medication. Standard medication for a TB infection consists of an "intensive phase" of two months and a "continuation phase" of four months where medication is taken daily. The first phase aims to quickly reduce the number of bacteria in the lungs. This is done by using isoniazid, rifampicin, pyrazinamide and ethambutol. The second phase aims to kill off the rest of the bacteria and achieve sterilization. This is done by using isoniazid and rifampicin. As long as the sensitivity to the drugs is unknown, ethambutol is always added. Standard medication for LTBI patients consists of four options: six months of isoniazid daily, three months of isoniazid and rifampicin daily, four months of rifampicin daily, or directly observed treatment (DOT) consisting of three months of rifapentine with isoniazid weekly.

Each tuberculosis case, or suspicion of, has to be reported to a municipal health service (further referred to as the Dutch denomination *Gemeentelijke Gezondheidsdienst*: GGD) (1). The GGD is an umbrella name for municipal organisations that provide a number of services mandatory by the Dutch law with regards to public health. Once a case has been reported to a GGD organisation, the notification

has to be forwarded to the National Institute for Public Health and the Environment (RIVM) within one week. TB-patients often experience symptoms which leads them to visit a doctor. However, about 20% of the cases are found through active investigation by TB-nurses (3, 5). The active investigation includes screening target populations and researching contacts of known patients. This investigation is conducted by TB-nurses and plays an important role in the control of TB in the Netherlands.

All patients receiving TB treatment will be guided by a TB-nurse from the GGD in order to guard the health of the patient and protect the collective wellbeing (1, 6). If the patient does not adhere to his medication, TB can easily spread and resistance to the medication could occur. The treatment by a TB-nurse is a vital aspect since medication adherence is difficult in such long trajectories (1). Also, TB is often accompanied by turbulent emotions and experiences which can lead to commotion (1). A TB-nurse monitors the patient and medication adherence to take correcting measures if necessary. The first consultation often takes place within three days after diagnosis to minimize the commotion and acquire the necessary information. During treatment, three types of consultations are possible to guide the patient: appointments at the GGD location, telephone consultations, and house visits. The intensity of consultations ranges from a number of appointments during treatment to daily contact. Which type of consultation is necessary at what time is assessed by the treating TB-nurse.

New eHealth technologies have the potential to contribute to high quality and efficient care while using a patient-centred approach. However, these methods to support and guide patients are currently rarely used by TB-nurses in the Netherlands (6). One of the eHealth technologies that could be valuable for TB treatment is Video Consultation (VC) (7). VC is a form of telemedicine that uses technology to provide a real-time visual and audio connection between the patient and the nurse in order to conduct a patient assessment (8). This technology is particularly patient-friendly and efficient in relatively large geographical distances between the nurses and their patients. Especially in the North East region of the Netherlands, the TB-nurses cover large parts of the country as can be seen in Figure 2. It allows the nurse to have visual contact with the patient without being present at the same location. It is believed VC could make it easier for patients and nurses to contact each other and could, therefore, benefit the treatment. VC would save both parties time and travelling and could, thereby, reduce health care costs without negatively impacting the patient-centred approach. However, more information on the need for VC and the precise consequences of using VC in the TB/LTBI treatment in the Netherlands is necessary. The GGD organisation in the north east regions and the KNCV-Tuberculosis Foundation have started a pilot eHealth where VC is added. In this pilot study, the nurses can experience what VC can mean to them and data on the effectiveness of VC can be gathered.

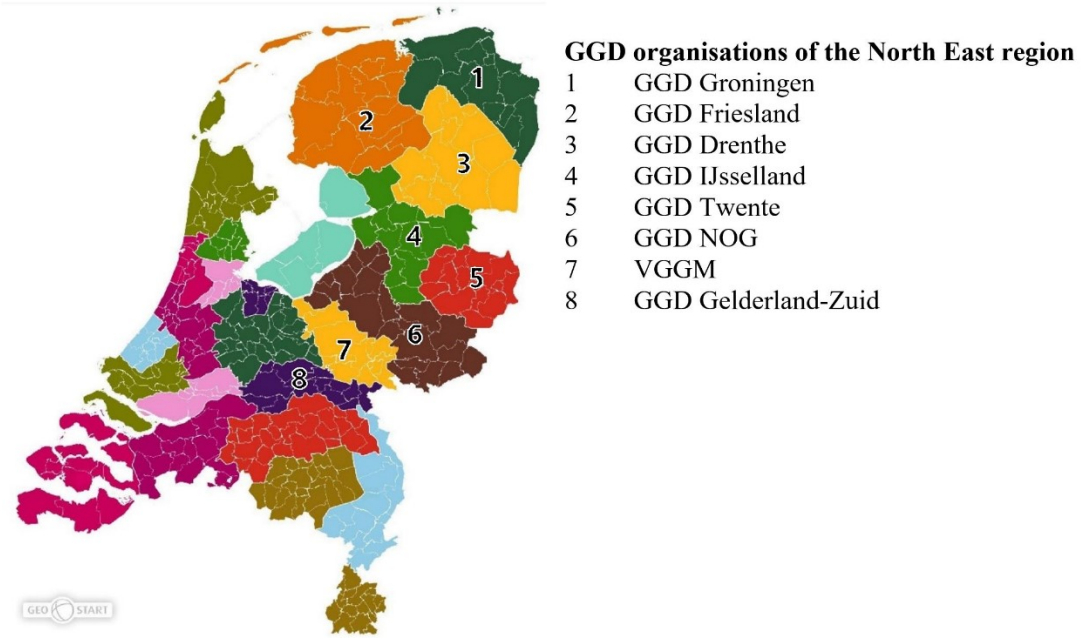

Figure 2. A map of the regions covered by each GGD in The Netherlands with the organisations of the North East region numbered one to eight (www.regiosatlas.nl).

When applying eHealth technologies, it is important the data is processed and stored in a secured manner. In the Netherlands, all processes that handle personal data should comply with the General Data Protection Regulation (GDPR, or in Dutch the *Algemene Verordening Gegevensbescherming*: AVG). In the case of VC, it is important that the application does not store sensitive data of the patient and that a safe internet connection is set up.

Adding VC to the consultation options will change the way TB-nurses treat their patient. In addition to implementing a new working method, the nurses will be exposed to technological aspects as well. Careful and thorough implementation of new technologies is important. Even if the technology works flawlessly, poor implementation could still lead to rejection. Implementation science provides a better understanding and explanation of how and why the implementation of innovations succeeds or fails (9). The need to establish theoretical bases of implementation and strategies to facilitate implementation has been widely recognized. Frameworks and models can be used to identify facilitating and impeding factors relevant to various aspects of the innovation process. Consequently, these identified factors can be used to construct strategies that improve the innovation process.

Data on the implementation and use of VC in TB/LTBI treatment is currently lacking. Therefore, insights into the innovation process of implementing VC are required. The innovation process describes the overall process of initial acquaintance with an innovation up until the complete integration. Within the field of innovation and implementation, many terms are used for slightly different purposes. Some general terms include diffusion, dissemination, adoption and implementation. The definitions of these terms, as explained by Davis and Taylor-Vaisey (10) and Grol and Wensing (11), are given in Table 1. The current study concentrates on the adoption, which refers to the initial acquitting and processing of information about the innovation and deciding on whether to use the innovation (i.e. behavioural intention). Adoption precedes actual implementation and maximizing the adoption will benefit the further course of the innovation process. This study aims to answer the following research question: What are the facilitating and impeding factors that influence the adoption of VC by TB-nurses in the Netherlands?

Table 1. General terms used in innovation and implementation and their definition in health care (10, 11).

Term used in innovation	Definition in health care
Diffusion	Distribution of information and the practitioners' natural, unaided adoption of policies and practices
Dissemination	Communication of information to practitioners to increase knowledge or skills; more active than diffusion and aimed at target population
Adoption	Positive attitude and the decision to change their process
Implementation	Introduction of the innovation into the daily routine

1.1. Overview of literature

This section will provide an overview of existing literature related to the implementation and use of VC. It is divided into three topics: literature specifically on (factors influencing) the implementation and use of VC, literature on (factors influencing) the implementation and use of technological innovations by nurses, and a brief overview of implementation frameworks and models.

1.1.1. Video Consultation in nursing care

Literature regarding one-on-one VC between nurses and their patients in developed countries is scarce. Most literature on VC concerns in-person consultations between a doctor and a patient where a specialist is added through video connection (specialist VC) or is situated the rural areas of a low-income country. However, some information on which factors could influence the innovation process of VC could still be extracted from this literature. These factors will be discussed below.

With several studies, Johansson and Johansson, Söderberg and Lindberg (12-14) examined the implementation of specialist VC in Sweden. The results of her studies show that preliminary evaluation of economic aspects (i.e. materials and personal resources), training, and technical support are important according to personnel. Health care staff do identify advantages of VC if it functions well and it is considered to save time and money. However, a patient-centred approach is thought to be necessary to

prevent patients from refusing specialist consultation. The results also reveal that patients prefer to decide themselves between video or in-person consultation. Their preference is to first meet the specialist physician in-person and secondly, via specialist VC with the general practitioner (GP) in the room.

When implementing video conferencing technology one should be cautious about the different roles a nurse has to play when new technologies are implemented (15). Their new role, that of telehealth coordinator, is imposed on them, for which they might not be prepared. This concept is based on Role Theory, which hypothesizes that expectations held by the individual and other people guide human behaviour (16). This theory also states that a variety of roles could lead to role overload, which can be the case for nurses implementing new technologies.

Furthermore, introducing VC in health and social care can be characterized as a digital change. A recent report on this topic distinguishes five general key themes for successful digital change management, including leadership and management, user engagement, information governance, partnerships, and resourcing and skills (17). In the report itself, an extensive explanation is given with the use of case studies including some barriers they overcame. For example, when discussing the resourcing and skills theme, the authors explain that "good resources and skill management does not just mean being efficient with finances, or maximising people's capacity. A lot of it concerns how you manage and motivate the workforce delivering the change, ranging from upskilling clinical leaders to ensuring that the informatics team are equipped with the infrastructure they need." (17)(p68).

1.1.2. Technological innovation in nursing care

The following paragraph will provide an overview of research on technological innovation among nurses. As aforementioned, research on nurses' perceptions of VC and its use in a relevant context is scarce. The perception of nurses on the use of computers and technology and the implementation of technology could be similar to nurses' perceptions of VC. Therefore, the literature on these topics is equally relevant. Factors that could influence the innovation process of technological innovations will be discussed below.

Several studies with regards to technology in health care are conducted on the attitude of nurses. Lam, Nguyen, Lowe, Nagarajan and Lincoln (18) examined how health care professionals' attitude towards engaging in eHealth is affected by confidence and perceived self-efficacy for learning new ICT-skills (Information, Communication and Technology). Their multiple regression analyses show that prior Information Technology (IT) training, confidence, and self-efficacy were significantly related to nurses' attitude towards using eHealth. Additionally, Huryk (19) examined factors that influence the attitude towards health care information technology. Main factors for positive attitudes were increased computer experience, a system that was easy to use or integrated well into the workflow, the perception of enhanced patient safety or care, and positive and supportive attitudes from the administration. Factors for opposite attitudes mainly consisted of poor system design, system slowdown, system downtime, and fearing the dehumanization of patient care. However, nurses with positive as well as negative attitudes did not want to revert back to paper once the technology had been implemented. The authors also refer to two change theories that layout phases people go through when changes arise: Rogers' diffusion of innovation (20) and Lewin's change theory (21). According to Lewin people must first be aware of a problem with the current situation and that improvements are possible. Secondly, they must be willing to change and lastly, they must be compatible with the change concerned. According to Rogers people must first be aware of the innovation in question and its benefits. Secondly, they must decide to use and implement the innovation. Lastly, some feedback on improvements due to the innovation is required in order for it to last.

Others studies focussed more on the explanation of computer usage acceptance. Daly (22) examined two external variables, namely the perceived usefulness and ease of use. These variable are indicated to be key determinants for the internal attitude and intention to use the targeted technology (23, 24). The results show that the perceived usefulness and ease of use are indeed deciding factors in the use of electronic documentation. Additionally, 64% of the nurses believed computers to offer a remarkable opportunity to improve patient care. Further examination of the nurses' use of health care technology by Strudwick (25) provided strong indications that perceived usefulness is a direct predictor of technology acceptance among nurses. The technology is considered useful if it improves care quality, enhances patient safety, or increases efficiencies. Furthermore, ease of use can directly predict

acceptance, but not always. Nurses are also more likely to believe a technology is useful if they find the technology easy to use, indicating a relation between ease of use and perceived usefulness. The abovementioned research made use of a model to examine health technology usage. However, their results also include factors that were not included in the original model but could explain possible variance in behavioural intention. Among others, these included facilitating conditions, personality traits, self-efficacy, and experience. Finally, Strudwick (25) concluded that nurses often work in complex environments and, therefore, adding variables can provide a more holistic understanding of nurses' use of health care technology. The authors also indicated that nurses' input is important to ensure acceptance.

Using new technologies requires an understanding of the determinants that influence the implementation of the technology. De Veer, Fleuren, Bekkema and Francke (26) examined these determinants as perceived by Dutch nursing staff. In order to do so, they applied the insight of the Fleuren framework (27), which was designed for analysing determinants of innovation processes in health care. Half of the respondents that experienced the introduction of a new technology rated this as positive. The determinants that were found to influence the innovation process had an impeding effect twice as often as an enhancing effect. Most determinants were related to the technology itself. For example, the perceived relative advantage and the functionality of the technology were frequently mentioned. Determinants related to the user and organisation were mentioned more or less equally. Examples include collegial support, lack of skills, involvement in the development, and time available to adopt and use the technology. Furthermore, the researchers examined the characteristics of the innovation strategy that could influence the introduction of technological innovation. The most frequently mentioned factor was training and coaching.

1.1.3. Frameworks and models for the implementation of innovations in health care

The following paragraph will provide an overview of relevant frameworks and models used for the implementation of innovation. The use of theoretical bases can facilitate the implementation of technological innovation in health care. Frameworks and models can be used to identify factors relevant to various aspects of implementation. Several relevant frameworks and models will be discussed below.

The Fleuren framework (27) has been used in several Dutch studies. It has been applied for the introduction and evaluation of innovations in health care and education settings. As aforementioned, the framework has also been applied to the implementation of technology, although less frequent. The Fleuren framework divides the process of innovation into four stages (i.e. dissemination, adoption, implementation, continuation), which are indicated to be critical phases where a change is desired to serve the innovation process. The dissemination phase refers to the active spread of new practices to the intended population with the use of planned strategies. The adoption phase refers to the initial acquitting and processing of information about the innovation and deciding on whether to use the innovation (behavioural intention). The implementation phase refers to the moment when the innovation is put into daily practice by the intended professional (behaviour). The continuation phase refers to the decision of the intended professional or organisation to (dis)continue using the innovation. To better understand and guide the process of designing fruitful innovation strategies, a detailed understanding of determinants that influence the four stages is necessary. Fleuren, Wiefferink and Paulussen (27) indicated that the transition from one stage to the next can be affected by various determinants. These determinants are divided into four categories: characteristics of the innovation, the potential user of the innovation, the organisational context of the user, and the socio-political context. Innovation strategies, targeted to specific determinants, aim to facilitate the desired behaviour for successful innovation. An overview of the framework can be found in Figure 3. Additionally, Fleuren, Paulussen, van Dommelen and van Buuren (28, 29) have developed a Measurements Instrument for Determinants of Innovation (MIDI) as a validated tool to improve the understanding of determinants that may affect the stage of implementation. It is based on empirical studies that used the list of potential determinants and comments by implementation experts to facilitate consensus about the operationalization of each determinant. An overview of these determinants can be found in Appendix 1a.

Simultaneously with the Fleuren framework, a method and a model for the diffusion of innovations in health service organisations are discussed by Greenhalgh, Robert, Bate, Macfarlane and Kyriakidou (30). In complex situations with many interactions, the model can be used as a tool for considering the different aspects. It includes aspects of the innovation, adopter, assimilation,

implementation process, outer context, communication and influence, system antecedents, system readiness, and linkage. A more elaborate overview of the model can be found in Appendix 1b. In their article, the authors noted: "A recently published review of diffusion of innovations aimed at changing individual clinician behaviour, not available when we were developing our model, was consistent with our own conclusions." (30)(p614), while referring to the previously mentioned Fleuren framework.

