FACTORS AFFECTING HEALTH CARE WORKERS' ACCEPTANCE AND USE OF TELEHEALTH IN HOSPITALS IN KWAZULU-NATAL

By

CELESTE JO-ANN PRINSLOO

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SUPERVISOR: PROF. HELEN SCHNEIDER

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DECLARATION

By submitting this thesis, I declare that the entirety of the work contained therein is my own original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), and that this work has not been submitted for any other degree at any other institution.

C. J. PRINSLOO **2017**

ABSTRACT

Background and rationale: Telehealth is a collection of methods for enhancing health care, public health, and health education delivery and support using telecommunications technologies. Despite the many reported benefits of telehealth, there are challenges to its continued and widespread use in South Africa. It remains unclear what facilitates or hinders the integration of telehealth into routine clinical practice.

Study aim and objectives: Drawing on the Unified Theory of Acceptance and Use of Technology (UTAUT), this study investigated factors affecting healthcare workers' acceptance and use of telehealth in hospitals in KwaZulu-Natal (KZN). Specifically, it described the frequency and nature of telehealth use and the factors associated with technology acceptance; and evaluated the influence of socio-demographic factors (age, experience, profession, qualification) and acceptance factors on use and behavioural intention to use telehealth.

Methods: A quantitative survey in seven hospitals (2 tertiary, 3 regional, 2 district) with telehealth facilities falling under the KZN Department of Health, was conducted. 177 medical, nursing, pharmacy and allied staff consented to complete an on-line, closed ended and structured self-administered questionnaire based on the UTAUT model. The responses to the individual likert scale items were assigned a score (1-4), and from this, total scores calculated for each construct. Respondent characteristics were converted into binary variables and associations with total scores on each of the UTAUT acceptance domains were tested using t-test. The associations between behavioural intention and actual use (as binary dependent variables); and the respondent profiles, scores for performance expectancy, effort expectancy, social influence, and facilitating conditions (independent variables) were assessed in two multivariate logistic regression models.

The study protocol was approved by the University of the Western Cape Senate Research Committee and the KZN Department of Health.

Results: A total of 127 respondents (72% response rate) consisting of a mix of ages, gender and qualifications completed questionnaires. 74.8% indicated they used telehealth at least weekly. However, use was mostly limited to technology that is currently widely available (e.g. SMS, email) rather than the more complex forms of telehealth, such as real time systems (PC with a camera). There were high levels of agreement amongst respondents regarding the value of telehealth (performance expectancy, mean score 11.3/16) and ease of use (effort expectancy, mean score 12.1/16), but less so for the role of social influence on use (mean score 9.1/16) and the presence of facilitating conditions (such as support and assistance, mean score 8.8/12). On multivariate analyses, acceptance factors associated with telehealth use (daily vs<daily use) were effort expectancy (adjusted OR (AOR) 2.3, 95% CI 1.4-3.7) and facilitating conditions (AOR 1.9, 95% CI 1.1-3.3), while behavioural intention to use telehealth (strongly intend vs other) was associated with performance expectancy (AOR 2.0, 95% CI 1.3-3.1) and facilitating conditions (AOR 2.8, 95% CI 1.5-5.1).

Conclusions and recommendations: Openness to and levels of telehealth use, framed broadly, were high across respondent groups. The use of and intention to use the technology were, respectively, associated with effort and performance expectancy. Both use and intention to use were significantly associated with the "facilitating conditions" construct of the UTAUT model. The low perceived support and assistance for telehealth combined with low management support, suggests this is an important underlying factor in telehealth adoption and use.

A key limitation of the study was establishing the boundaries of telehealth in an era of increasing availability of telecommunications technology and from this, constructing an appropriate study

population of potential telehealth users from which to draw a study sample. Notwithstanding these limitations, the findings give some insight into current attitudes to technology use, and could inform future innovations such as telerehabilitation.

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DEDICATION

I dedicate this work to my husband whose unwavering support carried me through and to my children, whose inspirational influence motivated me throughout this study and inspired my commitment to this work. To my family- each one of you, for believing in me.

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LIST OF ABBREVIATIONS

BI: Behavioural Intention

EE: Effort Expectancy

FC: Facilitating Conditions

PE: Performance Expectancy

SI: Social Influence

UTAUT: The Unified Theory of Acceptance and Use of Technology or UTAUT, as developed by Venkatesh et al. (2003), focuses on explaining individual acceptance of information technology.

DEFINITIONS OF TERMS

"Telehealthcare involves the use of information and communication technologies to deliver healthcare at a distance and to support patient self-management through remote monitoring and personalised feedback" (McLean, Sheikh, Cresswell, Nurmatov, Mukherjee, 2013:1). Telehealth encompasses a broad variety of technologies and tactics to deliver virtual medical, health, and education services (Mars 2013). Examples would include use of video conferencing real time as well as email, SMS/MMS and telephonic conversations.

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Telehealth is the compilation of approaches or procedures for augmenting health care, and health education delivery and support by making use of telecommunications technologies (Cilliers & Flowerday 2013). Examples of technology used in telehealth would include use of real time video conferencing, as well as email, SMS/MMS and telephonic conversations providing health communication between institutions across geographical areas.

Telemedicine, a more specific concept is defined by Al-Shorbaji (2003:13) as the "use of information technology to deliver medical services and information from one location to another" and is used for the purposes of medical care delivery, consultation, diagnoses and treatment, as well as education of the patient and staff.

Telehealth is located within the emerging field of e-health within medical informatics, using the internet and associated technologies to provide or improve health care services and information (Martínez-Pérez, de la Torre-Díez & López-Coronado, 2013). The term e-health also encompasses technologies associated with Consumer Health Informatics and e-business (Pagliari, 2007).

In 2005 the World Health Assembly (WHA) drew global attention to the field when it adopted a resolution affirming member nations' commitment to e-health and specifically telehealth as a possible solution to the growing problem of severe shortages of health care workers in developing countries (Jack and Mars, 2008). Beyond this, the World Health Organization (WHO) has identified telehealth as a possible means to strengthen health systems and improve

the quality of health care delivery across geographical areas and levels of the health system (Black, Car, Pagliari, Anandan, Cresswell & Bokun, 2011).

The early development of telehealth was affected by the cost and technology limitations of the time. Technological advances such as fibre optics, compressed video and integrated service digital networks have decreased or eliminated many of the problems initially experienced, such as high costs, poor quality and access to the technology. This has led to an increase in the technology use in health systems across the globe, in turn, driving the quality of the technology and decreases in cost (Martínez-Pérez et al, 2013). High end technology and sophisticated network communication such as video conferencing are increasingly becoming available in health care settings (Lemma, 2004). Moreover, rapid growth in access to mobile technologies and the use of social media has meant that consultation can be provided in a very simple way by making use of telephones or email contacts between remotely located health professionals. In this regard, Eysenbach (2001:1) attests to a wide ranging interpretation and conceptualisation of what has become termed e-health technologies. "In a broader sense, the term characterises not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology".

At present, telemedicine is practiced in one of two ways: store and forward or a synchronous approach. In the first approach, patient data, images or audio files are sent via e-mail or other form of transmission to a specialist who can review the information at a later stage and then send back a diagnosis and/or management plan. In synchronous or face-to-face telemedicine the patient consultation occurs in real time using video-conferencing (Jack and Mars, 2008).

Telemedicine can also be used for the rapid transmission of laboratory results via short message service (SMS) between health care providers and patients. This saves patient transportation costs to health care facilities in order to collect results as well as decreasing overcrowding in public health care facilities (Black et al, 2011). Other uses of telehealth include e-mail consultations between health care professionals and patients and telephonic conversations providing support for clinical practice, governance, provider education, research and policy (Black et al, 2011; Martínez-Pérez et al, 2013). Reported benefits include easier access to specialist opinion, reduced need to travel, shorter waiting times for appointments, financial savings, a broader system for interaction, accurate diagnoses, and personal, tailored care (Black et al, 2011).

In South Africa, telehealth presents many opportunities to address health challenges such as the imbalances in access to health care and access to specialized services between urban and rural areas, referral and support between hospitals at different levels, shortage of staff, and long travel distances for patients (Nwabueze, Meso, Kifle, Okoli, & Chustz, 2009). The National Department of Health has undertaken the implementation of various telehealth pilot initiatives, particularly in rural areas with the aim of enhancing access, quality and efficiency of healthcare (Cilliers & Flowerday 2010).

Despite the backing of the National Department of Health and support from the South African Medical Research Council (MRC), the uptake of telehealth and acceptance by health workers in South Africa has been limited at best (Chetty, 2005). Pilot projects such as the National Telemedicine Lead Programme have not expanded into a national program as envisaged (Jack & Mars, 2008), and provincial health departments have not incorporated it into their health care strategies. South Africa has thus had little success with telehealth. KZN is not unique in this respect (Mars 2012).

Obstacles to the application of the technology are documented to include unreliable electricity supply, poor internet connectivity and low bandwidth (Mars, 2013; Mars, 2012; Jack & Mars, 2008). There are also human barriers involved in the adoption of telehealth. These include the shortage of staff in rural health care centres and the fact that telehealth creates additional steps in clinical work flows, adding to the work load of already overburdened health care workers (Mars, 2013). Many health care workers remain unaware of the technology and the value of such. Concerns have been raised about the quality of service, continuity of care, confidentiality and securing of patient data. Apart from technological challenges, the key obstacle to successful implementation of telehealth is user acceptance (Black et al, 2011).

Telehealth initiatives were first introduced in KZN in 1999 as part of the National Telemedicine Project. Videoconferencing equipment was provided for synchronous point to point teleophthalmology and antenatal tele-ultrasonography projects at eleven hospitals in this province. This pilot telemedicine project was deemed a failure, in part for technological and financial reasons. The internet protocol (IP)-based videoconferencing required integrated services digital network (ISDN) connections at 256 kbps, while hospitals were only allocated 128 kbps bandwidth, which served all hospital activities (Mars 2012).

In cooperation with the KZN Department of Health (DOH) it was then agreed that the videoconferencing infrastructure could be used by The Nelson R. Mandela School of Medicine (NRMSM) at the University of KwaZulu-Natal (UKZN) for medical education purposes (Mars 2007). With the assistance of external donor funding, the number of video conference units in the province increased to 41 over a 10 year period. (Mars 2012).

1.2 PROBLEM STATEMENT

The Lewin Group (2000) found that, after the availability of appropriate technology, user acceptance by health care workers was the second biggest threat to successful telehealth implementation. As investments in telehealth services grow, user acceptance of technology has become a key issue in successful implementation (Kohnke, Cole & Bush 2014). Studies on telehealth have focused mainly on the feasibility of specific technologies and user acceptance and less on implementation and actual use and its relationship to user acceptance (Cilliers & Flowerday 2010). There are few documented examples of telehealth becoming part of daily clinical practice (May, Mair, Finch, MacFarlane, Dowrick, Treweek et al, 2009) and it therefore remains unclear what facilitates or hinders the integration of telehealth into routine clinical practice. Consequently, there is a growing need to better understand user acceptance of telehealth innovations and its relationship to use.

In KZN more than 50% of the population live in rural areas. Rural health care workers are challenged to provide health services with limited resources (Cilliers & Flowerday 2013). E-health is seen as a possible solution through distance education, telehealth, and computerized health information systems however there are few people trained in the field (Mars 2012). Telehealth has been introduced in District Hospitals and clinic sites around KZN in an effort to bridge this gap. These pilot sites have not produced the desired results and it has been found that the technology was underutilised or not used at all (Mars 2013).

1.3 PURPOSE OF THE STUDY

Drawing on a theoretical model (Unified Theory of Acceptance and Use of Technology), the purpose of this study is to investigate telehealth use and acceptance in South Africa with the aim of exploring factors affecting healthcare workers' acceptance and use of telehealth in hospitals in

KZN. By developing an understanding of these factors the researcher will contribute to the understanding of how to strengthen the uptake of telehealth. Evaluating the existing experience of telehealth can also inform future innovative interventions such as telerehabilitation, which is the researcher's professional interest.

1.4 SETTING

The KZN province covers an area of approximately 98,000km² and has a population of approximately 10,6 million people. Of this population 84% are dependent on the public health sector and 54% live in rural areas. There are approximately 33 doctors per 100,000 people and 67 public sector hospitals (Health Statistics, 2011).

The KZN health system has various levels of hospitals including regional, district, tertiary-specialist, chronic, and psychiatric (DOH, 2015/2016). District Hospitals are geographically far apart from each other and few in number, by comparison to the large population numbers requiring services. This has led to poor referral patterns, with primary health care clinics referring directly to the regional hospital due to the absence of community health centres and a district hospital (DOH, 2015/2016). In this context, telehealth has the potential to improve communication and access, while infrastructural barriers are being addressed.

1.5 CHAPTER OVERVIEW

The remainder of the mini-thesis is structured as follows: in the Literature Review in Chapter two the researcher reviews the theoretical and empirical literature related to user intention to use telehealth and subsequent usage behaviour. It introduces the Unified Theory of Acceptance and Use in Technology (UTAUT) model and its four key constructs that directly influence usage intention and behaviour. Chapter three states the study aims and objectives and chapter four the

research design and method are discussed. Chapter five presents the findings of the study and chapter six discusses the research findings in relation to the literature. The limitations of the study, the implications of the findings and recommendation for future research are also outlined.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

Health care systems are burdened by challenges such as the increased numbers of ageing individuals, health care worker recruitment and retention, the HIV/AIDS burden, inadequate and inaccessible health care services and the isolation of health care workers in rural areas (WHO, 2004). Health systems are further constrained by workforce shortages and the distribution of populations across larger geographical areas (Kairy, Lehoux & Vincent, 2014). The WHO has recommended telehealth as a tool to support efforts to address these problems. Telehealth is being increasingly utilized to improve patient access to health services in the face of geographical, cultural and socio-economical barriers.

2.2 TELEHEALTH

Telehealth involves electronic information and telecommunications technologies in order to promote and assist long-distance clinical health care. Telehealth also aids in patient and health care professional education, public health and health administration (Mars 2013). Unlike telemedicine, telehealth denotes a broader scope of remote healthcare services. While telemedicine refers specifically to remote clinical services, telehealth can also encompass remote non-clinical services. In addition to clinical services this may include provider training, administrative meetings, and continuing medical education (Kohnke et al. 2014).

As indicated in the introduction, telehealth has two general types of applications: Synchronous or real-time communication, and asynchronous or "store-and-forward" (Mars 2013). Telehealth can be applied to a number of settings. These could include hospitals, clinics, ambulances, prisons

and the patient's home (Kohnke et al. 2014). Home-based telehealth applications remain relatively new to the healthcare system (Kairy et al. 2014).

In general, telehealth is a means of increasing the contact between a patient and the medical system and healthcare professionals. Telehealth improves access to information for health care workers, patients and populations (Lee & Rho 2013; Hjelm 2005; Watson & Gasser 2005). It can assist in providing additional expertise to consult on a case. It is more cost efficient to make use of telehealth than to employ and retain specialists in rural areas and it assists in decreasing the isolation of health care workers.

Further benefits typically include improved patient care encompassing safety, quality and efficiency as well as providing evidence and data to support clinical practice, research and policy (Pagliari et al. 2005). Patients can be better reached in their home environment, saving travel time and expense for practitioners and patients. Home-based telehealth applications have been identified as a possible alleviating strategy, and providing a potentially effective means of treatment and rehabilitation (Nwabueze et al, 2009; Cilliers & Flowerday 2010).

2.3 MODELS OF USER ACCEPTANCE

User acceptance reflects whether a system fits the characteristics of the users and the task to be performed. As such user acceptance can be an indicator to measure whether a specific technology really supports health care workers in their clinical working processes and ultimately to assess overall system success (Alwahaishi & Snasel, 2013).

Venkatesh, Morris & Davis (2003) brought together eight models of user technology acceptance into a composite model referred to as the Unified Theory of Acceptance and Use in Technology (UTAUT) model. The eight models reviewed were "the theory of reasoned action, the

technology acceptance model (TAM), the motivational model (MM), the theory of planned behaviour, a model combining the technology acceptance model and the theory of planned behaviour, the model of PC utilization, the innovation diffusion theory and the social cognitive theory" (Venkatesh et al. 2003;425).

By integrating and refining these models, Venkatesh et al (2003) was able to improve upon the predictability that technology would be accepted and used. The researchers found that UTAUT explained 70% of variance in technology use, which is an improvement of 40% from previous studies investigating technology acceptance (Venkatesh et al. 2003).

2.4 FACTORS INFLUENCING UPTAKE

The potential benefits of telehealth are well documented. However, uptake has been limited (Mars, 2013). Kifle et al. (2008) for example note that the technology must be accepted and continually used by the health care workers and the community in order to realise the benefits. Possible reasons for slow uptake include legislative, infrastructure and human or cultural factors (Chetty 2005). Human factors such as user acceptance of new technology, motivation, support and training of staff must be addressed before telehealth can be efficiently implemented (Chetty 2005). This is supported by Lemma (2004) who reports that despite the proven advantages of telehealth in health care, it cannot be translated until health care workers realise the benefit of the technology. Difficulties have often been experienced in initiating sustainable telehealth facilities. This may be due to reluctance of health care professionals to actively take part in telehealth activities who see additional steps and perhaps extra time added to their workload (Mars, 2013).

According to Esser & Goossens (2009) a more user-centered approach is missing in the development of telehealth services as a whole. The environment and manner in which the new

technology is introduced will influence the perceived value of the technology and the subsequent continued use (Nwabueze et al. 2009).

With the market and the need to implement and sustain telehealth growth, it becomes increasingly important to develop an appreciation of what the requirements of users are and how they influence usage intention and motivation (Cilliers & Flowerday 2010).

Cilliers and Flowerday (2010) reviewed the literature on the direct and indirect factors influencing acceptance, use and adoption of technology. The factors included demographic features (age, race), personal factors (social identity, self-identity and personal experience) and workplace factors (computer skills, trust, management support, social pressure and perceived enjoyment). Trust was the second highest contributor and it was found to have a significant influence on user acceptance and use of technology. Subjective norms had the highest effect as a contributor to user acceptance, use and adoption of technology.

Performance expectancy, effort expectancy, social influence and facilitating conditions are the four key user acceptance constructs that directly influence the usage intention (Venkatesh, et al, 2003). In addition facilitating conditions will also directly influence usage behavior.

Performance Expectancy, also referred to as perceived usefulness (Lee & Rho, 2013), focuses on task accomplishment and is the degree to which employees believe that using a specific technology will enhance their job performance or help them attain their goals (Venkatesh et al, 2003). The construct is considered as an important determinant of adoption intention, since people are more likely to adopt a technology when they expect it to be useful for their job (McKenna, Tuunanen & Gardner, 2013). Effort Expectancy reflects the degree of ease associated with using a certain technology (Venkatesh, et al. 2003; McKenna et al. 2013).