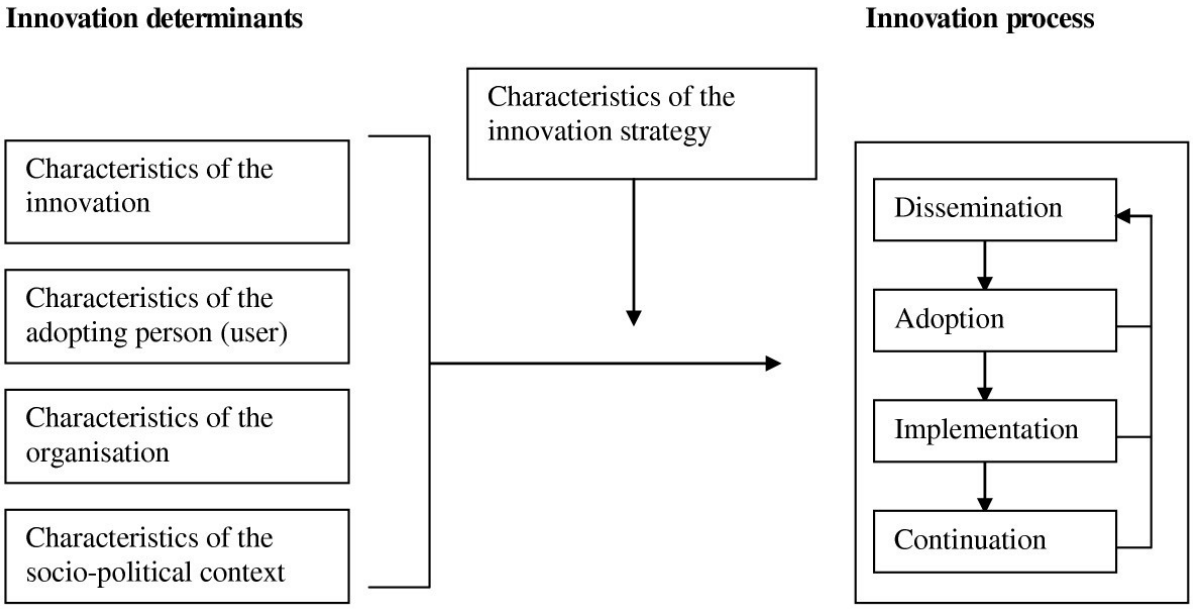

Figure 3. The innovation process described by Fleuren (22).

To add to the understanding of the complex and dynamic nature of implementation, Meyers, Durlak and Wandersman (31) discussed a Quality Implementation Framework (QIF) synthesized from the information of 25 existing implementation frameworks. Herein, they identified fourteen critical steps that comprised four QIF phases: initial considerations regarding the host setting, creating a structure for implementation, ongoing structure once implementation begins, and improving future applications. Details on the fourteen critical steps can be found in Appendix 1c. The authors conclude that many factors affect the level of implementation attained and indicate that the QIF critical steps can be used as a guide for future research and practice.

Another model, used for understanding drivers of technology acceptance, is the UTAUT. Venkatesh, Morris, Davis and Davis (32) reviewed and empirically compared eight competing models and formulated the UTAUT. They found several constructs that appeared to be determinants of intention or usage. Their results provided strong empirical support and indicated two direct determinants of usage (i.e. intention and facilitating conditions) and three direct determinants of intention to use (i.e. performance expectancy, effort expectancy, social influence). Performance expectancy consists of perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations. Effort expectancy consists of perceived ease of use, complexity, and ease of use. Social influence consists of subjective norm, social factors, and image. Facilitating conditions consists of perceived behavioural control, facilitating conditions, and compatibility. The remaining constructs, attitude towards using technology, self-efficacy and anxiety, are theorized not to be direct determinants of intention. Since self-efficacy and anxiety are often measured without controlling for effort expectancy, the authors explain that they expect those determinants to be indistinguishable from effort expectancy and have no direct effect on intention above and beyond effort expectancy. Additionally, attitudinal constructs appeared to only be significant when constructs related to performance and effort expectancies are not included. Therefore, the authors considered any observed relationship between attitude and intention to be a result of the omission of the other key predictors. An extensive systematic literature review to assess which factors determine the success of IT innovations in primary care is conducted by van Dijk (33). Based on the results, van Dijk constructed two frameworks. The topics found in these frameworks coincide with elements from the UTAUT. Some examples of topics are finance, attitude towards IT, time, ease of use,

guidelines & standardization, user involvement, workflow, knowledge, skill & support, technology, security, impact, and user satisfaction (see Appendix 1d).

1.2. Theoretical framework

Implementation frameworks can "provide an overview of ideas and practices that shape the complex implementation process and can help researchers and practitioners use the ideas of others who have implemented similar projects." (31)(p465). To describe the systematic planning of innovation in health care, many models and frameworks have been proposed. The selecting of a model/framework for research depends on the setting, innovation, research aim, resources, and preference of the researchers. While choosing a theoretical approach to implementation science, careful consideration of the differences and similarities is important (9). Nilsen (9) has identified three overarching aims of the use of theories, models and framework: describing and/or guiding the process of translating research into practice, understanding and/or explaining what influences implementation outcomes, and evaluating implementation. The current study concentrates on the second aim since it is an explorative study in the primary phases of the innovation process. The second aim can be further broken down into determinant frameworks, classic theories, and implementation theories. Further explanation of the differences between these three approaches can be found in Figure 4. This study will make use of a determinant framework.

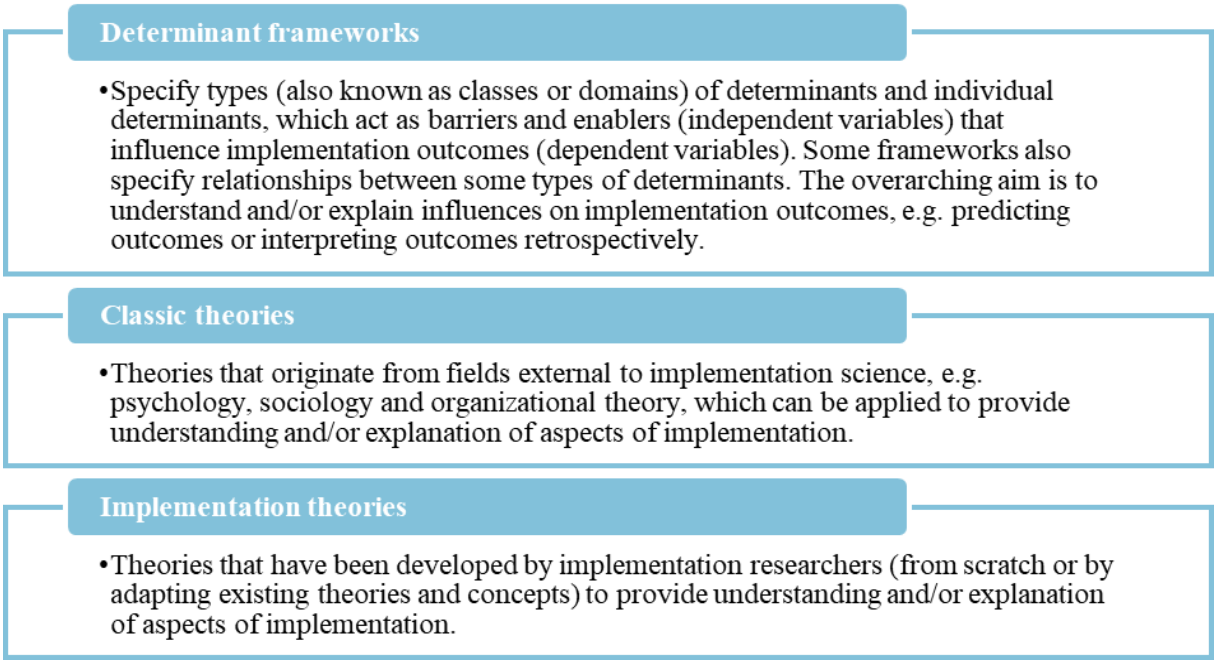

Figure 4. Descriptions of the different approaches to understanding what influences implementation outcomes as described by Nilsen (9).

The previously mentioned Fleuren framework (28, 29) provides a solid base for the theoretical framework of this study (Figure 3). The application for introduction and evaluation of innovations in health care coincide with the aim of this study. Furthermore, the framework can be used before, during and after the introduction of an innovation. Since this study focuses on the time period prior to using the innovation, it aligns with the adoption phase of the Fleuren framework. Therefore, this study shall refer to the adoption phase as described by Fleuren. As mentioned before, the framework indicates all phases to be critical when a change is desired to serve the innovation process. Additionally, the MIDI, used for evaluating possible influential factors, is a well-researched tool and its determinants cover most of the factors found in the aforementioned literature. It, therefore, provides this study with an empirically grounded assessment of factors that could influence the adoption of VC. The MIDI includes many factors of which some might not prove to be relevant to the current study. Fleuren et al. (29) indicate that researchers using the MIDI should decide which determinants will be measured.

To create a more holistic understanding of the technological innovation process among nurses, some variables are also added to the theoretical framework based on the literature and input of

researchers. The theoretical framework is complemented with elements from UTAUT/TAM. This theory is specifically aimed at technology and could, therefore, complement some technological aspects possible overlooked by the MIDI. Based on the QIF and the model of Greenhalgh et al. (30), extra attention was given to assessing the need for VC and readiness of the organisation. All taken together, the aspects found in the literature are represented. Additionally, the theoretical framework can assist in finding other factors that influence the innovation process. The theoretical framework used for this study is shown in Table 2.

Table 2. Theoretical framework to identify facilitating and impeding factors for the nurses' adoption of VC.

Category	Factor	Description
Innovation	Procedural clarity	Extent to which Video Consultation is described in clear steps/procedures.
	Correctness	Degree to which Video Consultation is based on factually correct knowledge.
	Completeness	Degree to which the activities described are complete.
	Complexity & ease of use*	The degree to which (the implementation of) Video Consultation is perceived as relatively difficult to understand and use.
	Compatibility	Degree to which Video Consultation is compatible with the values, needs, and working method in place.
	Observability	Visibility of the outcomes for the nurses.
	Relevance for the client	Degree to which the nurses believes Video Consultation is relevant for his/her client.
	Perceived usefulness*	The degree to which the nurses believe that using Video Consultation would enhance their job.
User	Personal drawbacks/benefits	Degree to which using Video Consultation has (dis-) advantages for the nurses themselves.
	Outcome expectations	Perceived probability and importance of achieving the objectives as intended by the innovation.
	Professional obligation	Degree to which Video Consultation fits in with the tasks for which the nurses feel responsible when doing their work.
	Client satisfaction	Degree to which the nurses expects clients to be satisfied with Video Consultation.
	Client cooperation	Degree to which the nurses expect clients to cooperate with the innovation.
	Social support	Support experienced or expected by the nurses from important social referents relating to the use of Video Consultation.
	Descriptive norm	Degree to which colleagues use the innovation.
	Subjective norm	The influence of important others on the use of Video Consultation.
	Self-efficacy	Degree to which the nurses believe they are able to implement the activities involved in Video Consultation.
	Knowledge & experience*	Degree to which the nurses have the knowledge needed to use Video Consultation. Degree to which the user already has experience with the technology used or similar technologies.
	Awareness of content of innovation	Degree to which the nurses have learnt about the content of the innovation.
	Need[#]	Degree to which a need for Video Consultation is present among the nurses.

	Attitude*	An individual's positive or negative feelings about using Video Consultation.
Organisation	Formal ratification by management	Formal ratification of Video Consultation by management.
	Replacement when staff leave	Replacement of staff leaving the organisation.
	Staff capacity	Adequate staffing in the organisation where Video Consultation is used.
	Financial resources	Availability of financial resources needed to use Video Consultation.
	Time available	Amount of time available to (learn to) use Video Consultation.
	Material resources and facilities	Presence of materials and other resources or facilities necessary for the use of Video Consultation as intended.
	Coordinator	The presence of one or more persons responsible for coordinating the implementation of Video Consultation in the organisation.
	Unsettled organisation	Degree to which there are other changes in progress (organisational or otherwise) that represent obstacles to the process of implementing Video Consultation.
	Information accessible about use of the innovation	Accessibility of information about the use of the innovation.
	Performance feedback	Feedback to the user about progress with the innovation process.
	Flexibility & readiness for innovation #	Degree to which the organisation has the room to implement Video Consultation and is ready for change.
Socio-political context	Legislation and regulations	Degree to which Video Consultation fits in with existing legislation and regulation established by the competent authorities.

Factors are based on the MIDI (29) of the Fleuren framework with factors added based on the: * UTAUT/TAM (25, 32) or # QIF (31) and Greenhalgh(30).

1.3. Research context

The National TB plan (2016-2020) (6) of the RIVM has indicated eHealth technologies are rarely used in the treatment of TB/LTBI patients. Additionally, the WHO document "Digital Health for the END TB Strategy: an Agenda for action" (7) makes recommendations for the use of eHealth technologies. One of the proposed technologies was the use of VC for the treatment of patients. As aforementioned, a pilot eHealth is initiated by the KNCV-Tuberculosis Foundation, the RTC REC North East, and the eight GGD organisations of the North East region (i.e. GGD Groningen, GGD Friesland, GGD Drenthe, GGD IJsselland, GGD Twente, GGD NOG, VGGM, GGD Gelderland-Zuid). In this pilot study VC is added to the consultation possibilities. To conduct a consultation the nurses can choose between an appointment at the GGD location, a telephone consultation, a house visit, and the additional VC. The nurses are free to apply the type of consultation they deem fit to the patient and situation. One of the goals of this pilot study is to implement the use of VC with care and consideration. The experiences of the nurses in this pilot study can be used to implement VC in the other regions of the Netherlands. If compared to the total number of TB-nurses in the Netherlands (~64 nurses), the nurses of the North East region make up around 22% of the all working TB-nurses. Within the pilot study a project group was set up, consisting of five GGD TB-nurses, one GGD TB-doctor, two GGD researchers, and one member of KNCV Tuberculosis Foundation (Table 3). The inclusion of the five TB-nurses, who are also in the pilot study itself, provides the pilot with user participation on behalf of the TB-nurses. This project group has continuous meetings where they discuss and prepare all

documents and actions necessary to guide the nurses and their patients through the innovation process of using VC. The goal of the project group is to gather data on the use of VC, facilitate the desired behaviour (i.e. innovation strategy) and eliminate impeding factors in an early stage. These last two aspects are done by continuously evaluating the experiences and wishes of the nurses and making adjustments when necessary. The following documents are set up: information letters for the nurses and patients, a working protocol and instruction clips for the nurses, logging documents for the nurses, informed consent forms for the patients, and a simple user guide for the patients. Additionally, practical aspects are arranged, such as IT-support, work station demands, and technology training. Furthermore, the project group also discusses when and with whom VC should be used. The working protocol includes a list of patient characteristics that should lead to the exclusion of the pilot study. For example, patients in detention, underaged patients, or patients with a cognitive disability.

The inclusion of two researchers in the project group allows for scientific investigation of the innovation process. The research on the pilot is divided into two sections; the nurse section and the patient section. The current study takes place on the beginning months where the nurses get acquainted with VC and the application. The patient section is researched conjointly but this section will be described elsewhere.

The data collected during the nurse section will serve multiple purposes. Eventually, a long-term implementation report will be made with recommendations for implementation at other GGD organisations. This report shall also include information on the costs, expenses and time saved, materials needed, and experiences of using VC. However, the current study will be conducted during the adoption phase and can therefore not provide information on such results of using VC. Instead, this study will examine which factors could act as impeding or facilitating during the adoption phase. Additionally, the information given by the nurses and the project group meetings allows for continuous improvements. This information will be used to make adjustments during the pilot and thereby improve the adoption and the overall innovation process.

At the time of data gathering, the nurses just received the documents for the pilot. Some have briefly scanned them, while others were still unaware of its content. The nurses who were also members of the project group had already seen the documents since they provided feedback during the construction of the documents. Overall, all nurses were still in the adoption phase acquiring information about VC and determining its value to their work. A few members of the project group had already tested video calling with colleagues.

Table 3. The members of the project group members in the eHealth pilot study.