Social Influence occurs when the intention to adopt a particular technology is influenced by the opinion of others and this influences the persons decision to make use of the system (Venkatesh et al. 2003; Alwahaishi & Snasel, 2013). Facilitating Conditions encompass the environmental factors that make the task easy to accomplish (Venkatesh et al. 2003).

In addition to these four key constructs four other variables also impact on usage intention and behaviour. These include gender, age, experience and voluntariness (Venkatesh et al. 2003) (Figure 1).

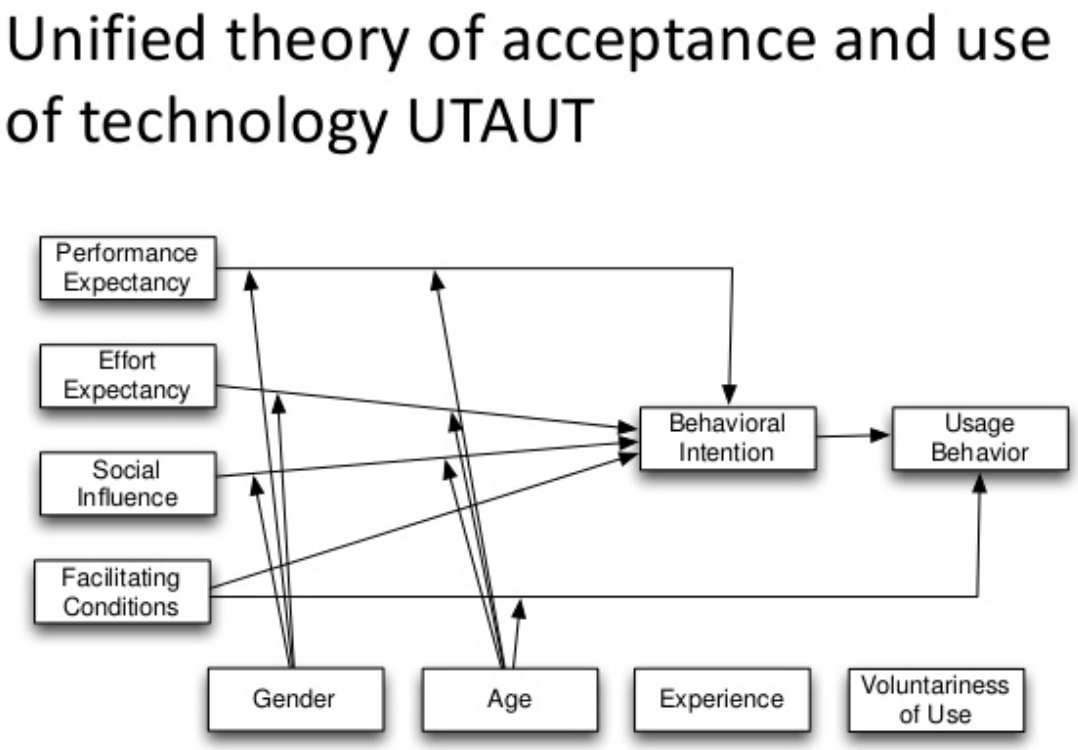

Figure 1: UTAUT model (Reproduced from Venkatesh et al. 2003:447)

The UTAUT thus makes use of 4 constructs and 4 user factors (age, gender, experience and choice) which moderate the main constructs. When testing the theory in health care research the

results suggested that health care workers were influenced by both social influence and facilitating conditions at various stages during the process of technology adoption (Venkatesh 2003). Cilliers and Flowerday (2010) summarised the evidence of the influence of these factors on use and intention to use technology (Table 1). It can be seen in this table, gender, age and experience interact in specific ways with the acceptance factors to influence use/intention to use. For example, men and younger workers are more influenced by performance expectancy, whereas women and older workers more influenced by effort expectancy (Venkatesh et al. 2003).

Table 1: Summary of findings for the UTAUT model (Reproduced from Cilliers & Flowerday 2010;79)

Dependent Variables	**Independent Variables**	**Moderators**	**Explanation**
Behavioural intention	Performance expectancy	Gender Age	Effect stronger for men and younger workers
Behavioural intention	Effort expectancy	Gender Age Experience	Effect stronger for women, older workers and those with limited experience
Behavioural intention	Social influence	Gender Age Experience Voluntariness	Effect stronger for women, older workers, under conditions of mandatory use and limited experience
Usage	Facilitating conditions	Age Experience	Effect stronger for older workers with increasing experience

Usage	Behavioural intention	None	Direct effect

2.5 UTAUT AND HEALTH CARE RESEARCH

The UTAUT model has been applied to study the acceptance and use of technology in the health sector. Kijsanayotin, Pannarunothai and Speedie, (2009) studied user acceptance and the use of telehealth introduced in community health centres in Thailand using the UTAUT model. They found that the health care workers in these settings exhibited a high degree of information technology acceptance and use. Performance expectancy, effort expectancy, social influence and voluntariness influenced this acceptance while use was predicted by previous IT experience, intention to use the system and other facilitating conditions. It was concluded that health technology is well adopted by community health centres in Thailand (Cilliers & Flowerday 2010). Hennington & Janz (2007) investigated the acceptance and use of electronic medical records by health care workers in the USA. Effort expectancy was found to be associated positively with prospective users' behavioural intention, while the opposite was found for actual users of the technology (Hennington & Janz, 2007). Social influence was a more important variable particularly among women than performance and effort expectancy. They concluded that it would be important to include these social constructs in implementation planning in order to improve acceptance and use of the technology (Hennington & Janz, 2007).

Nwabueze et al (2009) found in South Africa that social influence will diminish once the technology is in use. It is therefore important for managers to minimize the negative aspects of social expectations in the initial stages of implementation. They also found that facilitating conditions greatly influence technology conversion in underserved communities.

Health care workers are faced with great challenges with regards to time demands which may mean that technology that is perceived to be easy to use will be accepted more readily since the health care worker will not need to invest a large amount of time in learning how to use the technology. Studies have shown that those who were willing to commit some effort were the users that intended to continue using telehealth (Nwabueze et al, 2009).

Attitudes towards computers as well as performance expectancy of the technology were found to be factors for acceptance of telehealth in Hong Kong (Chau and Hu, 2002). It was noted that if the health care worker perceives the technology as being useful to their work practices both performance expectancy and effort expectancy will be affected. The technology is also more likely to be perceived as being useful, if it is easy to use. If the users' concerns regarding the performance of new technology are not addressed it will impact on the overall performance of the individual who is expected to use the technology and could lead to a slower or even failed technology transfer (Cilliers & Flowerday, 2010). These results indicate the importance of developing technology for health care workers that will support their performance expectancy and social influence while still ensuring ease of use (Hennington & Janz, 2007).

When investigating user acceptance of technology for health care workers Hu Chau & Tam, (1999) found that health care workers such as occupational therapists, nurses and doctors, as a group, exhibit different characteristics from other end users.

2.6 CONCLUSION

This chapter explored the theoretical framework used in this research study and the previous health care research conducted, making use of these theoretical frameworks.

The UTAUT model was developed by Venkatesh et al in 2003 as a combination of different models to improve predictions of whether new technology would be accepted. This

theory makes use of 4 constructs and 4 facilitating conditions which moderate the main constructs. In general it was found that men were more influenced by performance expectancy of new technology than women, while women were influenced by the effort expectancy construct when deciding to make use of new technology. When testing the theory in health care research the results also suggested that health care workers were influenced by both social influence and facilitating conditions at various stages of technology adoption.

The results of this model are important for managerial decision making as incorporating it into future technology projects will avoid the pitfalls of the past and improve the technology acceptance of the health care worker and the financial returns of future projects.

CHAPTER 3: STUDY AIMS AND OBJECTIVES

3.1 STUDY AIMS

The aim of this study was to assess healthcare workers' use and acceptance of telehealth and the factors affecting this in hospitals in KZN, drawing on the Unified Theory of Acceptance and Use of Technology (UTAUT).

The objectives of this study were:

1. To describe the frequency and nature of telehealth use amongst healthcare workers in KZN hospitals;
2. To describe the factors influencing acceptance of telehealth in KZN hospitals using the UTAUT constructs, namely: performance expectancy (PE); effort expectancy (EE); social influence (SI); and facilitating conditions (FC);
3. To evaluate the factors influencing use and behavioural intention to use telehealth, specifically:
    a. socio-demographic (age, experience, profession, qualification) factors;
    b. performance and effort expectancy, social influence and facilitating conditions.

CHAPTER 4: METHODOLOGY

4.1 STUDY DESIGN

The study design was a quantitative self-administered survey of healthcare workers in seven KZN hospitals.

4.2 STUDY POPULATION

The study population consisted of healthcare professionals (doctors, nurses, pharmacists and allied health professionals such as physiotherapists, occupational therapists and speech therapists) who currently have access to telehealth in KZN hospitals. Research sites were selected within a radius around the researcher's location (Amanzimtoti), in the eThekwini, uMgungudlovu, Harry Gwala and Ugu Districts. The criteria for location selection was based on the researcher's knowledge of the existence of telehealth in these areas and where access was not restricted by geographical or safety challenges. Six telehealth sites: GJ Crookes, Port Shepstone, Greys, Edendale, King Edward VIII and Mahatma Ghandi Hospital were selected for study and when the sample size was not reached, an additional seventh site (St Apollinaris Hospital) which adhered to the stated criteria was added.

4.3 SAMPLING

Sample size calculations indicated that a sample size of 128 respondents was needed to detect an effect size of 0.25 at a power of .80 (using GPower 3.0.3 (Faul, Erdfelder, Lang, & Buchner 2007)). Due to the difficulty of establishing the study population of people who have access to telehealth or are potential users, the researcher adopted the following procedures to recruit participants:

- At the start of the study, the researcher conducted face to face briefing sessions with staff at each of the seven hospitals.
- The researcher then visited each hospital, each relevant department and all wards and solicited volunteers to supply email addresses.
- The researcher went to the physiotherapy, occupational therapy, speech therapy departments including the pharmacy, acquiring a list of all staff emails in these departments.
- In order to obtain doctors and nursing staff contact emails, the researcher visited outpatient departments and all the wards on both shift days in order to collect emails from staff.
- A list of staff contact emails was compiled, consisting of 177 email addresses.
- Potential study participants were approached individually by email, with an information sheet explaining the purpose of the study, inviting them to complete a questionnaire and informing them that participation is voluntary and anonymous.
- Respondents who replied via email consenting to the study were provided a link to the completion of a questionnaire on Google Forms.

4.4 DATA COLLECTION

Respondents completed a closed ended and structured questionnaire (Appendix 2) as proposed and laid out by the UTAUT model developers (Venkatesh et al. 2003).

The questionnaire consisted of two parts. The first part comprised of demographic variables (i.e., role of participant, gender, age, education level, and general comfort level with technology). The second part consisted of the four scales that measured the predictors (independent variables) PE,

EE, SI, and FC and one scale that measured the dependent variable behavioural intention (BI) and actual use.

Different formats of questions and responses were included in the questionnaire such as yes/no, and degree of agreement or disagreement in likert scale questions. Through the use of an automated function, non-participants were reminded at regular intervals to complete the survey until the required sample size had been achieved.

4.5 DATA MANAGEMENT AND ANALYSIS

The data were entered into an excel spreadsheet, coded, cleaned and then imported into the Statistical Package for the Social Sciences (SPSS), and analysed by the researcher with the support of her supervisor, using both descriptive and analytic statistics. The analysis followed that proposed by the UTAUT model, where each composite factor was assessed for its impact on the use of technology.

Based on the responses to the likert scale items, scores of 1-4 were assigned to each individual variable (factor) and then the mean and total scores calculated for each UTAUT construct (PE, EE, SI, FC). Respondent factors (age, qualification, profession, facility location) were converted into binary variables and assessed for their association with total scores for each UTAUT construct (t-test). These respondent factors were combined with the UTAUT acceptance factors in two logistic regression models assessing their association with use and intention to use telehealth. The decision on how to categorize was based on sample size considerations and based on the distribution of findings on each variable and sample size factors.

The analytic model is represented diagrammatically below (Figure 2)

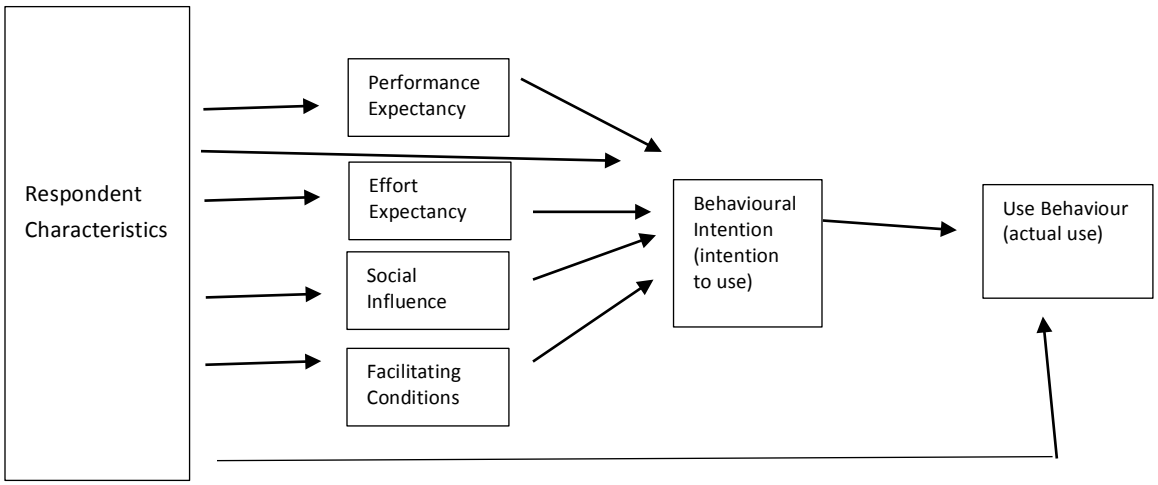

Figure 2: Conceptual framework for analysis

4.6 VALIDITY OF THE STUDY

The validity of the UTAUT questionnaire has been shown amongst users of a diverse set of technologies in both a voluntary and mandatory environment (Venkatesh et al. 2003). It can be applied to individuals of varied levels of IT competency, gender, age and culture (Yarbrough & Smith, 2007; Lai & Li, 2005). Reliability was enhanced through careful design and layout of the questionnaire, which was pilot tested with a few colleagues in a non-study hospital. No changes were made to the questionnaire after the pilot study.

4.7 LIMITATIONS OF THE METHODS

A key difficulty was constructing an appropriate study population of potential telehealth users from which to draw a study sample. The respondents who agreed to participate after face-to-face briefings may thus not be representative of the study population, and could be considered a volunteer sample. The sample was also not weighted by hospital size.

The study made use of self-reporting methods to collect data, Assuming that self-reported usage will reflect actual use, it may prove useful to combine a survey type data collection tool on telehealth with objective measures (Agarwal & Karahanna, 2000).

The study sample included a variety of professionals and levels of training – from pharmacy assistants to allied health professionals and medical doctors. While all were considered to be potential users of telehealth, their access and exposure are likely to differ and findings should not be generalized to any single category of respondents.

4.8 ETHICAL CONSIDERATIONS

Participants received an information sheet explaining the purpose of the study and informing them that participation in the study was voluntary. To ensure confidentiality, no personal identifiers were collected from survey responses. The researcher ensured all records were protected including any electronic files and all information was kept confidential. Participants were identified by a code rather than by name and the information was stored in password-protected computer files. There were no direct risks associated with participation in this study. There was a slight risk that participants could find the questions uncomfortable or threatening. However, they were informed that should they experience discomfort with items in the questionnaire they were free not to answer and could stop at any time and withdraw from the survey. Ethics approval was obtained from the University of the Western Cape Senate Research Committee before the study was conducted and approval was received from the Department of Health KZN.

CHAPTER 5: FINDINGS

5.1 INTRODUCTION

This chapter describes the profile of respondents, use of telehealth and intention to use; the factors facilitating this from the UTAUT model and the associations between use, intention to use, and socio-demographic and acceptance factors.

5.2 RESPONSE RATE

Of the 177 questionnaires distributed to public sector health care workers at the selected telehealth sites in KZN, 127 questionnaires were collected after a 7 week period, representing a 71% response rate.

Table 2 provides the distribution of respondents by facility type. Participants from regional hospitals were the largest category (40.1%) followed by tertiary (38.6%) and district (21.2%) hospitals.

Table 2: Distribution of study population (N=127)

Facility	N	Percentage (%)	Number of beds
Facility 1 (District)	15	11.8	155
Facility 2 (Regional)	13	10.2	874
Facility 3 (Tertiary)	23	18.1	507
Facility 4 (District)	12	9.4	288
Facility 5 (Regional)	21	16.5	333
Facility 6 (Tertiary)	26	20.5	799
Facility 7 (Regional)	17	13.4	355
TOTAL	127	100.0	3311

5.3 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

The study population consisted of a mix of genders, with a slight majority of females (55.9%) (Table 3). The majority of participants were in the age group 30-50 years. Just under 60% had a degree qualification. Slightly below half were nurses (25%) or doctors (22%), the remainder (52,8%) were made up of allied and other health professionals: physiotherapists, occupational and speech therapists, dieticians, pharmacists and pharmacy assistants.

Table 3: Socio-demographic representation of the study population.

	N	Percent
Gender		
Female	71	55.9
Male	56	44.1
TOTAL	127	100.0
Age		
<30 yrs	11	8.7
30-40 yrs	60	47.2
41-50 yrs	42	33.1
>50 yrs	14	11.0
TOTAL	127	100.0
Qualification		
Gr 12/Other	24	18.9
Diploma	28	22.0
Degree	75	59.1
TOTAL	127	100.0
Profession		
Doctor	28	22.0
Nurses	32	25.2
Other	67	52.8
TOTAL	127	100.0

5.4 USE AND INTENTION TO USE

Reported telehealth use was high with the majority (74.8%) indicating they used telehealth weekly or more often. Only 10% said they never used it. The vast majority of participants (86.6%) agreed or strongly agreed with the statement "I intend to use telehealth in the next 12 months" (Table 4).

Table 4: Frequency of use and intention to use telehealth

Frequency	N	Percent
Never	13	10.2
Monthly	19	15.0
Weekly	46	36.2
Daily	49	38.6
TOTAL	127	100.0
Intention to use		
Strongly Disagree	5	3.9
Disagree	12	9.4
Agree	81	63.8
Strongly Agree	29	22.8
TOTAL	127	100

Telehealth was used for a mix of clinical and educational purposes (Figure 3).