Project group members		
TB-Nurses	5	GGD Gelderland Zuid, GGD Gelderland-Midden, GGD NOG, GGD IJsselland, GGD Groningen/Friesland/Drenthe
Doctor	1	GGD Twente
Researchers	2	GGD Twente
Digital consultant	1	KNCV Tuberculosis Foundation

1.4. The innovation technology

The application used for conducting VC is WeSeeDo (www.weseedo.nl, the Netherlands), of which an example is shown in Figure 5. This application was chosen based on the requirements of data security, privacy, and context in which it will be used by nurses and TB-patients. Among others, these requirements are that user data (and metadata) may not be stored outside the EU boundaries and that the information security should be minimally compliant with the norm ISO27001, NEN7510, or alike. User requirements were among others: easy setup of a video connection; works on a desktop / laptop and on a smartphone; and good quality video connection. Based on these requirements WeSeeDo was chosen for the pilot. It provides real-time communication that connects through a browser (WebRTC). It makes use of peer-to-peer communication and no sensitive data is stored. WeSeeDo has the ISO 27001 certificate (valid 25/5/2019-25/5/2022) which indicates that the system complies with requirements regarding data security and audits. The GGD Twente assessed which application would be most suitable for the TB treatment setting, fitting with the current methods of contact between nurses and patients. The aim is to keep the use as simple and straightforward as possible. With the abovementioned demands

in mind, the WeSeeDo application was chosen. WeSeeDo has an appropriate interface to be used by health care professionals. The application and several others were reviewed by a team of diverse specialists and approved by the project team. Among these specialists were: a GDPR-specialist, a lawyer, ICT-specialist, TB-doctor, TB-nurse, Researcher Public Health, and a digital consultant.

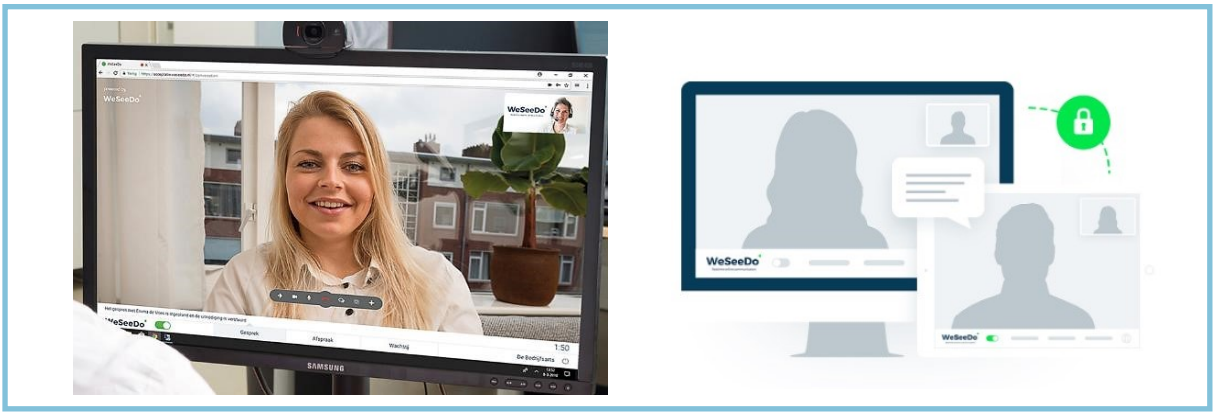

Figure 5. Example of the WeSeeDo application used by the nurses in the pilot study for a secure VC connection (www.weseedo.nl).

2. METHOD

2.1. Study design

The method chosen for collecting data in this study was semi-structured individual interviews. While the assumption seems to be that interviews and focus groups provide the same information, the two methods are rather different in structure (34). Individual interviews are more suitable to collect personal attitudes, thoughts, and knowledge of a given phenomenon (35), while focus groups allow for a thorough reflection on collaborative experiences (36). An interview guide was set up with the use of the previously mentioned theoretical framework and some open-ended questions were formulated (see Appendix 2). The start of the interview consisted of a general question where the nurses could address topics they found relevant. As aforementioned, not all factors of the framework are equally relevant for this study so not all factors were evaluated. Based on the literature, the most relevant factors from the theoretical framework were pointed out by the interviewer. Some factors were also discussed in the project group meetings or can be (indirectly) deduced from other answers. Therefore, not all factors from the composite theoretical framework were mentioned by the interviewer. The factors that had less priority or were less relevant to this study and were, therefore, not directly asked were as follows: *Correctness*, *Observability*, *Client satisfaction*, *Client cooperation*, *Descriptive norm*, *formal ratification by management*, *replacement when staff leave*, *unsettled organisation*, and *performance feedback*. The factors that can be deduced or were discussed with the project group were as follows: *Completeness*, *Professional obligation*, *Subjective norm*, *Attitude*, *Financial resources, Information accessible about the use of the innovation,* and *legislation and regulations*. It is important to note that all information regarding the factors are based on the opinions and experiences of the nurses.

2.2. Sample

The participants of this study were all nurses working at the participating GGD organisations. Their organisations have agreed to participate in the eHealth pilot and the nurses have agreed to start using VC. All, sixteen TB-nurses from eight GGD organisations were contacted to collaborate in the pilot.

2.3. Procedure

The interviews were conducted in Dutch since all involved researchers and nurses are fluent in said language. The nurses were informed they would receive a call from the researcher to plan an interview. After a date was set up, they would receive a confirmation email with the date and time. This email also included the informed consent form where permission was asked for the recording of the interview and the use of the data. The informed consent can be found in Appendix 3. Individual interviews were conducted through a video connection. This way of making contact was argued by the following: the geographical distances between the interviewer and nurses were great, a video connection provides more information than a phone call and makes it easier to connect to each other, and the nurses could gain experience with video calls. When a connection was established, the nurses were asked to confirm they have read and agreed to the informed consent. The informed consent was either signed and sent electronically or signed in person at a later date. Additionally, permission to record the interview was asked both off and on record. It was emphasized that the recordings would be deleted after transcription and their names would not be mentioned. Finally, the interview was conducted with the use of the interview guide.

2.4. Data analysis

During the interviews, demographic data on the nurses was gathered, such as gender, age, and years of working experience in the field of TB. Depending on the distribution, either the average or the median age and working experience were calculated with the use of Excel Office 365. All interviews were transcribed with the use of the recordings. These transcriptions were used to analyse the data. Analyses were conducted both deductively and inductively. The previously mentioned theoretical framework was used to analyse the data deductively by coding fragments according to the framework. However, if fragments were deemed important but did not fit the framework, new codes were added (i.e. inductive analysing). All interviews were coded by the primary researcher (L.A.). The second researcher (S.B.) reviewed the coding afterwards. If S.B. did not agree with the coding or suggested to add codes,

discussion took place until consensus was reached. The frequency of the codes was not reported because the interviewer also brought up topics and this makes the frequency less relevant. Coding and analysis were done using ATLAS.ti 8. After all the interviews were coded, relations between factors and between nurses were explored. For example, if certain factors relate to one another or if certain nurses of the same organisations show similarities. This exploration was done by attaching a level to each factor in which it is experienced by the nurses, based on the interviews and conversations with the nurses. The levels ranged from one to ten, where one is a low or negative experience and ten a high or positive experience. These levels are put into a table to compare all factors and nurses. The levels were given by L.A. and were reviewed by S.B.

2.5. Ethical considerations and approval

The current research is part of a larger GGD Twente pilot study on applying eHealth technologies in the treatment of TB-patients. The complete GGD pilot study was reviewed by the Medical Ethics Review Board of the University Medical Center Groningen (METc UMCG). They concluded that, under the conditions of the Medical Research Involving Human Subjects Act (WMO), the pilot is not a clinical research with human subjects and, therefore, does not need a WMO approval (METc number: METc2018/457) (Appendix 4a). Since the study described in this article was conducted by a University of Twente (UT) student, it was also assessed whether UT ethical approval was necessary. The Ethics Committee of the Electrical Engineering, Mathematics and Computer Science (EEMCS/EWI) faculty reviewed the situation. Further ethical approval was deemed unnecessary. The documents of both assessments can be found in Appendix 4b.

3. RESULTS

3.1. Sample and demographics

The sample originally included sixteen nurses. One nurse indicated she did not have the time and energy for the pilot and, therefore, did not want to participate any further in the pilot study altogether. The remaining fifteen nurses were invited for the individual interviews. Of these fifteen, one nurse was unable to conduct an interview due to health problems at that time. Resulting in a sample of fourteen nurses from eight GGD organisations. All nurses where female. Their years of working experiences in the field of TB ranged from two to twenty-three years (median: 12.5 SD: 7.03). The age of the nurses ranged from 26 to 62 (median: 51, SD: 11.1).

3.2. Factors of the theoretical framework

The full transcripts were coded by the first researcher and reviewed by the second researcher. While reviewing the coding of the first five interviews, the second researcher added only a small number of codes which did not influence the direction of the results. Therefore, it was decided that the remaining coding did not need reviewing.

The factors of the composite theoretical framework in Table 2 are categorized by the four determinant groups of the MIDI: the innovation, the user, the organisation, and the socio-political context. For each category, all factors mentioned during the interviews or project group meetings will be discussed separately. An overview of these factors can be found in Table 4. This table also shows the factors of the composite theoretical framework (Table 2) that were not found relevant in the adoption phase in this study based on the interviews and project group meetings. Therefore, they will be discussed no further. The influence of correcting measures undertaken by the project group (i.e. innovation strategy) will be discussed with the associated factors. Apart from the factors of the theoretical framework, one additional factor was found, namely, *job security*. This factor is included in the organisation category. Finally, the observed relations between factors and nurses will be discussed.

The results are complemented with quotes from interviews. Since the interviews are conducted in Dutch, these quotes required translation for this report. The translation is done with the use of a DeepL translator (www.deepl.com/translator). A conversion table with the original statements can be found in Appendix 5.

3.2.1. The innovation

This section will discuss the factors related to the innovation (i.e. VC) and their influence on its adoption.

1.a - Procedural clarity and completeness

The documents were constructed in cooperation with the nurses form the project group. Furthermore, all nurses were asked to provide feedback on the working documents as the pilot proceeded. Therefore, procedural clarity and completeness were not topics during the individual interviews. Overall, procedural clarity and completeness are not considered to be an impeding factor in the adoption of VC by the nurses. The attention given to the documents by the pilot and feedback from the nurses themselves ensures that the documents will suit their working practice.

Table 4. Overview of which factors from Table 2 are discussed regarding the adoption of VC by TB-nurses.

Factors relevant			
Innovation (1)	**User (2)**	**Organisation (3)**	**Socio-political context (4)**
a. Procedural clarity and completeness b. Complexity & ease of use c. Compatibility d. Relevance for the client e. Perceived usefulness	a. Personal drawbacks/benefits b. Outcome expectations c. Professional obligation d. Social support e. Self-efficacy f. Knowledge and experience g. Awareness of content of information h. Need i. Attitude	a. Formal ratification by management # b. Staff capacity c. Financial resources d. Time available e. Material resources and facilities f. Coordinator g. Unsettled organisation # h. Information accessible about use of the innovation i. Performance feedback # j. Flexibility & readiness k. Job security*	a. Legislation and regulations
Factors not relevant			
Innovation (1)	**User (2)**	**Organisation (3)**	**Socio-political context (4)**
Correctness Observability	Client satisfaction Client cooperation Descriptive norm Subjective norm	Replacement when staff leave	-

factor in the composite theoretical framework (Table 2) that is not specifically asked, but mentioned by nurses.
* factor not present in the composite theoretical framework (Table 2), but found during analyses.

1.b - Complexity & ease of use

The nurses who have seen the WeSeeDo application find it quite easy to use. They find that marginal steps are required to handle WeSeeDo for both nurse and patient. Four nurses have not seen the WeSeeDo application yet and could, therefore, not fully judge the complexity of WeSeeDo itself. One aspect that is indicated to be difficult by five nurses is the primary installation and the explanation to the patient. Also, five nurses consider technical difficulties to be complex in general and, therefore, expect this for WeSeeDo as well. The idea of having to learn a new working method is perceived to be complex by one nurse because it involves new programs, new ways to log-in or other aspects related to using the computer.

> *"I think once it runs and the patient has an email address it's not that hard. Look, if you think the patient is suitable for this, then it is not difficult. It is not a difficult programme." (4.2)*

It is indicated, that some GGD organisations make use of an open workspace, while in others the nurses share a room with a maximum of two nurses. Also, some have special consultation rooms readily available while others need to reserve a room. Some nurses need a separate room in order to conduct a VC since their regular workspace is to public. To find a room is perceived as difficult for some, but not a problem for others. Even though the amount of effort to find an appropriate space to conduct a VC differs, all nurses indicate they could make it work.

1.c - Compatibility

VC is considered to be a means that fits within the developments of the current society. Not using it is considered to be 'old fashioned'. Although most nurses found VC to be compatible with their work, a much-discussed topic was the difference between a house visit and a VC. All nurses are very clear on the value of a house visit, which is regarded as more valuable than a VC.

The nurses feel that conducting house visits distinguishes them from nurses in other disciplines and ensures they can provide proper treatment to patients. They believe this has led to the control of TB in the Netherlands. For them, VC is not comparable with this intensive type of treatment and can never replace house visits. Nonetheless, most nurses feel a house visit is not always necessary and VC is a valuable addition to their communication means in the treatment. If VC would become one of the working methods in place, they will accept that and make use of it. However, initial direct contact is perceived to be necessary.

"This is kind of the future, right" (5.3)

"We have noticed, at least I have noticed over the years that a home visit is very valuable. That you get a lot of information. Also the social things around it." (4.2)

Furthermore, it is indicated it might be necessary to make clear agreements on when and how often VC can be used. Partly, to ensure nurses VC's are applied appropriately and, partly, to have the proper materials and working stations in place by every GGD organisation.

"…but these are new means and you have to use them in a good way and you have to agree on the limits of or within which frameworks you can use them well and when you shouldn't do it." (1.1)

Additionally, it is indicated that the new working method asks for different skills from the nurses. In order to receive the needed information through VC, they might have to use different strategies than they would during a phone call or a house visit. What these strategies could be and where extra attention is required are interesting points of discussion. The nurses feel these points should become a topic for conversation by professionals.

"I think it's very interesting that you have to look at what skills you need as a nurse from time to time, because you're missing a number of signals. You have, uh, you don't see someone live so maybe you need to ask some extra questions, or learn to pick up certain signals. So me, it's really nice to talk to other professionals about that. So how do you do this, do you do that?" (2.2)

With regards to the compatibility in the everyday activities, the nurses indicate VC could be easily scheduled. The nurses state that they divide their time between their desk and house visits. Since VC is also a desk activity, it is not expected to disrupt their daily activities. Additionally, VC appointments can simply be added to the agenda like any other consultation. However, the VC has to be scheduled at a set time while a telephone consultation provides the nurse with more freedom in their schedule. Nevertheless, this limitation is not perceived as a problem by the nurses who addressed the matter.

The patient population includes people from various cultures. Four nurses expect VC is not an appropriate means for some of these people based on their situation and their culture and would be uncomfortable using VC when the patient does not speak Dutch or English. When and where VC can be used needs to be carefully considered case by case. However, most indicated they have no problem with using a translator on speaker phone like they would during a house visit or consultation by telephone.

"...and our target group are not people who always keep their promises, other cultures, in the Netherlands it's time is time, that is, of course not for all cultures. And so yes. But you can't do anything about that, but I think that's what we're going to run into within the video calling." (6.1)

1.d - Relevance for the client

The nurses clearly indicate that VC is not suitable for everyone. They say the patient needs to have the means and willingness to use VC. Some patients benefit from the social aspect of a house visit and this will fall short when VC is used. Furthermore, many patients are immigrants or asylum-seekers living in refugee centres. The nurses indicate these living conditions could make it more difficult to apply VC. While most patients have a smartphone with a camera they could use, not everyone has internet or a proper wifi-connection.

However, VC is perceived as patient-friendly if it can be applied. A VC is indicated to be scheduled easier in comparison to a house visit, which especially benefits patients with a busy schedule. It will leave those patient feeling less dependent and controlled. Additionally, it can save a patient travelling time if they could conduct a VC instead of a consultation at the GGD. Generally, adding VC to the options provides the patient with more freedom to shape their treatment according to the nurses.