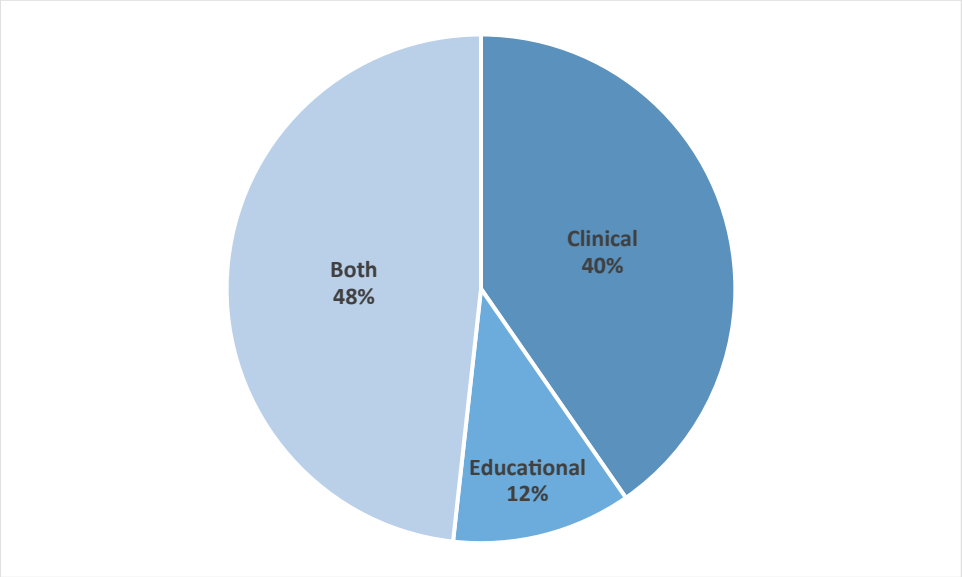

Figure 3: Distribution of telehealth purposes (n=114)

The most common modalities of communication were telephone, followed by SMS and email. A small percentage (16.5%) reported use of the real-time video conferencing unit (Figure 4).

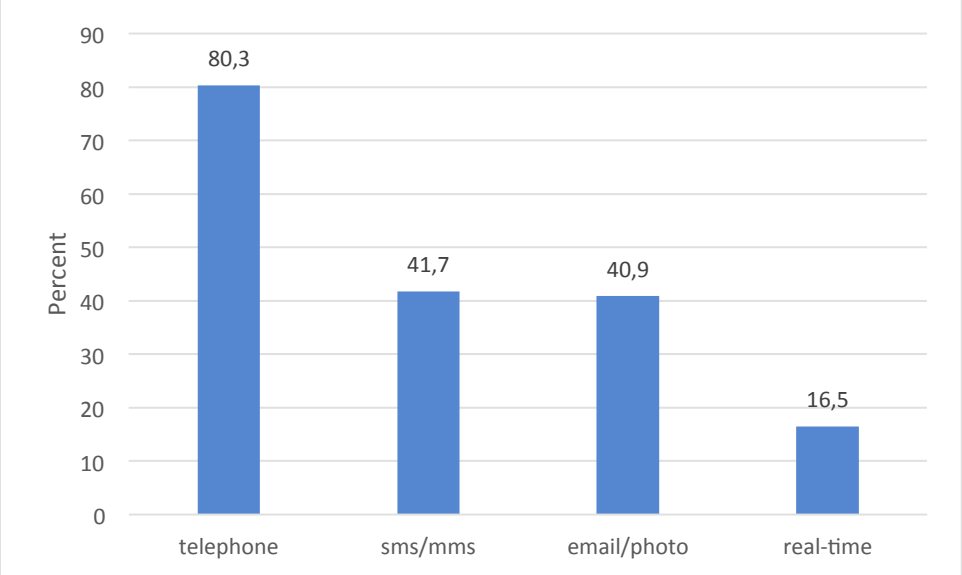

Figure 4: Modalities used by study population (n=127)

Nearly half (42.5%) of the participants considered themselves confident about their knowledge while another 41.7% indicated they were "somewhat knowledgeable" and only 10.2% considered themselves not knowledgeable about telehealth.

5.5 FACTORS INFLUENCING ACCEPTANCE OF TECHNOLOGY

There are different conditions which influence the acceptance and use of technology as pointed out in the UTAUT model. These conditions include *performance expectancy, effort expectancy, social influence and facilitating conditions.* The descriptive findings on each of these constructs are discussed in this section.

5.5.1 PERFORMANCE EXPECTANCY

Responses were assigned scores (Strongly disagree=1; strongly agree=4) and mean scores for the individual indicators and mean total scores for the construct as a whole computed. The mean score for 3 of the performance expectancy variables was 3 out of a maximum of 4 (Table 5). The mean total score was 11.3 out of a possible maximum score of 16.

Table 5: UTAUT indicators for Performance Expectancy (n=127)

PE Indicator	Min	Max	Mean	Std Deviation
1. I find telehealth useful in my job (useful)	1	4	3.28	0.675
2. Using telehealth enables me to perform tasks more quickly (perform)	1	4	3.20	0.727
3. Using telehealth enables me to be more productive (productive)	1	4	3.24	0.675
4. If I use telehealth, I will increase my chances of getting a salary increase (salary)	1	4	1.62	0.734

The generally positive ratings in this construct are also reflected (Figure 5) which shows the distribution of responses. The majority of participants believed that telehealth would improve their ability to do their job, with respect to its usefulness, performing tasks and increasing productivity. However, only one-tenth thought it would enhance their chances of a salary increase.

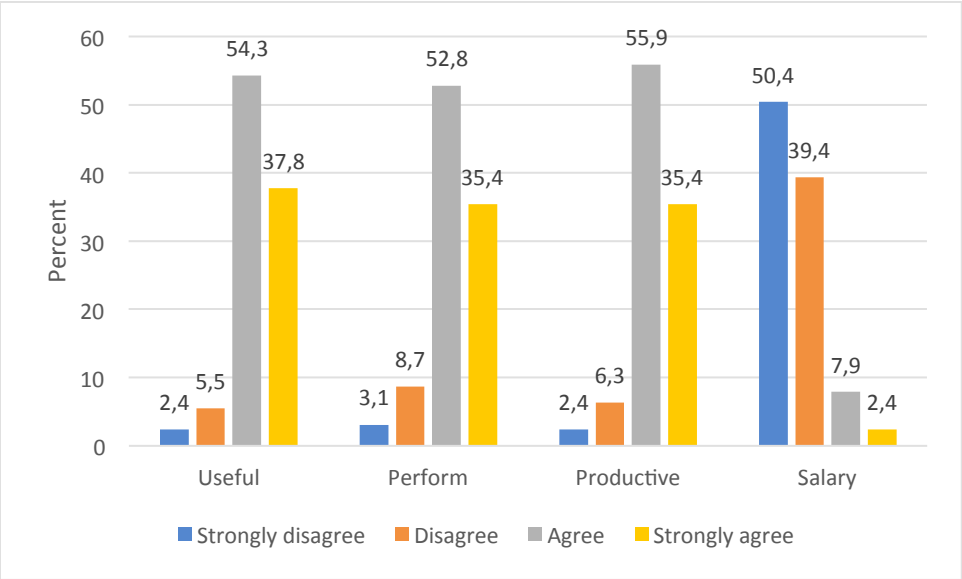

Figure 5: Ratings of Performance Expectancy (n=127)

5.5.2 EFFORT EXPECTANCY

As with performance expectancy, the responses in this category were favourable, with the "effort" involved in using telehealth seemingly not posing a barrier to most participants. The mean score for 4 of the effort expectancy variables was 3 out of a maximum of 4 (Table 6). The mean total score for this category was 12.1 out of a possible total of 16.

Table 6: UTAUT indicators for Effort Expectancy (n=127)

EE Indicator	Min	Max	Mean	Std Deviation
1. My interactions with the telehealth system is clear and understandable (understand)	1	4	2.96	0.583
2. I find the telehealth system easy to use (easy)	1	4	3.01	0.611
3. Learning to operate the telehealth system is easy for me (learning)	1	4	3.13	0.617
4. It was easy for me to become skilful at using the telehealth system (skilful)	1	4	3.03	0.590

The majority of the participants agreed or strongly agreed that it was easy to use the system (85%) and learn how to use the system (88.2%) (Figure 6)

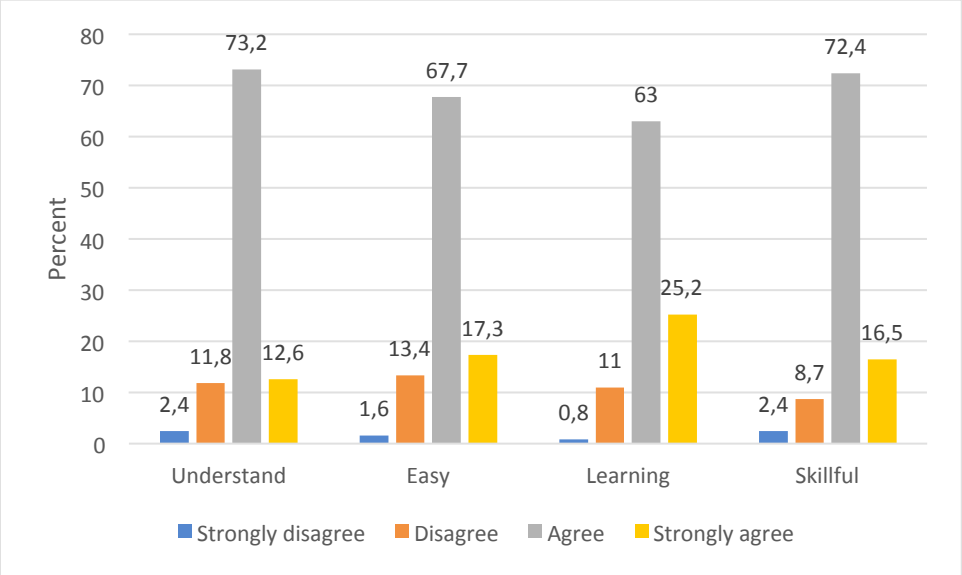

Figure 6: Ratings of Effort Expectancy (n=127)

5.5.3 SOCIAL INFLUENCE

Participants did not rate the role of social influences on their telehealth use very highly. The overall mean score for this category was 9.1/16, and mean scores for individual items ranging from 2.21-2.32 (Table 7).

Table 7: UTAUT indicators for Social Influence (n=127)

SI Indicator	Min	Max	Mean	Std Deviation
1. People who influence my behaviour think I should use telehealth (influence)	1	3	2.32	0.518
2. People who are important to me think I should use telehealth (important)	1	4	2.32	0.547
3. The senior management of my institution have been helpful in the use of telehealth (management)	1	4	2.21	0.586
4. In general the management have been supportive in the use of telehealth (Mx support)	1	4	2.22	0.562

Across the four questions, a third or less of the study participants agreed with statements on social influences. Only a third (33%) of participants indicated that they did have access to support and assistance if necessary while less than a third indicated that management were supportive of their use of telehealth. Just over one quarter perceived management or senior management to have been "helpful" or supportive" in the use telehealth (Figure 7).

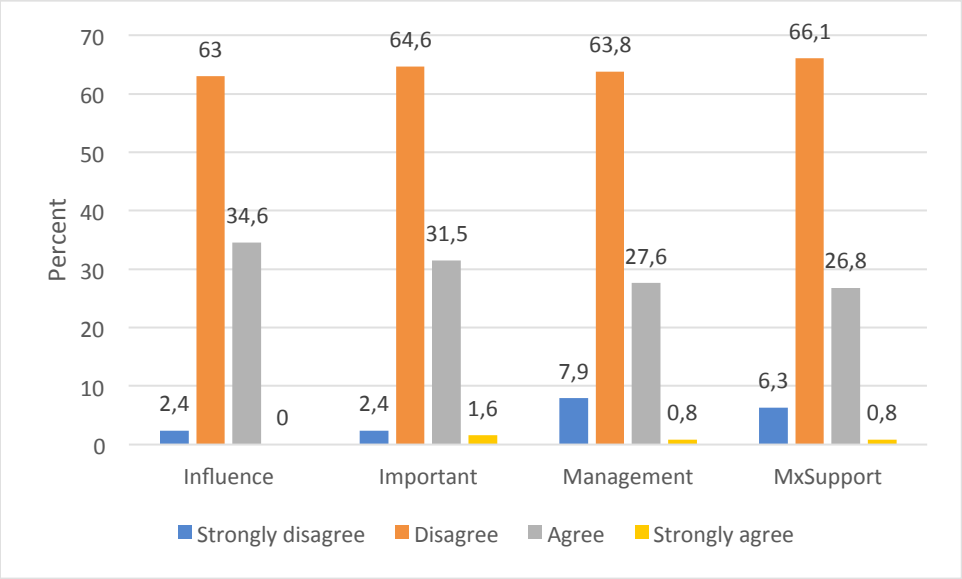

Figure 7: Ratings of Social Influence (n=127)

5.5.4 FACILITATING CONDITIONS

Facilitating conditions include resource availability such as technical assistance, knowledge of the system and compatibility with other systems already in use. The mean total score was 8.78 out of a possible maximum score of 12 with mean scores for individual items ranging from 2.31-3.27 (Table 8).

Table 8: UTAUT indicators for Facilitating Conditions (n=127)

FC Indicator	Min	Max	Mean	Std Deviation
1. I have the physical and mental ability necessary to use telehealth equipment (ability)	2	4	3.27	0.556
2. I have the knowledge necessary to use telehealth equipment (knowledge2)	1	4	3.20	0.691
3. Support and assistance is available if I have difficulties (support)	1	4	2.31	0.649

The majority of the health care workers indicated that they had the knowledge necessary to operate the system while a large portion indicated that they had the physical and mental ability necessary to use the telehealth equipment. A significant finding is the low level of perceived support and assistance. (Figure 8).

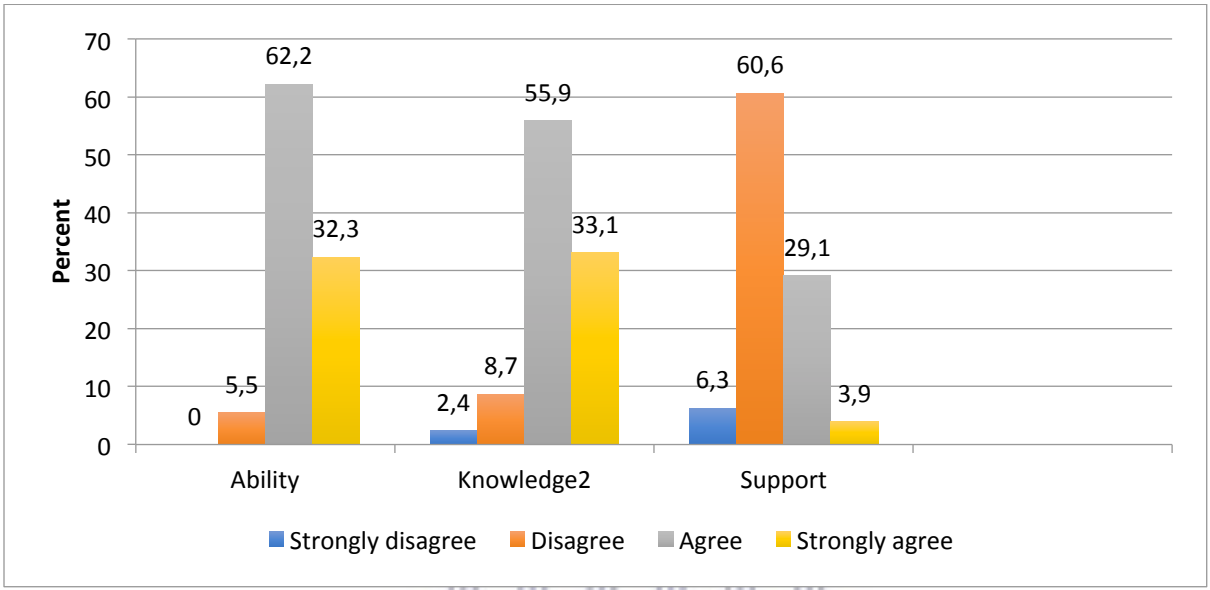

Figure 8: Ratings of Facilitating Conditions (n=127)

5.6 ASSOCIATIONS BETWEEN RESPONDENT PROFILES AND UTAUT CONSTRUCTS

The influence of respondent characteristics (as binary variables) on mean total scores for each UTAUT construct was assessed using the t-test. There were no statistically significant differences in any of the four acceptance factors for telehealth by respondent characteristics (Table 9).

Table 9: Comparison of means scores for performance expectancy, effort expectancy, social influence and facilitating conditions by respondent characteristics.

		Performance Expectancy		Effort Expectancy		Social Influence		Facilitating Conditions	
Variable	Values	Mean score	P value	Mean score	P value	Mean Score	P value	Mean Score	P value
Age (years)	<=40	11.6	0.334	12.2	0.117	9.0	0.336	8.7	0.589
	+40	11.1		12.1		9.2		8.9	
Gender	Male	11.4	0.402	12.3	0.871	9.0	0.357	8.9	0.771
	Female	11.3		12.0		9.2		8.7	
Profession	Doctor	11.8	0.229	11.9	0.382	9.1	0.267	8.6	0.215
	Other	11.2		12.9		9.0		9.3	
Highest qualification	Degree	11.3	0.114	11.8	0.663	9.4	0.390	8.6	0.771
	Other	11.4		12.4		9.0		8.9	
Hospital type	Tertiary	11.3	0.776	11.9	0.747	9.0	0.456	8.8	0.321
	Other	11.4		12.6		9.2		8.7	

5.7 MULTIVARIATE ANALYSES OF FACTORS INFLUENCING USE AND INTENTION TO USE TELEHEALTH

Respondent characteristics and UTUAT variables (as scores) were entered together in a logistic regression model as independent variables, and assessed for their association with telehealth use (daily vs other) and intention to use (strongly intend vs others) as dependent variables.

With respect to telehealth use (daily use vs other), the factors remaining significant on multivariate analysis were effort expectancy (Adjusted Odd's Ratio (AOR)=2.3, facilitating conditions (AOR=1.9) and having a degree qualification (AOR=5.7) (Table 10)

Table 10: Multivariate analysis of associations with telehealth use (daily use vs other)

	Exp (B) Odds Ratio	95% CI for Exp (B) Lower	95% CI for Exp (B) Upper	Sig.
Age	2.004	.703	5.712	.193
Degree vs Others	5.729	1.656	19.820	.006
Gender	1.451	.466	4.524	.521
Drs vs Others	.564	.140	2.272	.421
Tertiary vs Others	1.830	.638	5.249	.261
Effort Expectancy	2.282	1.394	3.735	.001
Social Influence	.826	.590	1.156	.265
Facilitating Conditions	1.911	1.097	3.328	.022
Performance Expectancy	1.387	.990	1.945	.058

With respect to intention to use telehealth (strongly intend vs others) factors remaining significant were performance expectancy (AOR=2.0) and facilitating conditions (AOR=2.8).