> *"Yes, I think that will also be different for each patient, because one is just lonely for example and is happy that someone is coming to visit and the other who is thinking well damn, I have to stay at home the whole morning because that lady is coming." (4.1)*

1.e - Perceived usefulness

Many nurses have expressed several situations where they expect VC to be useful and to contribute to the treatment of patients. For example, VC can be deployed when uncertainties regarding the medicine box of the patient arise. Currently, the nurse asks for a photo or she visits the patient's house. Both methods have their shortcomings and VC could eliminate those. A VC would provide the nurse with the possibility to easily inspect the patient, check the medicine box, and discuss the medication for the upcoming week without having to conduct a house visit. It is important to note that all notions of usefulness depend on the assumption that WeSeeDo works properly.

Another given example for when VC can be used is by replacing the standard telephone consultation conducted with LTBI patients after two weeks. VC would provide the nurse with more information about the patient and, thereby, improve the treatment. Whereas four nurses indicated asylum seekers would be a difficult group, three others specifically indicated using VC is a good way to maintain contact with patients in the refugee centres and improve their treatment.

Additionally, the nurses indicated VC will provide them with a visual assessment of the patients' health. Visual confirmation takes away the doubt that could lead to them making a house visit. Also, the nurses believe VC will provide them with more information in comparison to a phone call. Especially when an acute response is requested, the nurses can quickly assess whether further action is necessary while a house visit is not always possible.

> *"Well, I think it's, uh, yeah, you're in a different contact than just by phone, just hearing each other's voices. And you can see that someone is taking medication, whether someone has filled his weekly box well, what someone looks like, how someone looks uh, wherever someone is now and then, that you think of well people sitting in all different places of course, how do they feel about themselves. You can get more out of it. Yes and sometimes it is no longer necessary to visit someone." (6.1)*

Furthermore, due to less travelling, eleven nurses are convinced it would save them time and save the organisation money. They indicate that they occasionally have to overcome vast distances. VC would reduce the travelling frequency and, thereby, make their work more efficient. It should be noted that travelling was not necessarily considered negative since it also provides some variety in work-related activities. The other three nurses are more sceptical about the effects on time-saving. They said to only conduct a house visit when strictly necessary. Therefore, VC would not save time and money. Another possible outcome put forth by one nurse, suggested that adding VC could actually increase the time spent on a patient. This outcome is reasoned by the notion that VC would make nurses more approachable for the patient, which can lead to more, and possibly longer, consultations.

As aforementioned, adding VC to the treatment options can especially be helpful when the patient has a busy schedule. The nurses say that making appointments and house visits can be difficult in this situation. VC can provide the patient with more freedom and independence because they can have visual contact at any time and location they want. Also, it makes it easier for the nurse to reach the patient. Conversely, VC is indicated to also provide the opportunity for the nurse to build in a little distance between themselves and a patient. When, for example, a nurse is uncomfortable or feels unsafe to visit a patients house because the patient is perceived as difficult, a VC can be a solution.

Although VC is considered useful by many nurses, this is expected to vary between patients and is, therefore, patient dependent. This notion makes two nurses feel VC is not particularly useful. They consider only a small portion of the patient population to be suited for VC. Additionally, the higher perceived value of house visits is a reason to consider VC as less useful. Examples of unsuitable patients given included asylum seekers and elderly. The nurses find especially the elderly need social interaction and are probably not able to use VC.

> *"I am very approachable and very easy, so they know where to find me when they have questions and they do, they call me or they drop by or I visit them if it is easy, on the way, and things like that, so I don't see that [video calling] that much profit at the moment either" (7.2).*

> *"I think video calling is a unique way to connect with patients. You have to take a good look at when you're going to use it and when you're not going to use it." (1.1)*

3.2.1.1. Summary

Overall, the *procedural clarity and completeness* can be perceived as facilitating or neutral to the adoption since it was taken for granted. The *ease of use* of WeSeeDo can have a facilitating influence, but only after primary acquaintance. The nurses have to be aware of WeSeeDo's low complex content in order to be positively influenced. With regard to the *compatibility*, possible impeding influences on the adoption indicated, are the fear of the primary installation and the lack of an appropriate room to conduct VC in. However, the nurses indicate this problem could be overcome with some effort. The general notion that the VC is less valuable than a house visit can function as an impeding influence on the adoption of VC for some nurses. What could be most impeding is the patient population. The share of patients that is perceived to be *incompatible* with VC and for which the *relevance* is perceived low, can influence the adoption of VC since the nurses fit their treatment to the patient. Otherwise, the notion of 'keeping up with the time' could function as a facilitating factor. Additionally, the new skills that are asked can influence the level of adoption if not properly addressed. Nonetheless, there were many ways in which the nurses perceived VC to be *useful*. Therefore, this perception could positively influence the adoption of VC.

3.2.2. The user

This section will discuss the factors related to the nurses and their influence on the adoption of VC.

2.a - Personal drawbacks/benefits

When asked about personal drawbacks or benefits, the nurses did not have an immediate opinion. Most benefits are related to aspects of guiding the patient. For example, saving time or improving the quality of contact. They indicated no immediate personal drawbacks are mentioned because they make an indication if VC is appropriate beforehand and, thereby, prevent negative outcomes. Other personal drawbacks/benefits are not clear beforehand and would require some experience with VC. Overall, personal drawbacks/benefits will not directly influence the intention to use VC.

> *"I find it very difficult to say beforehand whether there are any real disadvantages to it. I think we should really see that at the start." (5.1)*

2.b - Outcome expectations

In general, the nurses believe that adding VC to the options will offer them with an extra tool for guiding their patients. In other words, more means to an end, wherein the nurses are to judge what type of consultation is appropriate at what time. Although VC can improve the quality of a contact moment, it is not expected to improve the outcome of the treatment. Considering, the nurses always strive for the best outcome regardless of the tools they have at hand. One nurse even indicated that the hassle of introducing the VC technology could be too overwhelming for the patient, especially in combination with the pilot study and its requirements. Overall, the outcome expectation should not directly affect the adoption of VC.

> *"Look, as a nurse you can say at a certain point that I am not doing it with video calling because I still think that this patient needs a personal contact, so really face-to-face, so presence, uh then you decide to do that. And if you estimate that it doesn't have to be done, this is a good way to do it. But that has nothing to do with the success of the treatment, more with the assessment, your own assessment of uh, can this patient deal with this? Is this sufficient or not sufficient in the contact? Does he have enough connection with you, to dare to ask things or, uh, yes, so I think that it doesn't matter for the relationship, uh, at least if the patient is uh uh, open to it, for such a means as this." (7.3)*

2.c - Professional obligation

The *professional obligation* coincides with *compatibility* for the most part. However the MIDI does mention the factor separately. The subtle distinction lies in the difference between a working method in place and the perceived responsibilities related to the job. Since the VC is part of guiding the patient, which is the main responsibility of the nurses, *professional obligation* is not discussed as a responsibility but more as fitting to the working method (i.e. compatibility).

2.d - Social support

The nurses are all quite supportive of each other. It has been mentioned by six nurses that turning to their colleagues for assistance is no problem. They view this pilot study as something they are doing together. However, the nurses sometimes felt less supported by their organisation. These experiences will be discussed at the factor *material resources and facilities*.

2.e - Self-efficacy

Most of the nurses indicate they are capable to adapt to technological changes, one more quickly than the other.

> *"As far as technical experience is concerned, I don't see that as a problem, it will work out, I understand and it will be all right." (7.1)*

However, seven nurses feel they are less able to learn. Of those who are less convinced of their own capabilities six indicate they are willing to learn and their colleagues always offer a helping hand. They, therefore, do not expect trouble with using WeSeeDo. One nurse did imply her inability to adapt to digital application can lead to rejecting VC in general.

> *"I'm technically not very handy with these things, so with me of course there has to be a turning point of eh, but we have to look at that gradually, of course it remains a burden for me it is a burden or it becomes a pleasure …… I can quickly uhm jam." (7.3)*

2.f - Knowledge and experience

As previously mentioned, the nurses have been provided with working documents that explain how to use WeSeeDo. Further relevant knowledge about VC is not mentioned during the interviews. Nonetheless, using digital means always requires certain IT knowledge in order to solve problems on

the spot. Since none of the nurses indicate they possess this kind of knowledge, they might not always be able to successfully set up a VC. Nine nurses have already conducted a couple of regular video calls or VC's with the use of other applications than WeSeeDo, such as WhatsApp or Skype. With these application they did not experience any technical difficulties since they are already well known with the application.

2.g - Awareness of content of innovation

Seven nurses have tested WeSeeDo one or a couple of times, of which six were project group members. The others did not have many experience with the WeSeeDo application and could therefore not indicate difficulties. However, the nurses who were aware of the content of WeSeeDo were positive about it.

2.h - Need

When asked if they felt a need for VC, most nurses respond with approval. This need has also indirectly expressed itself in the previous use of VC applications other than WeSeeDo to conduct a VC.

> *"Really a need from the nurses, you mean? I think so, because I know my, uh, one of my colleagues has done it before. Uh, so that's where it really came in handy."* *(5.1)*

Additionally, the many ways in which VC is perceived useful could indicate a need for VC. This was the case for ten nurses, but two nurses have not experienced the need for VC in the past even though they could think of ways they would use VC in the future. Furthermore, two nurses are less convinced of the need for VC altogether. Their view of the patient population has led them to believe there is no need for VC, at least not for them. The responses of all nurses varied from *"Yes. I always think about it." (6.1)* to *"Absolutely not. No no, I can lie to you but I'm not going to do it." (7.2).*

2.i - Attitude

The general attitude of the nurses is positive. Most nurses are excited, eager, curious, and interested. Even though the adoption would require energy, they are excited to learn the ropes. Nonetheless, three nurses who are interested to learn also indicate it would probably be a hassle beforehand. Additionally, two nurses hold a negative attitude towards technological innovation and WeSeeDo altogether. They indicate that the use of VC does not have a high priority for them.

> *"Yes, yes, but I do find it interesting to learn." (4.1)*

> *"It will probably be a hassle again, so I don't know very well with, yes [...] that whole technology and continuous changes, that I, continuously everything goes, and then you have to logon like this and then you're going to logon like this again and then you'll be back in the Cloud and then you won't be able to access files. I find that is asking a lot …… well let's just start you would think." (1.1)*

> *"It all comes on top of that, and that's what I experience when I think of it, if I may put it bluntly, it is at the bottom of the list of priorities." (7.1)*

3.2.2.1. Summary

Overall, the *social support* can have a positive influence on the adoption of VC and can, therefore, act as facilitating. The nurses' *self-efficacy* is on a sufficient level to positively influence the adoption. However, if the self-efficacy is low, it could impact the adoption. This is indicated to be the case for only one nurse. Other nurses who experience low self-efficacy did not indicate low willingness or adoption. The lack of *knowledge and experience* could have a impeding influence on the adoption of VC since the lack of knowledge makes the nurses more dependent on others for solving technical problems. Conversely, a higher *awareness of content* could serve as an facilitating factor. Most likely, *awareness of content* is intertwined with the *ease of use* of WeSeeDo. The nurses indicate they feel a *need* for VC, which could serve as facilitating. The nurses show, when the *need* is not implied, the

intention to use VC is also low. Furthermore, a positive *attitude* could serve as a facilitating factor to the adoption of VC. It could provide the nurse with more resilience against unsettled organisations and technical difficulties.

3.2.3. The organisation

This section will discuss the factors related to the GGD organisations and their influence on the adoption of VC.

3.a - Formal ratification by management

In three GGD organisations the nurses struggled to receive support from the IT department. It was indicated that the formal ratification by management made it much easier for nurses to acquire resources and assistance from the IT-department.

> *"But I do like the fact that WeSeeDo is now also supported by the management, eh …… yes, it is of course very clear when it came to the KON, eh, with all those managers, that this is necessary and that this must be done. Yes, that's widely supported, there's not someone who has said 'no, so I'm really not going to do that with my GGD'." (4.1)*

> *"Then it is usually that if you do it through the manager, and exert more pressure than that, then yes, then you will succeed." (6.1)*

3.b - Staff capacity

In the TB discipline it is difficult to have the right capacity of health care professionals, according to the nurses. The number of patients are declining which leads to less hours of work. However, in the event of an open TB case a large scale contact investigation needs to be conducted. These investigations lead to a sudden increase in hours of work that cannot be covered by a single nurse. At the time of the interviews, one GGD organisation indicated they were in the midst of a contact investigation. They, therefore, had less time to get to know WeSeeDo. The lack of time could slow down the innovation process, but is unavoidable nonetheless. However, the nurses of this organisation were closely involved in the project group and therefore already more acquainted with WeSeeDo. During the time of the interviews, four nurses indicate they are quite busy, while others said to have more time available for the pilot.

Furthermore, the project group discussed several options for substitution in case of illness. The process with VC would be no different from the regular process. If a nurse falls ill, she contacts colleagues to fill-in. The appointments previously made will be cancelled, rescheduled or covered by a colleague. In the case of VC, a new invitation would have to be sent. This process is not perceived as a problem by the nurses. WeSeeDo also offers options to forward each other's appointments with the use of an admin. These options can be used for future reference, but is not perceived necessary for the time being by the nurses.

> *"If I'm sick, yes, it'll be solved, I think, you know, [referring to a colleague] will pick it up and she'll call others if it gets too much." (3.1)*

3.c - Financial resources

The GGD has not spared financial resources on the VC technology. Also, the nurses were provided with the necessary materials. The financial resources are therefore not a factor that could influence the adoption phase for the nurses and was not mentioned during the interviews. However, a financial aspect that is brought up by the nurses, is the organisation's expenses that could be saved by decreasing the number of house visits conducted. These comments leads to believe that a feeling of 'costs reduction' by the organisation is present. However, the nurses did not indicate dissatisfaction or interference with their job. Since the project group facilitated the financial resources, the direct influence on the adoption of VC is unclear.

3.d - Time available

The nurses find their workload to be very irregular and inconsistent. The patient load can be low at times and then suddenly increase significantly due to a case of open TB. The care of patient will always have their first priority when scheduling their time. Therefore, the time spend to familiarize themselves with WeSeeDo is indicated to have lower priority and has to be scheduled in between. For four nurses, this scheduling is considered to be quite stressful, while others perceived it to be part of their job.

> *"Well, you'd have to find that somewhere out of time, wouldn't you? Yes, of course it is, it, you don't get any extra time for it …… it's on top of that." (7.3).*

Since the adoption of VC comes simultaneously with the gathering of data for the purpose of the pilot study, a lot was asked from the nurses. For three nurses, their intention to include patients decreased since they would have to formally ask for consent and explain the research, which requires time and energy. Also, as aforementioned, the prospect of the pilot study has led to one nurse not wanting to participate the pilot study after all.

> *"Well, you know, I also understood that you'll have to inform the patient about it and then, uh, give him a letter. That's all clear, it's clear, but I don't think I'm very keen on that if you're already talking to someone via the interpreters' phone and it's all going with a lot of difficulty. Then I will not burden the patient with this, and I also have a question and an investigation. You know, I'm really going to make the choice of not that one." (7.1)*

3.e - Material resources and facilities

Six nurses said they are already equipped with all the materials needed for the pilot, while five others still required materials, such as, a proper laptop or headphones. These materials would be provided in the near future and the nurses did not foresee any problems. In general, most nurses feel they could easily receive materials when necessary based on previous experiences. They feel very supported by management and could easily reach out. However, five nurses said the requesting of materials to be a hassle.

> *"...it's tiring as long as it's not taken care of and I can also imagine that my colleagues are like that, if the right facilities aren't there yet, then, uh, you're not in such a hurry either. So I can imagine that this will affect each other." (5.1)*

Furthermore, for most necessary materials the nurses are dependent on the IT-department. The level of cooperation in the IT department differs per GGD organisation. Some needed time to get acquainted with WeSeeDo and are starting 'to warm up' to the idea, while others are ready to assist wherever necessary. For one of the GGD organisations it was especially difficult, since their IT department was not willing to work with Google Chrome due to security reasons. Eventually, it was solved when the nurses agreed to use Google Chrome for WeSeeDo only. However, these obstacles make it difficult for the nurses to stay positive. In general, the pilot arranged for each GGD organisation to have one IT colleague that is well informed, has close contact with a WeSeeDo employee, and can offer assistance when necessary.

> *"If I call now they [IT department] are at my desk within 5 minutes, so [laughter] so that's it." (2.1)*

> *"Yes, that is starting to happen now, like I think now when I call the helpdesk and I mention WeSeeDo or video calls they know what it's all about and like [...] uh, she now knows what we're doing and she' s a little bit more contributing or a bit more positive about it now. In the beginning I found that a little bit, that I had to pull and drag a lot and it was every time as if you told something new." (1.2)*

As mentioned before, the workspace variates between GGD organisation. Therefore, each organisation requires different materials and facilities with regards to the working station of the nurses. Even though the amount of effort to find an appropriate space to conduct a VC differs, all nurses indicate they could make it work.

> *"Well, it's true that you have a separate place that not everyone listens to and that you don't have all kinds of sounds and scenes. And that, of course, is also for the patient, if you have children walking around all the time, then you can't hear them very well either." (2.3)*

Additionally, it was indicated by four nurses that they prefer clear and practical working instructions on the use of WeSeeDo, such as instruction videos, a short training, or a colleague showing them the workings of the application. Also, the nurses indicate the documents to gather data should be short and concise. These requests were previously indicated by the nurses in the project group and processed while constructing and updating the working documents. Some nurses expressed negative previous experiences, where their IT department gave them a complicated installation guide for the use of their cell phone and they were left on their own.

Another mentioned aspect, is the materials required for the patients. The nurses prefer a clear overview of what the patient needs, such as a smartphone or proper internet. Also, it is indicated that some patients might not have everything required and are, therefore, unable to conduct VC's.

3.f - Coordinator

The nurses were specifically asked if there was someone they could contact with regards to the pilot. All nurses indicated they knew who and how to reach out if they were in need of assistance or had questions. All nurses feel they could easily find a helping hand when necessary, mostly because their organisation is represented by a member in the project group or they have close contact with one of the members. Also, the researchers and digital consultant of the project group were perceived as easily approachable by most nurses. Since the project group facilitated the presence of a coordinator, the direct influence of a coordinator on the adoption of VC is unclear.

3.g - Unsettled organisation

Since august 2018 the nurses have started working with a new digital patient file, the iTBC. Two nurses were still getting used to the programme, but it is not mentioned often. Also, VC is not yet included in the iTBC database management system and, therefore, not an option when the type of consultation needs to be registered. Furthermore, one of the GGD organisation cannot arrange some necessary IT matters because they are in the middle of a net sourcing transformation. This transformation resulted in a lot of delay when starting up with WeSeeDo.

> *"...at least with us at the moment there is a problem that we can't handle a number of ICT matters properly because we are in the transition to another net sourcing and that's why some things don't uh not run very smoothly with us" (2.1)*

3.h - Information accessible about use of the innovation

As beforementioned, the nurses were provided with a working instruction. This instruction included steps on the installation and use of WeSeeDo for them and their patients. All documents are updated with continuous feedback during the pilot. The nurses did not indicate to have insufficient information about the innovation during the interviews. Since the project group facilitated the presence of information about the innovation, the direct influence on the adoption of VC is unclear.

3.i - Performance feedback

The nurses were made aware of the VC pilot beforehand. However, after initial introduction, multiple application for VC had to be assessed by the project members before the nurses were informed about the continuing of the pilot. This assessment demanded more time than expected. After the right application was chosen (i.e. WeSeeDo) the course of the pilot suddenly accelerated and the nurses were

informed they were about to start with VC. Most nurses did not indicated to have a problem with this acceleration and are ready for the next step. However, they would like to receive a clear date on which they will officially start with VC. Especially, the nurses who are members of the project group indicate they would like to have a 'firm' start for the rest of the pilot group. Furthermore, one nurse found the notification to start quite sudden, but she was able to adapt quickly. Since the project group facilitated the performance feedback, the direct influence on the adoption of VC is unclear.

3.j Flexibility & readiness

Nine of the nurses are very positive about the organisation they work at, one more strongly than the other. Most agree they are continuously trying new things, conducting research, and adapting if necessary. However, four nurses feel that changes within the organisation always come with a lot of effort, mostly from the IT-department, but they eventually get organized.

> *"There are always projects running and there is always room for improvement and above all, our manager is very open to them. Well, and of course everything is changing." (6.1)*

> *"Yes this is really a very pleasant GGD …… yes it is uh very innovative." (1.1)*

3.k - Job security

As indicated before, the nurses highly value the house visits. Over the last years, the number of TB-patients are declining. Declining numbers of TB is ultimately the goal of TB control, but also leads to a decrease in required TB-nurses. Additionally, being able to treat more patient by adding VC to the treatment options can result in the further declining of human resources required. Furthermore, one nurse suspects the organisations aim could be to eliminate house visits altogether and the management might misjudge the importance of it.

> *"Our management does, but I think there is also a lot of management that just doesn't have that much affinity with tb and says of `eh well, low grade he uhhh, well that can go away at some point, or can't it be done with that, we're going to put it there, or that the hospital has to take over." (1.1)*

If VC is used as a means to eliminate house visits, the nurses would be quite disappointed since they feel the house visits are the reason for success in the control of TB.

> *"What I'm struggling with myself is indeed, uh, I don't think it's a substitute for the home visit. That that, I think it's one, it has added value, it's a supplement, it's a tool, but the home visits that you're doing now, yes there you see so much that is quite valuable, I think. That would be a great pity if it were to disappear in this way. Well, I think that would be a real loss …… I think we have to be very careful not to lose our expertise in the Netherlands." (4.2)*

3.2.3.1. Summary

Overall, the nurses experienced that a *formal ratification by management* serves as a facilitating influence in the adoption of VC. However, the nurses indicate they have little *time available* to get acquainted with WeSeeDo, and the time they do have is unpredictable. Therefore, the innovation process gets interrupted from time to time which can negatively influence the process. Since the workload of the nurses fluctuate, the *staff capacity* is also irregular. The irregularity and occasionally busy schedule of the nurses can have an impeding influence on the adoption of VC. It is indicated that the *materials and resources* could have an impeding influence on the adoption when not arranged properly since the nurses feel the materials need to be present for them to use VC. Especially if the IT departments is not cooperative, the adoption could be negatively affected. An *unsettled organisation* can be a major impeding factor in the adoption of VC. It not only causes delay, but also influences the *attitude* of the nurses. However, if the nurses otherwise believe in the innovation, the process could continue after the disruptions are solved. The perceived *readiness* of an organisation could be a facilitating factor for the

adoption of VC. If VC is used as a means to eliminate house visits, the nurses would be quite disappointed since they feel the house visits are the reason for success in the control of TB. The influence of the perceived *job security* on the adoption of VC is uncertain.

3.2.4. The socio-political context

This section will discuss the socio-political context and its influence on the adoption of VC.

4.a - Legislation and regulations

Relevant legal aspects of VC are the security of the connection and the storing of data. These aspects should align with the GDPR requirements for data management in health care. As aforementioned, the project group has selected a safe application that complies with legal requirements. The nurses have been informed about the legal measures taken by the project group. Therefore, this not a topic during the interviews. Nonetheless, two nurses explicitly asked for confirmation on the legality of WeSeeDo during the interview, but most nurses left the decision with their organisation. Since the project group facilitated the legal aspects of VC, the direct influence on the adoption of VC is unclear.

3.3. Observed relations between factors

When all factors are taken together, some observations can be made about patterns in the data. An overview can be found in Table 5. This table compares all factors and nurses by attaching a level to each factor in which it is experienced by the nurse in order to observe patterns between the nurses and/or the factors. The levels are based on the interviews and conversations with the nurses and given by the primary researcher (L.A.). The levels range from one to ten, where one is a low or negative experience and ten a high or positive experience. The columns represent the nurses, where the first number indicates one of the eight GGD organisations in the pilot study.

Even though the TB-nurses of the North East region make up almost a quarter of all TB-nurses in the Netherlands, it should be noted that due to the small number of participants, no significant relations can be measured. Nonetheless, the nurses who indicated higher *awareness of the content* of WeSeeDo also showed lower *complexity* of VC. In general, the nurses who indicated higher *knowledge and experience* also feel a higher *need*. The cause or effect relation of this observation is unclear. Furthermore, it appears that the *attitude* towards VC is similar for the nurses of the same organisation. Whether this is a cause or a consequence is unclear. Nurses who experience low support from the IT department (i.e. *materials and resources*) also indicate their organisation as less *flexible* and have a more negative *attitude*. However, nurses who experience an *unsettled organisation* or who feel like there is little *time available* do not show a more negative *attitude*. The nurses who did show a more negative *attitude* also perceived little *usefulness* of VC. Moreover, the nurses who are members of the project group indicate an overall more positive *attitude* and more intention to use VC. These nurses are also more *aware of the content* of WeSeeDo. For the other factors there is no clear difference between the project group members and the other nurses. However, there seems to be an overall slightly higher experience of most factors, except for the following: *social support, self-efficacy, formal ratification, materials and resources, coordinator, no unsettled organisation, and flexibility & readiness*. An overview of Table 5 grouped by members and non-members of the project group can be found in Appendix 6.

Table 5. Overview of the relevant factors in Table 4 with a scoring per nurse and factor as given by the researchers.

	1.1	1.2*	2.1	2.2*	2.3	3.1*	4.1*	4.2	5.1*	5.3	6.1	7.1	7.2	7.3*
Procedural clarity & completeness	-	8	-		-	-	8	-	8	-	-	7	7	-
Low complexity (& low ease of use)	5	8	6	7	-	3	7	7	8	-	-	5	-	5
Compatibility	7	8	7	7	6	7	8	7	8	7	7	4	5	7
Relevance for the client	7	7	7	7	6	7	7	7	8	5	8	4	4	7
Perceived usefulness	8	8	7	7	7	7	8	7	8	7	8	6	5	7
Drawbacks/benefits	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Outcome expectations	5	5	5	5	5	5	5	-	5	5	5	5	4	5
Social support	7	7	7		-	-	8	-	7	7	-	7	-	-
Self-efficacy	6	5	6	7	7	8	5	5	6	5	7	7	2	7
Knowledge & experience	7	8	7	7	4	7	8	7	7	4	8	3	1	7
Awareness of content	4	8	4	7	3	6	8	6	8	6	5	1	3	8
Need	7	8	7	7	5	8	8	7	8	7	7	5	1	6
Willingness/intention/adption	7	8	7	8	8	8	8	7	8	8	7	4	2	8
Attitude	6	8	7	8	8	8	8	8	8	8	8	5	1	6
Formal ratification	8	8	-	-	-	-	6	6	7	-	-	-	-	7
Staff capacity	7	7	-	-	-	7	7	4	6	-	-	4	-	-
Financial resources	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Time available	5	6	-	7	-	6	5	3	7	5	5	3	3	5
Material resources/support	8	8	8	5	7	8	7	7	6	8	6	4	4	4
Coordinator	7	8	8		8	-	8	7	8	-	7	7	7	-
No unsettled organisation	8	8	2	2	2	-	-	7	8	-	-	-	6	-
Information accessible a/b VC	-	8	-	-	-	-	8	-		-	-	6	-	-
Performance feedback	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flexibility & readiness	8	8	8	6	7	7	6	6	6	8	7	4	-	4
Job security	4	-	-	-	-	-	4	4	-	-	-	-	-	-
Legislation	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* nurses who are also members of the pilot's project group.

- factors not mentioned/unknown.

4. DISCUSSION

The purpose of this study was to examine the facilitating and impeding factors that could influence the adoption of VC by nurses when treating TB/LTBI patients. The findings show that many factors may have an influence on the adoption of VC. The influence differs per nurse and per organisation because all nurses and organisations are different from one another. This chapter will discuss the implications of this study and the factors that were found to influence the adoption of VC. Factors related to the innovation were as follows: complexity, compatibility, relevance for the client, and perceived usefulness. Factors related to the user were as follows: support, self-efficacy, knowledge and experience, awareness of the content of the innovation, need, and attitude. Factors related to the organisation were as follows: a formal ratification by management, staff capacity, time available, materials and resources, unsettled organisation, and readiness of the organisation.

4.1. Adoption of video consultation

Conducting a pilot where a technology is implemented demands time and effort from the nurses. The prospect of the demanded time and energy can lead to resistance or negative expectations on the part of the nurses. Experiencing a need for the innovation might relieve this resistance and is important for the adoption of VC. The need for VC is present among almost all nurses. The majority of the nurses agreed VC is compatible with their work and the digital society we have come to live in. However, a couple of nurses feel no need for VC or WeSeeDo or show less intention to use VC. Therefore, they will most likely not use VC in the future. The adoption of VC also depends on the share of patients that can and want to conduct VC's. If only a small number of patients is interested in conducting VC, the nurses will feel less need for the technology. Additionally, a major aspect that is required for the adoption of VC is the support of the IT department and proper training for the nurses to increase the level of skills and experience with the technology. The nurses who are less supported or less skilled show a lower adoption than the others. Moreover, the establishment of VC requires the nurses to learn new communication skills while conducting consultations. When the required skills are not present, the nurses could become dissatisfied with the amount of information they receive during VC's. Furthermore, the fact that the nurses conduct house visits is perceived as an important attribute of the successful reduction of TB incidence. The nurses emphasize the importance of the house visits and that VC should not be implemented to replace the house visit. In addition, four nurses indicate there is little time for the nurses to get acquainted with WeSeeDo, due to an irregular patient load. In general, the care for the patient has first priority, which means the adoption of VC comes second. When the patient load increases, it forms a threat to the adoption of VC. Also, the differences between the GGD organisations form a major challenge in managing the adoption of VC. Even though the organisations belong to the same umbrella organisation, they operate quite independently. It is difficult to coordinate the organisations simultaneously since many different actors are involved that all have their own complications and resistance. When VC is implemented it has the potential to save the organisation time and costs but the actual savings are unclear. Only if the number of house visits goes down, it will reduce the amount of travelling that is done by the nurses. How often the information from a VC suffices to eliminate the necessity for a house visit needs to be experienced in the continuation of the pilot study.

The current study focusses on the adoption phase, which examines the intention of the users to adopt the innovation. While evaluating intention, one should keep in mind that what people say or intend to do is not necessarily equal to what people actually do. This concept is also known as the intention-behaviour gap (37). Additionally, since this study is conducted in the adoption phase, the nurses might not have a complete view of the actual use of WeSeeDo and their intention can change over time. Also, a common aspect of implementation research is whether the facilitating or impeding factors are the actual factors (i.e. whether they have actually been experienced or encountered) and the extent to which they are perceived to exist (i.e. they are more hypothetical influences) (9). These aspects of the adoption phase might sound challenging, but they also provide opportunities to positively affect the nurses and, thereby, the innovation process. How this can be done is be discussed in the innovation strategy (chapter 4.3).

4.2. Comparison to literature

Literature indicates the perceived usefulness and ease of use as factors of technology acceptance among nurses (22, 25). Most nurses in this study gave several examples where they would use VC, which indicates the perceived usefulness. The nurses who did not find VC useful also indicate a more negative attitude, which coincides with the literature. The nurses who experienced the low complexity of WeSeeDo show positive attitudes but the perceived prospect of a complex installation and usage of the VC technology negatively affects the nurses' attitude and adoption of VC. Furthermore, most nurses find VC relevant for their patients, while two nurses do not indicate such relevance for the majority of their patients and show a more negative attitude. As Huryk (19) has indicated, a factor for a positive attitude is the perception of enhanced patient care. Nurses who indicate to have little experience with VC also show less need for VC. As mentioned in the literature, skill and experience with the application are important in the innovation process (17, 19, 26). Moreover, the literature indicates that user engagement in the development is important while innovating (17, 26). The innovation strategy applied by the project group answers to these demands by including the nurses in the project group. The nurses are involved in discussing how and when VC should be applied, constructing work documents, and facilitating the desired behaviour. Additionally, the nurses have experienced that a formal ratification by the management is important in order to adopt VC since the required materials are more easy to receive when management is involved. This experience corresponds with the literature that states leadership, management and supportive administrations are important in the innovation process (17, 25). Moreover, technical support has been indicated to be important to health care personnel (12-14). In this study as well, the cooperation and support from the organisation's IT department have a substantial impact on the adoption of VC. Nurses from organisations that experience little support, or even resistance, show more problems in the adoption and actual use of VC. An interesting result of this study that does not coincide with the literature, is the factor self-efficacy. Several studies have indicated self-efficacy to influence the nurses´ attitude towards eHealth (18, 19) or usage of technology (25). However, the adoption of VC in this study was not influenced by their self-efficacy for most nurses. Some of them showed high willingness and intention to use VC even though they felt less able to learn.

4.3. The innovation strategy

Each nurse experiences the innovation process different and, therefore, requires different support. The innovation strategy provides targeted actions to facilitate optimal implementation and makes recommendations aimed at several influential factors.