Table 11: Multivariate analyses of behavioural intention (strongly agree that intend to use vs others)

	Exp (B) Odds Ratio	95% CI for Exp (B) Lower	95% CI for Exp (B) Upper	Sig.
Age: <40 years vs >=40 years	2.764	.836	9.144	.096
Degree vs Others	2.326	.556	9.732	.248
Gender: male vs female	2.547	.684	9.479	.163
Doctors vs Others	1.827	.395	8.454	.440
Tertiary hospital vs Others	1.105	.333	3.664	.871
Effort Expectancy (score)	1.175	.781	1.768	.439
Social Influence (score)	1.147	.775	1.698	.492
Facilitating Conditions (score)	2.780	1.528	5.055	.001
Performance Expectancy (score)	1.988	1.272	3.108	.003

5.8 ASSOCIATION BETWEEN INTENTION TO USE AND USE OF TELEHEALTH

Association between intention to use and actual use (as binary variables) was assessed in a 2x2 table (Table 12). Seventy six percent of those who strongly agreed that they intend to use telehealth in future made daily use of the technology, whereas only 27.6% of the remainder reported daily use of telehealth. The differences were highly significant (Chi-Squared $p<0.001$)

Table 12: Daily use vs others vs strongly intend vs others

	Daily telehealth use	Less than daily telehealth use	Total
Strongly agree that intend to use	22 (75.9 %)	7 (24.1 %)	29 (100 %)
Others	27 (27.6 %)	71 (72.4 %)	98 (100 %)
Total	49 (38.6 %)	78 (61.4 %)	127 (100 %)

Pearsons' Chi-squared test: $p<0.001$

CHAPTER 6: DISCUSSION

6.1 PROFILE OF RESPONDENTS

This research project investigated the acceptance and use of telehealth among health care workers in seven hospital facilities within the public sector of KZN. The study achieved a 71% response rate, considered to be reasonably high for this kind of survey, involving self-administered online questionnaires (Schaefer & Dillman, 1998). The study sample included a variety of professionals and levels of training – from pharmacy assistants to allied health professionals and medical doctors. Over half of the participants were made up of allied and other health professionals: physiotherapists, occupational and speech therapists, dieticians, pharmacists and pharmacy assistants. While all were considered to be potential users of telehealth, their access and exposure are likely to differ and findings should not be generalized to any single category of respondents.

The majority of participants were in the age group 30-50 years, and over half were 40 years of age or less. Age can have a significant influence on the use of telehealth, as technology is generally considered to be better used and accepted by the younger compared to the older generations (Cilliers & Flowerday 2010; Venkatesh & Davis, 2000). However, this was not demonstrated in this study, where age was not statistically significantly associated with telehealth acceptance and use. There were also no statistical differences in use and acceptance by gender. This is in contrast to the literature which reported differences in the motivators for the adoption of technology for men and women, where men will base their use of new technology on their perception of its usefulness while women will be influenced by their perception of the technology‘s ease of use (Venkatesh & Davis, 2000).

Nearly 90% claimed to be knowledgeable about telehealth. These high levels of self-reported knowledge could be due to growing familiarity with electronic communication, internet and email use, and could also explain the absence of generational or gender effects in the study.

In the multivariate analysis, respondents with a degree were significantly more likely to make daily use of telehealth. This is corroborated by the literature which indicates that educational level is considered important for computer literacy as higher educational qualifications are equated with increased exposure to computers in general (Cilliers & Flowerday 2010).

6.2 PROFILE OF USE/INTENTION TO USE

A high percentage of the study respondents reported making use of telehealth – three quarters as often as daily or weekly - and an even higher proportion (87%) intended to use it in future.

A quarter of the study participants indicated that they never or very seldom make use of the system. Although the sample size precluded disaggregated analyses, this could be because of the nature of the study sample which included professions where telehealth currently does not have ready clinical applications, such as in rehabilitation.

Telehealth can make use of different types of technology. SMS/MMS and telephonic conversations were the most frequently used as they are accessible to all and provide a convenient means of communication. Mobile technology is available in a variety of settings, both urban and rural, and can be used for immediate feedback. Email communication was less frequently reported. Its use depends on connectivity and the attending health care worker on the receiving side may not open or return a reply for a few days, limiting its value and use.

Participants rarely made of use the real-time telehealth unit, which could be for a variety of reasons. Telehealth is more often used for diagnostic than therapeutic reasons, and has greater

application for some professions than others. Connectivity between the urban and rural centres may be a further obstacle as well as physical access to the unit as it has to be secured at all times. It is not feasible to have a telehealth unit in each department of a larger hospital, and the unit is often located in a department such as casualty or Intensive Care where it will be most useful for medical consultations, but not accessible by all.

6.3 INFLUENCING FACTORS

Participants believed that telehealth could improve their work. The majority indicated that telehealth enabled them to be more efficient with regards to performing tasks and to increase their productivity. In general there were high levels of agreement regarding performance (value of use) and effort (ease of use) expectancy.

The majority of the health care workers indicated that they believed telehealth to be easy to use or that they would find it easy to learn how to use telehealth systems.

Social influences were less important to the health care workers, although at least a third did indicate that players around them could influence their decision making regarding the acceptance of new technology.

With respect to facilitating conditions the majority of respondents indicated that they had the knowledge necessary to operate the system while a large portion indicated that they had the physical and mental ability necessary to use the telehealth equipment. However, only one third indicated that they had the necessary support and assistance to make use of telehealth.

Effort expectancy, facilitating conditions and a university degree qualification were associated with daily use of telehealth. Behavioural intention was also associated with facilitating conditions and with performance expectancy. These findings suggest that paying attention to ease of use (including perhaps better access) influences regularity of telehealth use, while awareness of the potential benefits creates openness to future use.

Both use and intention to use were significantly associated with the facilitating conditions construct of the UTAUT model. The low perceived support and assistance for telehealth when combined with the low management support and helpfulness reported in the social influences construct, suggest this is an important underlying factor in telehealth adoption and use. It highlights the crucial role of management support in facilitating the use of telehealth. Dansky et al (1999) found that perceived organisational support is an important predictor of perceived usefulness.

Venkatesh et al (2003) found that health care workers were influenced by both social influence and facilitating conditions at various stages of technology adoption, while behavioural intent was influenced by performance expectancy, effort expectancy and social influence. They further found that behavioural intent to make use of technology will directly impact on the actual usage of the individual (Venkatesh et al. 2003).

6.4 STUDY LIMITATIONS

As discussed in the methods chapter, the study had a number of weaknesses, most notably the difficulty of establishing the population of potential telehealth users in a context of all round greater access to technology, and the manner in which the study sample was obtained. While

every effort was made to recruit participants who saw themselves potentially using telehealth, there may have been some people in the study sample that were not typical targets of telehealth initiatives. The sample was not self-weighting, by hospitals or profession and the findings on levels of use cannot be generalised to all staff or KZN generally. The uses of telehealth were limited for the purpose of this study to clinical care and educational purposes and excluded patients' views of the technology. Although this study had some limitations, this study yielded some valuable implications. Despite these limitations, the findings do shed some light on current uses and attitudes to use, and the factors influencing this. It can also help to inform future research in this area.

6.5 CONCLUSIONS

When planning a new technology system for an organization, designers should assess whether the new system is acceptable to users, investigate reasons why a planned system may not be fully acceptable, and then take corrective action to increase acceptability. This action will help to improve the investment in time and money (Cilliers & Flowerday, 2010).

The use and intention to use telehealth technology is significantly associated with facilitating conditions, including support and assistance, but health care workers perceived little support from local hospital management towards the technology. Management support is important to communicating the objectives and goals of the technology and ensuring adequate ease of use, and thereby addressing performance and effort expectancy.

6.6 RECOMMENDATIONS FOR PRACTICE AND FUTURE RESEARCH

Practice recommendations

- The introduction of new telehealth technologies needs to ensure feedback loops between management and staff with sufficient empowerment to understand and implement instructions (Schwamm, Chumbler, Brown, Fonarow, Berube, Nystrom, Suter, Zavala, Polsky, Radhakrishnan, Lacktman, Horton, Malcarney, Halamka & Tiner, 2017)
- As health care is increasingly moving towards computerized systems in order to provide universal access to medical records and other results, it has become important that health care workers are given opportunities to develop their computer literacy.
- Training in telehealth needs to be introduced into undergraduate training of health care workers in order to prepare them for its use when they are qualified. None of the universities at present offer more than an introductory course to the technology.

Recommendations for research

- With the changing technology environment and increased possibilities through smart phones and other technologies requiring less bandwidth, the future of healthcare delivery will likely involve increased reliance on these mobile technologies that can support a variety of operating systems and future research should focus on this.
- Telehealth literature suffers from the poor representation of particular groups (McLean et al. 2013). Included in these are those with disabilities. People with disabilities who live in rural communities face challenges accessing healthcare as well as health care providers who are faced with challenges of meeting the needs of these multifaceted patients. Rehabilitation providers may not be aware of all telerehabilitation options available via innovative healthcare technologies. For telerehabilitation to benefit the end-user (in this case-an individual with a disability), all parties involved need to have access to the

greatest possible set of available options to choose what will most likely work for the consumer and the environment in which they function (Forducey, Glueckauf, Bergquist, Maheu, & Yutsis, 2012). As telerehabilitation services continue to grow as a complement to traditional face-to-face clinical services, further research is needed to standardize appropriate clinical uses, reimbursement, and health care policy regarding the use of telerehabilitation and investigate user acceptability in this context (Forducey et al. 2012).

- There needs to be a greater understanding of the role of the different UTAUT constructs in specific contexts as well as investigation into the causes underlying UTAUT responses, and how relationships differ depending on the stage of health technology implementations (Holden & Karsh, 2009).
- Future research should include testing the acceptance of telehealth on larger population sizes, longitudinal studies tracking technology acceptance and use amongst groups and individuals

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APPENDIX 1: Information sheet & consent forms

UNIVERSITY *of the* WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2132 Fax: 27 21-959 2872

E-mail: 3310742@UWC.co.za

"Telehealthcare involves the use of information and communication technologies to deliver healthcare at a distance and to support patient self-management through remote monitoring and personalised feedback" (McLean et al, 2013: 1). Telehealth encompasses a broad variety of technologies and tactics to deliver virtual medical, health, and education services (Mars 2013). Examples would include use of video conferencing real time as well as email, SMS/MMS and telephonic conversations.

Title of Study: Factors affecting healthcare workers' acceptance and use of telehealth in hospitals in KwaZulu-Natal.

What is this study about?

This research project is being conducted by Mrs CJ Prinsloo at the University of the Western Cape. We are inviting you to take part in this research project because you are a health care professional who currently has access to telehealth in your relevant setting. The purpose of this study is to investigate healthcare workers' telehealth use and acceptance in hospitals in KwaZulu-Natal and the factors affecting this. By developing an understanding of these factors the researcher will be able to report on factors which either promote or inhibit the uptake of telehealth.

What will I be asked to do if I agree to participate?

You will be asked to complete a closed ended and structured questionnaire. This will be preceded by face-to-face briefings at the hospitals and an email to you requesting your consent for participation. Consenting participants will then be directed to an online site to complete the questionnaire within a certain time period.

Would my participation in this study be kept confidential?

The study team is committed to maintaining your privacy. The researcher will protect your records including any electronic files and keep all information confidential to the greatest extent possible. You will be identified by a code rather than a name and the information will be stored in password-protected computer files.

What are the risks of this research?

Should you experience discomfort with items in the questionnaire you are free not to answer and can stop at any time and withdraw from the survey. If you have had any bad past experiences with telehealth, I would be very happy to discuss these individually and confidentially with you.

What are the benefits of this research?

The results of this study may help to improve accessibility to healthcare and specifically report on the role of telehealth in KZN.

Do I have to be in this research and may I stop participating at any time?

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

Will I receive compensation for taking part in the study?

There is no compensation or remuneration provided for participation in this study.

What if I have questions?

This research is being conducted by, Mrs CJ Prinsloo from the University of the Western Cape. If you have any questions about the research study itself, please contact myself at:

Kingsway Hospital
607 Andrew Zondo Road
Amanzimtoti
Durban
4126
Tel: 0721877653
Email: celesteprinsloo99@gmail.com

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Director of the School of Public Health:

Prof Helen Schneider
School of Public Health
University of the Western Cape
Private Bag X17
Bellville 7535
hschneider@uwc.ac.za

UNIVERSITY *of the* WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2132 Fax: 27 21-959 2872

E-mail: 3310742@UWC.co.za

CONSENT FORM

I have been invited to participate in research about factors affecting healthcare workers' acceptance and use of telehealth in hospitals in KwaZulu-Natal.

I have read the foregoing information. I consent freely and voluntarily to be a participant in this study.

I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction.

I also understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way.

Print Name of Participant: _____

Signature of Participant:

Date:

Day/month/year

APPENDIX 2: Questionnaire

QUESTIONNAIRE

"Telehealthcare involves the use of information and communication technologies to deliver healthcare at a distance and to support patient self-management through remote monitoring and personalised feedback" (McLean et al, 2013: 1). Telehealth encompasses a broad variety of technologies and tactics to deliver virtual medical, health, and education services (Mars 2013). Examples would include use of video conferencing real time as well as email, SMS/MMS and telephonic conversations.

SECTION 1 - DEMOGRAPHICS

1. Indicate your gender	a. Male	b. Female

2. Indicate your age	a. < 30yrs	b. 30-40 yrs	c. 41-50 yrs	d. >50 yrs

3. What is your highest academic qualification?	a. Grade 12	b. Diploma	c. Degree	d. Other

4. What is your profession?	a. Doctor	b. Nurse	c. Other

5. Do you consider the facility you work in to be	a. Urban	b. Peri-Urban	c. Rural

6. Which of the following describes your place of work?	a. Clinic	b. Regional hospital	c. Community health centre	d. Secondary hospital	e. District hospital	f. Other

8. How often do you use telehealth?	a. Never	b. Monthly	c. Weekly	d. Daily

9. If you do use telehealth, for what purposes do you use it? (tick one)	a. Clinical – for diagnosis or treatment	b. Educational purposes	c. Both

10: Please indicate which of the following telehealth modalities you have made use of in the past:

SMS/MMS	Never	Seldom	Often	Daily
Telephonic conversations	Never	Seldom	Often	Daily
E-mail with photographs attached	Never	Seldom	Often	Daily
Real time system (PC, camera)	Never	Seldom	Often	Daily
Other (please specify)	Never	Seldom	Often	Daily

11. How would you describe your knowledge of telehealth in general?	a. Not knowledgeable	b. Somewhat knowledgeable	c. Knowledgeable	d. Very knowledgeable

12. I intend to use telehealth in the next 12 months	Strongly disagree	Disagree	Agree	Strongly agree

SECTION 2

Please indicate the degree to which you agree or disagree with the following statements as they relate to using telehealth
UTAUT Model (PE, EE, SI, FC)

Acceptance and Use of Technology **Performance Expectancy (4 items)**				
1. I find telehealth useful in my job	Strongly disagree	Disagree	Agree	Strongly agree
2. Using telehealth enables me to perform tasks more quickly	Strongly disagree	Disagree	Agree	Strongly agree
3. Using telehealth enables me to be more productive	Strongly disagree	Disagree	Agree	Strongly agree
4. If I use telehealth, I will increase my chances of getting a salary increase	Strongly disagree	Disagree	Agree	Strongly agree
Effort Expectancy (4 items)				
1. My interactions with the telehealth system is clear and	Strongly disagree	Disagree	Agree	Strongly agree

understandable				
2. I find the telehealth system easy to use	Strongly disagree	Disagree	Agree	Strongly agree
3. Learning to operate the telehealth system is easy for me	Strongly disagree	Disagree	Agree	Strongly agree
4. It was easy for me to become skilful at using the telehealth system	Strongly disagree	Disagree	Agree	Strongly agree
Social influence (4 items)				
1. People who influence my behaviour think I should use telehealth	Strongly disagree	Disagree	Agree	Strongly agree
2. People who are important to me think I should use telehealth	Strongly disagree	Disagree	Agree	Strongly agree

3. The senior management of my institution have been helpful in the use of telehealth	Strongly disagree	Disagree	Agree	Strongly agree
4. In general the management have been supportive in the use of telehealth	Strongly disagree	Disagree	Agree	Strongly agree
Facilitating conditions (3 items)				
1. I have the physical and mental ability necessary to use telehealth equipment	Strongly disagree	Disagree	Agree	Strongly agree
2. I have the knowledge necessary to use telehealth equipment	Strongly disagree	Disagree	Agree	Strongly agree
3. Support and assistance is available if I have difficulties	Strongly disagree	Disagree	Agree	Strongly agree

APPENDIX 3: Ethics Approval

UNIVERSITY of the WESTERN CAPE

OFFICE OF THE DIRECTOR: RESEARCH
RESEARCH AND INNOVATION DIVISION

Private Bag X17, Bellville 7535
South Africa
T: +27 21 959 2988/2948
F: +27 21 959 3170
E: research-ethics@uwc.ac.za
www.uwc.ac.za

07 July 2016

Mrs C Prinsloo
School of Public Health
Faculty of Community and Health Sciences

Ethics Reference Number: HS/16/3/42

Project Title: Factors affecting healthcare workers' acceptance and use of telehealth in district hospitals in rural KwaZulu-Natal.

Approval Period: 10 MAY 2016 – 10 MAY 2017

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval. Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

PROVISIONAL REC NUMBER - 130416-049

APPENDIX 4: KZN Department of Health Approval

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Physical Address: 330 Langalibalele Street, Pietermaritburg
Postal Address: Private Bag X9051
Tel: 033 395 2805/ 3189/ 3123 Fax: 033 394 3782
Email:
www.kznhealth.gov.za

DIRECTORATE:
Health Research & Knowledge Management

HRKM Ref: 249/16
NHRD Ref: KZ_2016RP31_949

Date: 17 August 2016
Dear Ms C. Prinsloo
University of the Western Cape

Approval of research

1. The research proposal titled **'Factors affecting healthcare workers' acceptance and use of telehealth in district hospitals in KwaZulu Natal'** was reviewed by the KwaZulu-Natal Department of Health.

   The proposal is hereby **approved** for research to be undertaken at King Edward VII, Mahatma Gandhi, GJ Crooke's, Port Shepstone, Edendale and Grey's Hospital.

2. You are requested to take note of the following:
   a. **You are required to request access and make the necessary arrangement with the identified facility before commencing with your research project.**
   b. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.

3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Mr X. Xaba on 033-395 2805.

Yours Sincerely

Dr E Lutge
Chairperson, Health Research Committee
Date: 17/08/16.

Fighting Disease, Fighting Poverty, Giving Hope