According to Rogers (20), the population of adopters can be classified into five categories based on their rate of adoption. Meaning some people will adopt an innovation quicker than others. These categories are as follows: innovators, early adopters, early majority, late majority, and laggards. Innovators are the ones that adopt an innovation the fastest, while laggards are the slowest adopting group. These labels have proven helpful as a model of variation in adoption behaviours (38). The nurses in this pilot study differ from one another since some are very quick to adopt VC, while others are more hesitant. Based on the results there is no definite way to categorize the nurses in the way that Rogers does, but this study does provide direction. It is advised to identify the early adopters of the population because they can be used as advocates for VC and positively influence the other nurses (38). Therefore, it is also important to invest in the curiosity of the early adopters.

The nurses can each be individually targeted with appropriate strategies to improve adoption. In their book, Grol et al. (11) describe strategies for several situations as can be seen in Table 6. If the nurses feel no need for VC, this should be personally discussed to examine the value of VC for the nurse concerned. Nurses with negative attitudes or unwillingness to change can be influenced by positive experiences from their colleagues or other key persons. For example, early adopters can be used to share positive experiences and motivate others. Another option is to use positive experiences from patients. Continuously sharing these stories could improve adoption. Additionally, options to adjust the VC technology to the wishes of the nurses should be examined and the reasons for the nurses' resistance should be discussed. When the willingness is present but no implementation occurs due to lack of time, means, or skills, more support, training, and assistance is required. It is important for the nurses to be able to test the innovation without major risks or consequences. Also, an examination of the working process is needed to see how VC fits within the current process. When there is still insufficient success, more information on the advantages is necessary. Monitoring progression and providing feedback can

improve the motivation to continue. For future reference, these measures can also positively influence the integration in working routine. Therefore, a system needs to be put in place that monitors and provides feedback and reminders. In addition, a clear working protocol is necessary to facilitate integration. Creating clear working instructions to standardize the working method will positively influence the innovation process. Finally, to improve the anchorage of VC in the organisation, possible strategies include support from management, organisational measures, and rewards or compensations for conducting the desired behaviour.

Strategies on a more general level are important to optimize the workplace of the nurses. The nurses require assistance from the IT department. Therefore, the IT department needs to be fully informed and sufficient internal communication is necessary. Additionally, a general training to improve the IT skills and communication skills for conducting VC will benefit all nurses in this pilot study. If the nurses already made use of WeSeeDo, they are generally more positive. To gain experience, training in the use of WeSeeDo is recommended. Since the application is fairly easy to use and straight forward a short training should suffice and could lead to better adoption of VC. Additionally, to properly provide treatment through VC, different communication skills are required in comparison to a house visit of a telephone consultation. For example, more explicit questioning and more eye contact are points of attention while communicating. It is important that the nurses are given the opportunity to learn these skills and, therefore, training on these skills should be provided. An overview of which nurses could act as early adopters and what strategy fits best for each nurse is given in Appendix 7.

Table 6. Several strategies to different barriers as given by Grol et al. (11) to improve implementation.

Possible barriers	Possible strategies
Not interested (no need, no relevance, no necessity)	Appealing brochure, personal approach and explanation, confrontation with own actions
Negative attitude (drawbacks, doubts, no commitment)	Adjust innovation to subjects, create discussion and consensus, discuss resistance, use key persons and leaders
Not willing to change (doubts about success and own capabilities)	Demonstrate possibilities with colleagues, find bottlenecks and search for solutions
Not implementing (no time, means, or skills; does not fit in current process)	Provide extra means, support, skill training, assist in the redesign of current process, provide assistance
Insufficient success (negative reactions)	Information on usefulness, make a plan with reachable goals
No integration in routine (relapse, forgotten)	Monitoring, feedback, and reminder system, integration in planning and protocols
No anchorage in organisation (no support)	Sufficient means, support from management, organisational measures, rewards or compensations

4.4. Strengths and limitations

This study has contributed to the scarcely available research on the innovation process of VC in the Netherlands. By using an extensive framework, it provides a structured and well-funded examination of factors that could influence the innovation process. In addition to the factors consulted from literature, open coding was used to examine any additional factors. In-depth interviews with the nurses fit the purpose of the study since it provides an understanding of the nurses' considerations in the adoption of VC. Especially when the literature on the topic is scarce, an explorative design fits best to get more familiar with the field. The coding of the interviews was reviewed by a second researcher in order to add to the objectivity of the coding. This method adds to the validity of the study. Additionally, the study applies a determinant framework with a descriptive purpose instead of a theory that attempts to explain mechanisms of implementation. This method suits the current study best since the research context involves eight different organisations that operate quite independently (9). A study that would examine mechanisms of implementation would have to be conducted separately for each organisation to fully understand the implementation mechanisms.

The results of this study must be carefully interpreted due to several limitations. First, the theoretical framework provides a summation of factors that could influence the innovation process but does not show relations between those factors. In this study, an attempt is made to gain more insight into how the factors relate to one another with the use of Table 5. This exploration has provided interesting insights but also comes with limitations. The scoring of the factors is given by the researchers and only based on observations. It is, therefore, susceptible to subjectivity. Also, due to the low number of nurses no analysis could be done on the relations and statements on coincidence cannot be made.

Second, even though the nurses are a reliable and experienced source, their experiences could be susceptible to bias and should be perceived as perceptions instead of factual knowledge. Moreover, even though the interviewer has stated her independent position as 'external' researcher, the nurse might not have felt they could speak freely or had ulterior motives during the interview because the interviewer was part of the project group. This notion could shape the nurses' answers if they feel like they could 'get something' out of the conversation. The direction in which it can shape the answers could be positive since they do not want to be seen as uncooperative, or it could be negative since they do not want the adoption of VC to be underestimated. Furthermore, the position of the interviewer could also influence the topics of the conversation by focussing more on the practical aspects of the pilot study.

Third, the evaluation of literature on theoretical frameworks has led to the construction of a particularly large framework used in this study and the questions asked during the interviews were stated rather generally. The high number of included factors made it difficult to cover all topics during the interviews. A selection was made based on the judgement from the authors and the indications by the nurses during the interviews. For some factors, this selection has occasionally led to the deduction of the influence based on the given answers. Possibly, a more explicit questioning of what factors are perceived to influence the nurses' intention to use VC could provide more decisive information on the effect. One might expect that a more experienced interviewer would have resulted in more explicit responses regarding the factors influencing adoption.

Finally, the interviews were conducted through a video connection. In most interviews, it facilitated a personal and informal connection between the interviewer and interviewee (i.e. the nurse). However, during some interviews, the connection was not optimal which has occasionally lead to insufficient quality of audio. The disruption of the conversational flow could diminish the amount of information given by the nurse and could negatively affect their attitude during the interview which can create a false image of the nurse's attitude.

The results of this study can be used for other regions in the Netherlands where the nurses will use VC with their TB/LTBI patients. Whether this study is applicable for nurses in other fields of health care is debatable since many fields do not allow for house visits or have predominantly elderly patients. The facilitating and impeding factors could differ in these situations. Furthermore, the study takes place in an environment for the Dutch health care system. The results are, therefore, not directly generalizable to other countries. Especially in countries with more rural settings and less digitally developed surroundings. Nonetheless, the influential factors while implementing a technology could be universal and still provide information.

4.5. Future research and innovation

The progression of the eHealth pilot will provide more information on the consequences of using VC and more clarity on how the nurses go through the innovation process. On the long-term, the gathered data could provide insight into the benefits for the nurses and patients, influential factors in the innovation process of VC, increased efficiency, and cost-effectiveness. Additionally, the patient section of the pilot study should provide more clarity on which patients have the motivation and means to conduct VC and what share of the patient population they make up. To provide a full understanding of VC, it is important to research whether VC is the right fit for the patients in terms of patient preferences and patient friendliness. Based on the current results, further examination of the effects of IT-training and improved communication between the nurses and the IT-department could provide more insight into factors that could facilitate the innovation process. Furthermore, monthly evaluations should be held to facilitate optimal implementation. It is important to keep close watch of the innovation process by frequently examining the factors that could influence the innovation process. The influence of these factors could change over time and different factors might become more prominent. The theoretical framework used in this study can be consulted to evaluate relevant factors.

When further pilot evaluations are conducted, some aspects require extra attention. First, more explicit questioning of what the nurses experience as impeding or facilitating is necessary. Second, an independent interviewer could minimize potential bias in the answers of the nurses. Third, further evaluation in the form of focus groups or group discussion could provide more insight into the overall influence of the factors. These shared experiences are important, although the nurses should feel like they are guided on a personal level as well. The study could benefit from quantitative analyses, but this requires a sufficient number of participants to provide valid analyses. Since there is only a relatively small number of nurses in the Netherlands (~64), it is difficult to reach a sufficient amount of participants. The study could be conducted on a larger scale across countries to increase the number of participants, but this will have many limitations as the study is quite specific to its setting.

Furthermore, the nurses have indicated that house visits are an important part of the treatment. However, what and how these house visits contribute to the treatment is not well researched. More research on the contribution of house visits to the TB treatment could support the statements made by the nurses. Studies conducted on house visits in other areas of health care have already proven its value (39-42). For example, in maternal care women experienced long-term positive impacts of home visits on their parenting abilities (42). Also, house visits promoted medication adherence and quality of life for HIV-infected heroin users (41).

Finally, the results have indicated an additional experienced need among patients and nurses to send each other pictures and text messages. Currently, the nurses use unsecured applications to fulfil this need. Research into an appropriate substitution can be valuable to the proper treatment of the patients. However, it should first be examined if this need for a message application is still present once VC is fully implemented, or that the need has been eliminated by the introduction of VC.

4.6. Practical recommendations

4.6.1. Recommendations for the pilot study

For the progression of the pilot study, some recommendation can be made to positively influence the innovation process. The recommended innovation strategy can be used to provide the nurses with proper assistance. It includes what strategies can be applied for certain factors and specific actions to undertake per nurse. All nurses would benefit from additional training in IT and communication skills for conducting VC. The monthly evaluations of the innovation process are necessary to maintain targeted and effective assistance. It is also recommended that the internal communication between the nurses and the IT departments is sufficient.

Additionally, some nurses make use of other applications to conduct VC's. These applications do not comply with the GDPR requirement for data management in health care. Nonetheless, these applications are easy to use and well-integrated into society which makes the adoption of other applications more difficult because the expectations of the ease of use are high. Since compliance with the law is desired, the nurses should be made aware that the use of these unsecured applications is not allowed. The raising of awareness could also facilitate the adoption of a secured application for VC, like WeSeeDo. Additionally, it should be continuously assessed if new developments in the technology have led to more user-friendly adjustments or applications that fit within health care.

4.6.2. Recommendations for upscaling

The continuation of the pilot shall give more information on whether VC should be used in other regions of the Netherlands for the treatment of TB. The experiences thus far can provide valuable lessons for when VC is implemented on a larger scale. When VC is implemented in these regions, there are several aspects to keep in mind prior to and during the adoption phase. First, an important element of the innovation process is the cooperation of the IT department. They should be informed as early as possible, preferably before deciding which VC application to use. In this way, they could provide input on the usability of the application. However, when multiple organisations are involved it can be quite difficult to involve every actor and have everyone agree. One should be wary about the time spent on getting everyone to agree. When a decision is made, a formal ratification by the management is required.

Second, since multiple organisations are involved who work quite independently, it could be useful to closely examine each organisation and the impeding factors they might experience. Currently, the experiences of the nurses are the primary source of information. Obtaining more involvement from the managers could benefit the adoption because the managers of the different organisations can learn

from each other. Also, they can provide better assistance to the nurses when they are more closely involved.

Third, while constructing the work instructions it is important to be as clear and explicit as possible and involve the nurses while making the documents. These aspects are especially important if unity between multiple organisation is required. However, every organisation should also be able to adapt the instructions to fit their organisation. Constructing clear documents is an important aspect during and after adoption since the documents can be altered and improved based on feedback given by the nurses.

Last, in order for the nurses to have consultations reimbursed, they have to register every consultation in the iTBC including the type of consultation. Currently, this registration is not possible which negatively influences the work process. If VC is going to be used nationally, the option should be included in the iTBC.

4.7. Conclusion

It can be concluded that many factors influence the adoption of VC among nurses and their TB/LTBI patients. Which factors influence the adoption can differ per nurse and per organisation. Targeted actions per factor need to be undertaken in order to facilitate adoption and eventually optimize implementation, of which recommendations are made in this report. Overall, the introduction of VC to the working method is a valuable addition for the TB-nurses. It provides the nurses with more options to conduct a consultation, but should not serve as a replacement of the current consultation options. Our present digital society makes the use of VC a logic development in TB care. However, within a care setting, it is important that the VC application provides sufficient privacy and data protection. Furthermore, the cooperation of the IT-department of each GGD organisation is vital and clear agreements have to be made on the used VC application. Whether VC is an appropriate means in the treatment also depends on the specific circumstances of the patient. The adoption of VC has the potential to increase efficiency in the nurses' work but more research is required to provide insight into the benefits for the nurses and patients, influential factors in the continuation of the innovation process of VC, increased efficiency, and cost-effectiveness.

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6. APPENDIX

Appendix 1 – Implementation framework and models

1A

Fleuren M, Paulussen T, Van Dommelen P, Van Buuren S. Measurement instrument for determinants of innovations (MIDI). Leiden: TNO. 2014. 1.5, Overview of determinant in the MIDI; p.5.

Determinants associated with the innovation	
1 Procedural clarity (e)	5 Compatibility (e)
2 Correctness (e)	6 Observability (e)
3 Completeness (e)	7 Relevance for client (e)
4 Complexity (e)	
Determinants associated with the adopting person (user)	
8 Personal benefits/drawbacks (e)	14 Descriptive norm (e)
9 Outcome expectations (e)	15 Subjective norm (e)
10 Professional obligation (t)	16 Self-efficacy (e)
11 Client/patient satisfaction (e)	17 Knowledge (t)
12 Client/patient cooperation (t)	18 Awareness of content of innovation (e)
13 Social support (e)	
Determinants associated with the organisation	
19 Formal ratification by management (e)	24 Material resources and facilities (t)
20 Replacement when staff leave (e)	25 Coordinator (e)
21 Staff capacity (t)	26 Unsettled organisation (p)
22 Financial resources (t)	27 Information accessible about use of the innovation (e)
23 Time available (e)	28 Performance feedback (e)
Determinants associated with the socio-political context	
29 Legislation and regulations (t)	

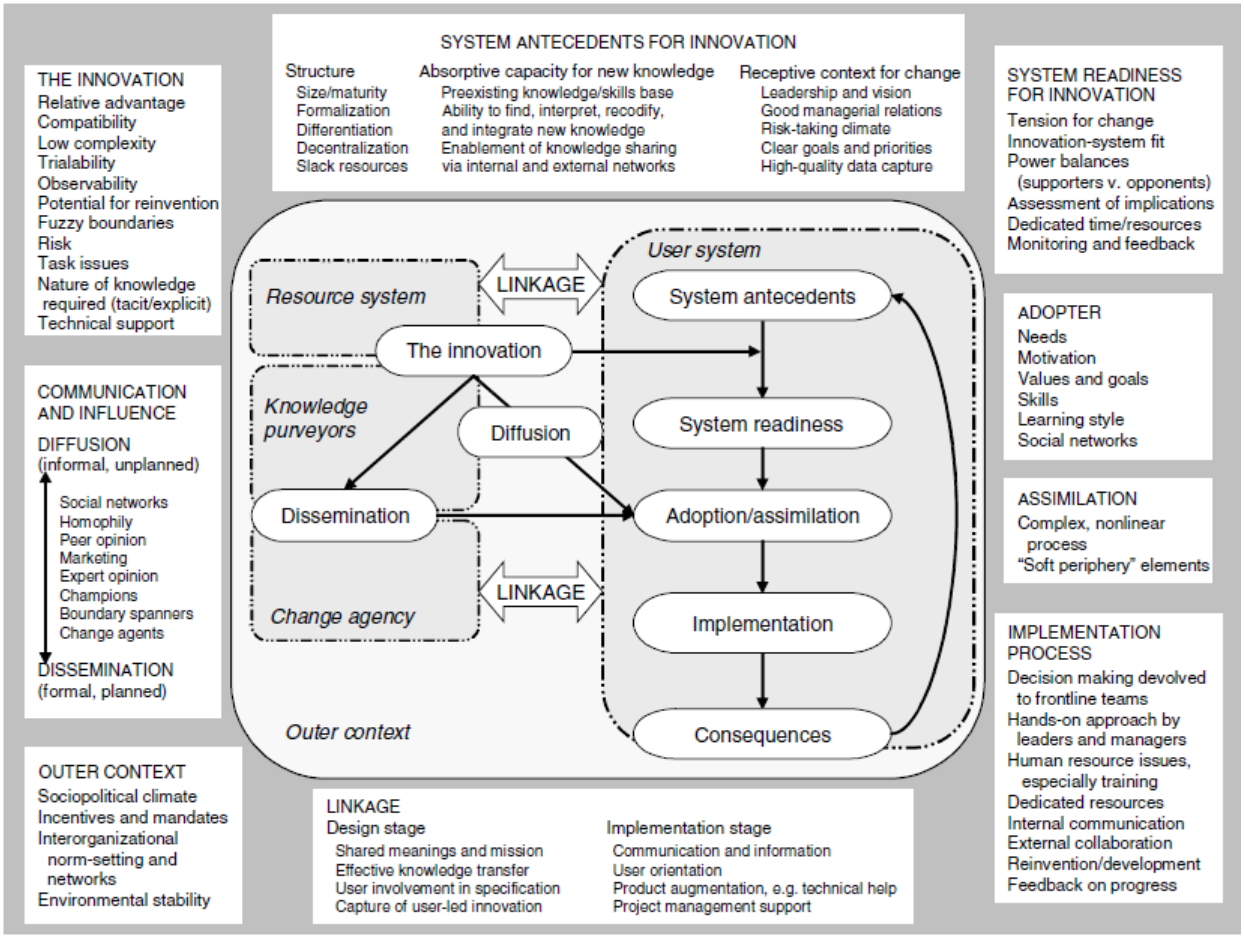
(e) based on the meta-analyses of the *empirical* data

(t) based on *theoretical* expectations of implementation experts

(p) based on *practical* experience of implementation experts

1B

Greenhalgh T, Robert G, Bate P, Macfarlane F, Kyriakidou O. Diffusion of innovations in health service organisations: a systematic literature review: John Wiley & Sons; 2008. Figure 3, Conceptual Model for considering the Determinants of Diffusion, Dissemination, and Implementation of Innovations in Health Service Delivery and Organization, Based on a Systematic Review of Empirical Research Studies; p.595.



1C

Meyers DC, Durlak JA, Wandersman A. The quality implementation framework: a synthesis of critical steps in the implementation process. American journal of community psychology. 2012;50(3-4):462-80. Table 2, Summary of the four implementation phases and 14 critical steps in the Quality Implementation Framework (QIF) that are associated with quality implementation; p.468.

Phase One: Initial considerations regarding the host setting
Assessment strategies
1. Conducting a needs and resources assessment
2. Conducting a fit assessment
3. Conducting a capacity/readiness assessment
Decisions about adaptation
4. Possibility for adaptation
Capacity-building strategies
5. Obtaining explicit buy-in from critical stakeholders and fostering a supportive community/organizational climate
6. Building general/organizational capacity
7. Staff recruitment/maintenance
8. Effective pre-innovation staff training
Phase Two: Creating a structure for implementation
Structural features for implementation
9. Creating implementation teams
10. Developing an implementation plan
Phase Three: Ongoing structure once implementation begins
Ongoing implementation support strategies
11. Technical assistance/coaching/supervision
12. Process evaluation
13. Supportive feedback mechanism
Phase Four: Improving future applications
14. Learning from experience

1D

van Dijk H. The critical success factors for IT innovations in Dutch general practices 2012. Table 7, Synopsis of Framework A: The complete framework including implications for practice is listed in Appendix B; p. 52.

Planning & Analysis	Design & Implementation	Use & Maintenance
Finance	Guidelines & standardization	Workflow, productivity & efficiency
Legislation, security & privacy	System reliability	Care quality
Attitude towards IT	Ease of use	Knowledge, skill & support
Political support	User involvement	Technology & control
Sociability & culture		Interoperability
Incentives		Communication
Presence of IT manager		Patient access & traveling
Perceived forecasted value		User satisfaction
Available implementation time		
Competition		

Appendix 2 - Interview guide

Interview gids
Nr:
Informed consent:

Zijn er nog vragen over het onderzoek?
Achtergrond vragen

1. Hoe lang werk je al bij de GGD?
2. Hoe lang werk je al bij de TBC-bestrijding?
3. Wat is je leeftijd?
4. Van de gestuurde documenten uit de pilot, welke heb je al gelezen?
    a. Informatiebrief
    b. Werkprotocol
    c. Instructiefilmpjes
    d. Logboeken
5. Heb je WeSeeDo al gebruikt? (Experience WeSeeDo, awareness of content)

Categorie	Wat wil je weten	Wat moet je vragen?
Algemeen	Wat maakt dat je beeldbellen wel of niet zou gebruiken in vergelijking met de huidige manier van werken? Denk je dat je beeldbellen gaat gebruiken en welke aspecten komen daarbij kijken volgens jou?	
Innovatie	**Wat vind je van het beeldbellen?**	
	Verwachte bruikbaarheid voor verpleegkundigen (perceived usefulness)	Denk je dat het gebruik van videobellen je prestaties op het werk zou verbeteren? Maakt het je werk makkelijker en/of meer efficiënt denk je? Vind je videobellen nuttig? Op welke manier?
	Verwachte bruikbaarheid voor patiënt (perceived relevance)	Draagt het videobellen bij aan de behandeling voor de patiënt?
	Verwacht gebruikersgemak (perceived ease of use/complexity)	Denk je dat je beeldbellen makkelijk kan gebruiken voor de beoogde doeleinden?
	Verwacht resultaat (outcome expectation)	Gaat beeldbellen de kwaliteit van behandeling verbeteren?
	Compatibiliteit (in werk) (&job-fit)	Denk je dat het beeldbellen past bij hoe je gewend bent te werken? Heeft het gebruik van beeldbellen verder effect op je werk prestaties/efficiëntie?
	Behoefte (need)	Is er behoefte aan beeldbellen? Vult het videobellen een gat in de huidige behandeling? In hoeverre en in welke mate voegt beeldbellen wat toe voor jou?
Gebruiker	**Hoe denk je dat jij als gebruiken met het beeldbellen omgaat?**	
	Attitude	Wat vind je van het idee om beeldbellen te gebruiken?

		In hoeverre zijn ze gemotiveerd om beeldbellen te gebruiken.
	Eigen effectiviteit (self-efficacy)	Heb je vertrouwen dat je het videobellen naar wens kunt gebruiken? Acht je jezelf vaardig met de computer?
	Persoonlijke voordelen (personal advantages)	Wat voor voordelen zouden er zitten aan het gebruik van beeldbellen?
	Persoonlijke nadelen (personal drawbacks)	Wat voor nadelen zouden er zitten aan het gebruik van beeldbellen?
	Verwachting voor gebruiker (user expectations)	Wat verwacht je dat het beeldbellen teweeg gaat brengen voor jou?
	Ervaring & kennis (experience & knowledge)	In hoeverre ben je bekend met videobellen? Hoe schat je jezelf in met betrekking tot computer gebruik? Hoeveel ervaring heb je met technologische innovaties?
	Subjectieve norm	*Hoe beïnvloeden andere hun keuze.*
	Intentie om te gebruiken (intention) & Bereidbaarheid (willingness) ***(Intentie tot adoptie, maatstaf)***	*Ben je van plan het te gaan gebruiken?* *Ben je bereid dit te gebruiken?*
Organisatie	**Hoe denk je dat de organisatie met het beeldbellen omgaat?** **Is er voldoende steun vanuit de organisatie?**	
	Beschikbare tijd (time available)	Heb je genoeg tijd om je nu in beeldbellen te verdiepen?
	Materialen (materials)	Zijn alle materialen (al) beschikbaar om beeldbellen te gebruiken?
	Coördinator (coordinator)	Is er een aanspreekpunt en aansturing met betrekking tot beeldbellen?
	Ondersteuning (support)	Hoe staat jullie administratie tegenover technologische innovaties?
	Capaciteit (capacity)	Heeft jou organisatie de capaciteit om technologische ontwikkelingen te implementeren?
	Flexibiliteit (flexibility) & readiness	Is er ruimte om nieuwe dingen te leren?

<u>Doel van interview:</u>
Ik doe dit onderzoek als MSc afstudeerder. Hiervoor wil ik op een gestructureerde manier al jullie ervaringen en kennis verzamelen om zo te kijken waar de behoeftes liggen, extra aandacht geven aan de punten die jullie aankaarten en zo het gebruik van beeldbellen zoveel mogelijk faciliteren. Ook om te kijken als het niet gaat zoals iedereen wilt waar het dan aan ligt.

Appendix 3 – Informed consent

Toestemmingsformulier (informed consent)

Betreft: *Individueel interview voor het onderzoek naar beeldbellen in de GGD pilot eHealth beeldbellen*

Ik verklaar hierbij op voor mij duidelijke wijze te zijn ingelicht over de aard, methode en doel van het onderzoek.

Ik geef toestemming voor:

1. De opname van het interview door middel van een voice/video recorder, waarna de opname vernietigd wordt na uitwerking van het interview
2. De anonieme verwerking van gegevens, zonder herleidbaar te zijn tot de persoon
3. De verwerking van de uitkomsten van dit interview in een verslag of wetenschappelijke publicatie

☐ Ik doe geheel vrijwillig mee aan dit onderzoek mee te doen en ik begrijp dat ik mijn medewerking aan dit onderzoek kan stoppen op ieder moment en zonder opgave van reden

Handtekening: …….
Naam: …….
Datum: ……..

Onderzoeker: Ik heb mondeling toelichting verstrekt over de aard, methode en doel van het onderzoek. Ik verklaar me bereid nog opkomende vragen over het onderzoek naar vermogen te beantwoorden.

Handtekening: …….
Naam: …….
Datum: ……..

Appendix 4 – Ethical approval

A

METc non-wmo declaration

University Medical Center Groningen

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Medical Ethics Review Board

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To
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Sociaal Verpleegkundige
Tuberculosebestrijding GGD twente
Per E-mail: a.smeijers@ggdtwente.nl

Enclosure(s) ----
Ref. M18.235824

Date 20th August 2018
METc number METc 2018/457
Title **Demonstratieproject: Het gebruik van E(M)-Health technologieën in de begeleiding van patiënten met (L)TBI.**
UMCG RR number 201800623

The Medical Ethics Review Board of the University Medical Center Groningen (METc UMCG) has discussed the above mentioned protocol and considered whether or not the research falls within the scope of the Medical Research Involving Human Subjects Act (WMO).

Based on the submitted documents the METc UMCG concludes that the above mentioned protocol is not a clinical research with human subjects as meant in the Medical Research Involving Human Subjects Act (WMO).

Therefore the METc UMCG has no task in reviewing the protocol and you do not need a WMO approval before you can start the research.

Please note that other legal Acts and/or guidelines, such as the Medical Treatment Agreement (WGBO), Dutch Personal Data Protection Act (Wpb) and codes of conduct of the FEDERA (Federation of Medical Scientific Institutions) may apply to the scientific research.

Kind regards,
on behalf of the Medical Ethics Review Board

Prof. W.A. Kamps, MD PhD
chairman

J. Davids, MSc
official secretary

umcg

B

University of Twente assessment

(not available in public version)

Appendix 5 – Translations of quotes by nurses

English translation	Dutch original
"I think once it runs and the patient has an email address it's not that hard. Look, if you think the patient is suitable for this, then it is not difficult. It is not a difficult programme." (4.2)	"Ik denk dat als het eenmaal loopt en het patiënt een email adres heeft dat het niet zo moeilijk is. Kijk, als jij denkt van de patiënt is geschikt hiervoor, dan is het niet moeilijk. Het is geen moeilijk programma." (4.2)
"This is kind of the future, right." (5.3)	"Is toch een beetje de toekomst dit he" (5.3)
"We have noticed, at least I have noticed over the years that a home visit is very valuable. That you get a lot of information. Also the social things around it." (4.2)	"Wij merken, tenminste ik heb in de loop van de jaren gemerkt dat een huisbezoek wel heel waardevol is. Dat je heel veel informatie krijgt. Ook de sociale dingen erom heen." (4.2)
"…but these are new means and you have to use them in a good way and you have to agree on the limits of or within which frameworks you can use them well and when you shouldn't do it." (1.1)	"…maar dat zijn nieuwe middelen en je moet ze op een goede manier inzetten en je moet de grenzen ook afspreken van of binnen welke kaders je dit goed kan gebruiken en wanneer je het juist niet moet doen." (1.1)
"I think it's very interesting that you have to look at what skills you need as a nurse from time to time, because you're missing a number of signals. You have, uh, you don't see someone live so maybe you need to ask some extra questions, or learn to pick up certain signals. So me, it's really nice to talk to other professionals about that. So how do you do this, do you do that?" (2.2)	"Ik vind het wel heel interessant dat uit je af en toe moet kijken welke vaardigheden heb je als verpleegkundigen nodig, omdat je een aantal signalen mist hé. Je hebt, uh, je ziet iemand niet live dus misschien moet je soms nog wat extra vragen stellen, of leren bepaalde signalen op te pakken. Dus ik, het is wel heel leuk om daar met je professional over te hebben. Zo van 'nou hoe doe je dit, doe je dat?" (2.2)
"...and our target group are not people who always keep their promises, other cultures, in the Netherlands it's time is time, that is, of course not for all cultures. And so yes. But you can't do anything about that, but I think that's what we're going to run into within the video calling." (6.1)	"…en ook onze doelgroep zijn niet mensen die zich altijd goed aan de afspraak houden, andere culturen, in Nederland is het hè tijd is tijd, dat is, geldt natuurlijk niet voor alle culturen. En dus ja. Maar goed daar kunnen jullie niks niks aan doen maar ik denk dat dat het is waar we tegen aan gaan lopen binnen het beeldbellen." (6.1)
"Yes, I think that will also be different for each patient, because one is just lonely for example and is happy that someone is coming to visit and the other who is thinking well damn, I have to stay at home the whole morning because that lady is coming." (4.1)	"Ja ik denk dus dat zal ook per patiënt verschillend zijn want de één is gewoon bijvoorbeeld eenzaam en is blij dat er iemand op bezoek komt en de ander die denkt van hé verdorie moet ik weer de hele ochtend thuisblijven omdat die dame komt" (4.1)
"Well, I think it's, uh, yeah, you're in a different contact than just by phone, just hearing each other's voices. And you can see that someone is taking medication, whether someone has filled his weekly box well, what someone looks like, how someone looks uh, wherever someone is now and then, that you think of well people sitting in all different places of course, how do	"Nou ik vind het uh ja je hebt toch ander contact dan alleen telefonisch he, door elkaars stem alleen te horen. En je kan zien dat iemand medicatie inneemt, of iemand goed zijn weekdoos heeft gevuld, hoe iemand eruitziet, hoe iemand kijkt uh, waar iemand ook is af en toe hè, dat je denkt van nou mensen zitten op allemaal verschillende plekken natuurlijk, hoe

they feel about themselves. You can get more out of it. Yes and sometimes it is no longer necessary to visit someone." (6.1)	zit iemand in z'n vel. Je kan er toch wel meer uithalen. Ja en soms is het dan ook niet meer nodig om iemand te bezoeken." (6.1)
"I am very approachable and very easy, so they know where to find me when they have questions and they do, they call me or they drop by or I visit them if it is easy, on the way, and things like that, so I don't see that [video calling] that much profit at the moment either." (7.2)	"Ik ben zelf vind ik heel laagdrempelig en heel makkelijk, dus dus bij vragen weten ze me te vinden en dat dat doen ze ook, ze bellen me ook of, ze komen even langs of ik ga even snel bij hun langs hè als het allemaal makkelijk op de route is en en dat soort dingen dus ik ik zie ik zie daar [videobellen] ook op dit moment gewoon niet zoveel winst van." (7.2)
"I think video calling is a unique way to connect with patients. You have to take a good look at when you're going to use it and when you're not going to use it." (1.1)	"Ik vind het beeldschermbellen vind ik een uniek middel om contact te hebben met patiënten. Dan moet je wel goed kijken van wanneer ga je dat inzetten en wanneer ga je het niet inzetten." (1.1)
"I find it very difficult to say beforehand whether there are any real disadvantages to it. I think we should really see that at the start." (5.1)	"Ik vind het nu vooraf heel moeilijk om te zeggen of er echt nadelen aan zitten. Ik denk dat we dat echt moeten zien als een van start gaan." (5.1)
"Look, as a nurse you can say at a certain point that I am not doing it with video calling because I still think that this patient needs a personal contact, so really face-to-face, so presence, uh then you decide to do that. And if you estimate that it doesn't have to be done, this is a good way to do it. But that has nothing to do with the success of the treatment, more with the assessment, your own assessment of uh, can this patient deal with this? Is this sufficient or not sufficient in the contact? Does he have enough connection with you, to dare to ask things or, uh, yes, so I think that it doesn't matter for the relationship, uh, at least if the patient is uh uh, open to it, for such a means as this." (7.3)	"Kijk, je kan als verpleegkundige op een gegeven moment zeggen van ik doe het niet met beeldbellen want ik vind toch dat deze patiënt wel een persoonlijk contact nodig heeft, he dus echt face-to-face, dus aanwezigheid, uh dan besluit je om dat te doen. En als je inschat dat het niet hoeft dan is dit een prima manier. Maar dat heeft niks te maken met slagen van de behandeling, meer met de inschatting, je eigen inschatting van uh, kan deze patiënt hiermee omgaan? is dit voldoende of niet voldoende in het contact? Heeft ie voldoende binding met je he, om dingen te durven vragen of uh, ja, dus ik denk dat dat, dat het niks uit maakt voor de relatie, uh, althans als de patiënt daar uh uhh, open voor staat, voor zo een middel als dit." (7.3)
"As far as technical experience is concerned, I don't see that as a problem, it will work out, I understand and it will be all right." (7.1)	"Qua technische ervaring daar zie ik niet tegenaan, dat zal wel loslopen, dat snap ik wel en dan komt het wel goed." (7.1)
"I'm technically not very handy with these things, so with me of course there has to be a turning point of eh, but we have to look at that gradually, of course it remains a burden for me it is a burden or it becomes a pleasure …… I can quickly uhm jam." (7.3)	"ik ben technisch niet zo handig met die dingen, dus dus bij mij moet er natuurlijk een keer een omslagpunt komen van hè, maar dat moeten we gaandeweg bekijken, van blijft het een belasting voor me is het last of wordt het een lust …… ik kan snel uhm blokkeren." (7.3)
"Really a need from the nurses, you mean? I think so, because I know my, uh, one of my	"Echt een behoefte vanuit de verpleegkundigen bedoel je? Denk ik wel, want ik weet dat mijn,

colleagues has done it before. Uh, so that's where it really came in handy." (5.1)	uh één van mijn collega's het ook al eerder heeft gedaan. Uh, dus daar was het ook wel echt een uitkomst." (5.1)
"Yes. I always think about it." (6.1)	"Ja. Ik denk er wel altijd over na." (6.1)
"Absolutely not. No no, I can lie to you but I'm not going to do it." (7.2)	"Absoluut niet. Nee nee ja nee ik ik kan tegen je liegen maar ga ik niet doen." (7.2)
"Yes, yes, but I do find it interesting to learn." (4.1)	"Ja, ja, maar ik vind het wel interessant om te te leren." (4.1)
"It will probably be a hassle again, so I don't know very well with, yes [...] that whole technology and continuous changes, that I, continuously everything goes, and then you have to logon like this and then you're going to logon like this again and then you'll be back in the Cloud and then you won't be able to access files. I find that is asking a lot …… well let's just start you would think." (1.1)	"Het zal wel weer een gedoe zijn, dus ik weet niet zo goed he met, ja […]die hele technologie en continue veranderingen, dat ik, continue gaat alles, en dan moet je weer zo inloggen en dan ga je weer zo inloggen en dan zit je weer in de Cloud en dan kun je bestanden niet. Dat vind ik wel veel vragen …… ja nou let's start zou je denken." (1.1)
"It all comes on top of that, and that's what I experience when I think of it, if I may put it bluntly, it is at the bottom of the list of priorities." (7.1)	"Het komt er allemaal weer bij bij bij, en en dat dat ervaar ik wel als dat ik denk van nou, ja lullig gezegd, het staat bij mij wel onderaan het prioriteitenlijstje." (7.1)
"But I do like the fact that WeSeeDo is now also supported by the management, eh …… yes, it is of course very clear when it came to the KON, eh, with all those managers, that this is necessary and that this must be done. Yes, that's widely supported, there's not someone who has said 'no, so I'm really not going to do that with my GGD'." (4.1)	"Maar ik vindt het nu wel prettig met dat WeSeeDo, dat het nu ook door het management ondersteunt is hè …… ja kijk het is natuurlijk toen in het KON heel duidelijk naar voren gekomen hè, bij al die managers, van dat dit er nodig is en dat dit moet gebeuren. Ja dat is breed gedragen dat is, d´r is niet iemand die gezegd heeft van nee dat ga ik dus echt niet doen bij mijn GGD." (4.1)
"Then it is usually that if you do it through the manager, and exert more pressure than that, then yes, then you will succeed." (6.1)	"Dan is het meestal dat als je het via de leidinggevende doet, en d´r maar meer druk achter zetten dan, ja dan lukt dat wel ja." (6.1)
"If I'm sick, yes, it'll be solved, I think, you know, […] will pick it up and she'll call others if it gets too much." (3.1)	"Als ik ziek ben ja dan wordt het wel weer opgelost denk ik, weet je dan pakt [...] het op en zal die wel weer anderen bellen als het te veel wordt." (3.1)
"Well, you'd have to find that somewhere out of time, wouldn't you? Yes, of course it is, it, you don't get any extra time for it …… it's on top of that." (7.3).	"Nouja dat moet je maar weer ergens uit de tijd pakken he. Ja dat is natuurlijk wel zo, het, je krijgt er geen extra tijd voor …… komt er weer bij ja." (7.3)
"Well, you know, I also understood that you'll have to inform the patient about it and then, uh, give him a letter. That's all clear, it's clear, but I	"Nouja weet je ik begreep ook wel van je moet straks de patiënt erover informeren en uhm dan hem een brief geven. Dat is allemaal duidelijk, is

don't think I'm very keen on that if you're already talking to someone via the interpreters' phone and it's all going with a lot of difficulty. Then I will not burden the patient with this, and I also have a question and an investigation. You know, I'm really going to make the choice of not that one." (7.1)	wel duidelijk, maar ik denk niet dat ik daar heel veel zin in heb als je al iemand spreekt via de tolken telefoon en het gaat allemaal al heel moeizaam. Dan zal ik niet de patiënt daarmee belasten van ik heb ook nog een vraag en nog een onderzoek. Weet je dan ga ik toch echt de keuze maken van die niet." (7.1)
"...it's tiring as long as it's not taken care of and I can also imagine that my colleagues are like that, if the right facilities aren't there yet, then, uh, you're not in such a hurry either. So I can imagine that this will affect each other." (5.1)	"…het wel vermoeiend is als het maar niet geregeld wordt en ik me ook voor kan stellen dat mij collega's zoiets hebben van nou, als de juiste faciliteiten er nog niet zijn dan, uhm, zit jou ook niet zo'n haast bij. Dus ik kan me wel voorstellen dat dat invloed heeft op elkaar." (5.1)
"If I call now they [IT department] are at my desk within 5 minutes, so [laughter] so that's it." (2.1)	"Als ik nu bel dan staan ze [ICT afdeling] binnen 5 minuten, staan ze bij mij aan het bureau bij wijze van spreken dus [gelach] dus dat is wel." (2.1)
"Yes, that is starting to happen now, like I think now when I call the helpdesk and I mention WeSeeDo or video calls they know what it's all about and like [...] uh, she now knows what we're doing and she' s a little bit more contributing or a bit more positive about it now. In the beginning I found that a little bit, that I had to pull and drag a lot and it was every time as if you told something new." (1.2)	"Ja dat begint nu wel meer te komen, zoals ik nu denk ik wel als ik nu bel met de helpdesk en ik noem WeSeeDo of beeldbellen dan uhm weten ze waar het over gaat en zoals […] uhm die die weet nu ook inderdaad wat we doen en en die is daar nu ook wel wat bijdragend of wat positiever in. In het begin vond ik dat wel een beetje hoor, dat ik daar heel erg aan moest trekken en leuren en was het elke keer alsof je iets nieuws vertelde." (1.2)
"Well, it's true that you have a separate place that not everyone listens to and that you don't have all kinds of sounds and scenes. And that, of course, is also for the patient, if you have children walking around all the time, then you can't hear them very well either." (2.3)	"Nouja dat je inderdaad een aparte plek hebt waar niet iedereen mee luistert en waar je niet allerlei geluiden en toestanden hebt. En dat, ja dat is natuurlijk ook voor de patiënt, als je dan de hele tijd kinderen rondlopen dan kan je ze ook niet goed verstaan." (2.3)
"...at least with us at the moment there is a problem that we can't handle a number of ict matters properly because we are in the transition to another net sourcing and that's why some things don't uh not run very smoothly with us" (2.1)	"…tenminste bij ons is momenteel een probleem dat we een aantal ict zaken niet helemaal goed kunnen regelen omdat we in de overgang zitten naar een andere netsourcing en vandaar dat sommige dingen niet uh niet helemaal makkelijk lopen bij ons" (2.1)
"There are always projects running and there is always room for improvement and above all, our manager is very open to them. Well, and of course everything is changing." (6.1)	"Er lopen altijd wel projecten en er is altijd wel ruimte voor verbetering en vooral, he onze leidinggevende staat daar heel erg voor open. Nouja en het is natuurlijk ook zo, het veranderd ook." (6.1)
"Yes this is really a very pleasant GGD …… yes it is uh uh very innovative." (1.1)	"Ja dit is echt een hele prettige GGD …… ja het is uh uh heel innovatief." (1.1)

“Our management does, but I think there is also a lot of management that just doesn't have that much affinity with tb and says of `eh well, low grade he uhhh uhhh, well that can go away at some point, or can't it be done with that, we're going to put it there, or that the hospital has to take over.” (1.1)	“Ons management wel, maar ik denk dat er ook heel veel management is dat gewoon niet zo veel affiniteit heeft met tb en zegt van ‘ach ja lage cijfer he uhh uhh, nou dat kan wel een keer weg, of kan dat niet daarbij, we gaan het daar onder brengen of kan het ziekenhuis niet overnemen.” (1.1)
“What I'm struggling with myself is indeed, uh, I don't think it's a substitute for the home visit. That that, I think it's one, it has added value, it's a supplement, it's a tool, but the the home visits that you're doing now, yes there you see so much that is quite valuable, I think. That would be a great pity if it were to disappear in this way. Well, I think that would be a real loss …… I think we have to be very careful not to lose our expertise in the Netherlands.” (4.2)	“Waar ik wel zelf een beetje mee worstel is inderdaad uh, ik vind het geen vervanging van het huisbezoek. Dat dat, ik vind het een, het heeft meerwaarde, het is een aanvulling, het is een hulpmiddel, maar de de huisbezoeken die je nu doet, ja daar zie je zoveel dat is wel heel kostbaar denk ik. Dat zou heel jammer zijn als dat op deze manier zou verdwijnen dat dat. Nou dat zou echt een verlies zijn denk ik …… ik denk dat we heel erg moeten oppassen dat we in Nederland onze expertise niet verliezen.” (4.2)

Appendix 6 – Observed relations between factors grouped by project members

This table compares all factors and nurses by attaching a level to the factor in which it is experienced by the nurses in other to observe patterns between the nurses and/or the factors. The levels are given by the primary researcher (L.A.) based on the interviews and conversations with the nurses. The table holds the same data as Table 5, but here nurses are grouped by whether they are members of the project group in order to see possible differences.

0	= low score/negative experience
10	= high/positive experience
-	= not mentioned/unknown

	1.2*	2.2*	3.1*	4.1*	5.1*	7.3*	1.1	2.1	2.3	4.2	5.3	6.1	7.1	7.2
Procedural clarity & completeness	8		-	8	8	-	-	-	-	-	-	-	7	7
Low complexity (& low ease of use)	8	7	3	7	8	5	5	6	-	7	-	-	5	-
Compatibility	8	7	7	8	8	7	7	7	6	7	7	7	4	5
Relevance for the client	7	7	7	7	8	7	7	7	6	7	5	8	4	4
Perceived usefulness	8	7	7	8	8	7	8	7	7	7	7	8	6	5
Drawbacks/benefits	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Outcome expectations	5	5	5	5	5	5	5	5	5	-	5	5	5	4
Social support	7		-	8	7	-	7	7	-	-	7	-	7	-
Self-efficacy	5	7	8	5	6	7	6	6	7	5	5	7	7	2
Knowledge & experience	8	7	7	8	7	7	7	7	4	7	4	8	3	1
Awareness of content	8	7	6	8	8	8	4	4	3	6	6	5	1	3
Need	8	7	8	8	8	6	7	7	5	7	7	7	5	1
Willingness/intention/adption	8	8	8	8	8	8	7	7	8	7	8	7	4	2
Attitude	8	8	8	8	8	6	6	7	8	8	8	8	5	1
Formal ratification	8	-	-	6	7	7	8	-	-	6	-	-	-	-
Staff capacity	7	-	7	7	6	-	7	-	-	4	-	-	4	-
Financial resources	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Time available	6	7	6	5	7	5	5	-	-	3	5	5	3	3
Material resources/support	8	5	8	7	6	4	8	8	7	7	8	6	4	4
Coordinator	8		-	8	8	-	7	8	8	7	-	7	7	7
No unsettled organisation	8	2	-	-	8	-	8	2	2	7	-	-	-	6
Information accessible a/b VC	8	-	-	8		-	-	-	-	-	-	-	6	-
Performance feedback	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flexibility & readiness	8	6	7	6	6	4	8	8	7	6	8	7	4	-
Job security	-	-	-	4	-	-	4	-	-	4	-	-	-	-
Legislation	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* project group members

Appendix 7 – Targeted strategies to facilitate the innovation process

The nurses can each be individually targeted with appropriate strategies to improve adoption. In their book, Grol and Wensing[1] describe strategies for several situations. The table below provides an overview of which actions can be undertaken to provide assistance to the nurses in the pilot study.

Nurse profile	Possible strategies for the pilot
1.1	Skills training, gain experiences, use positive experiences to influence others
1.2 (early adopter)	Skills training, gain experience, provide possibilities to practice with WeSeeDo to stimulate motivation, use positive experiences and early adopter qualities to influence others
2.1	Skills training, gain experience, provide extra means and support, assist in the redesign of current process, provide assistance
2.2 (early adopter)	Skills training, gain experience, provide possibilities to practice with WeSeeDo to stimulate motivation, use positive experiences and early adopter qualities to influence others
2.3	Skills training, gain experience, provide extra means and support, assist in the redesign of current process, provide assistance
3.1	Skills training, gain experience, provide extra means and support, assist in the redesign of current process, provide assistance, demonstrate possibilities with colleagues
4.1 (early adopter)	Skills training, gain experience, provide possibilities to practice with WeSeeDo to stimulate motivation, use positive experiences and early adopters qualities to influence others
4.2	Skills training, gain experience, provide extra means and support, assist in the redesign of current process, provide assistance, demonstrate possibilities with colleagues
5.1 (early adopter)	Skills training, gain experience, provide possibilities to practice with WeSeeDo to stimulate motivation, use positive experiences and early adopters qualities to influence others
5.3	Skills training, gain experience, provide extra means and support, assist in the redesign of current process, provide assistance, demonstrate possibilities with colleagues
6.1	Skills training, gain experiences, use positive experiences to influence others
7.1	Personal approach and explanation, confrontation with own actions, adjust innovation to the nurses, create discussion and consensus, discuss resistance, use early adopters and leaders, demonstrate possibilities with colleagues, find bottlenecks and search for solutions, provide extra means, support, skill training, gain experience, assist in the redesign of current process, provide assistance
7.2	Personal approach and explanation, confrontation with own actions, adjust innovation to the nurses, create discussion and consensus, discuss resistance, use early adopters and leaders, demonstrate possibilities with colleagues, find bottlenecks and search for solutions, provide extra means, support, skill training, gain experience, assist in the redesign of current process, provide assistance
7.3	Provide extra means, support, skill training, assist in the redesign of current process, provide assistance, information on usefulness, make a plan with reachable goals

[1] Grol RPTM, Wensing MJP. Implementatie: Effectieve verbetering van de patiëntenzorg. Amsterdam: Reed Business; 2011.