Development of an Instrument for Measuring Telemedicine Satisfaction

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Introduction

The growing adoption and potential benefits of telemedicine have led to an increase interest in studying the usage of these systems (Hailey et al. 2004; Saliba et al. 2012). Studies suggest satisfaction with telemedicine is high. However it is unclear whether existing methodologies successfully capture satisfaction with telemedicine and the extent to which results can apply to other contexts (Mair and Whitten 2000; Whitten and Love 2005). Reviews of the literature conducted on telemedicine show that it is common for researchers to develop their own instruments for measuring satisfaction and that the reliability and validity of these instruments is not often shown (Kraai et al. 2011; Williams et al. 2001).

The goal of this research is to use the lessons learned from existing studies to develop an instrument for measuring patient satisfaction with telemedicine. As part of a research project a team has been working with officials from the partner hospital to examine telemedicine adoption and acceptance. The team surveyed the literature to examine existing tools for measuring telemedicine satisfaction. However the research team determined that the instruments developed in prior research are context specific and there is a need for a standard instrument to measure patients' satisfaction with telemedicine. By using a grounded theory approach this research aims to create an instrument that capture the key factors that contribute to overall satisfaction with telemedicine which can be applied to different contexts, the instrument will then be validated at the partner hospital system.

Literature Review

Patient satisfaction is commonly investigated in studies on telemedicine (Williams et al. 2001). However some studies show mixed results (Upatising et al. 2013; Whitten and Love 2005). While studies may show high results for patient satisfaction it is not always clear what the results should signify. For example some studies show that while satisfaction may be high, patients can reject the idea that telemedicine can be used as a replacement for face to face consultations (Weatherburn et al. 2006).

In general there are issues with examining patient satisfaction as there is no clear definition of what exactly satisfaction is (Whitten and Love 2005). Appointment scheduling, travel time, and patient involvement are among the factors that can influence patient satisfaction (Gustke et al. 2000). Privacy, comfort, and perceived specialist comfort can also be potential predictors (Dick et al. 1999). Still other studies provide additional factors that can have an influence on patient satisfaction. Williams et al. (2001) describe professional-patient interaction, the patient's feeling about the consultation, and technical aspects of the consultation as having an influence on satisfaction. Because questions have arisen about the extent to which methodologies are measuring actual satisfaction some researchers urge a cautious optimism with the results (Mair and Whitten 2000; Whitten and Love 2005). Many instruments designed for measuring satisfaction with telemedicine are self-developed(Williams et al. 2001). Many of these instruments are also seldom assessed for validity and reliability (Kraai et al. 2011).

Some researchers have designed instruments specifically for measuring satisfaction with telemedicine. The Telemedicine Satisfaction and Usefulness Questionnaire (TSUQ), Telemedicine Perception Questionnaire (TMPQ) and the Telemedicine Satisfaction Questionnaire (TSQ) were developed specifically for measuring satisfaction with telemedicine (Bakken et al. 2006; Demiris et al. 2000; Yip et al. 2003). These instruments were developed to address concerns with other instruments such as the lack of testing for reliability and validity. Yet, there remain limitations with their use. For example, while the TSQ and TMPQ did test the instrument for validity and reliability the generalizability is questionable due to the limited sample size (Bakken et al. 2006; Demiris et al. 2000; Yip et al. 2003). While TSUQ attempted to address these issues it still has to our knowledge not received additional validation outside of the initial study. While many of these instruments are beginning to be used, there have still not been any

attempts to compare or resolve their differences or similarities. It remains uncertain whether the tools are adequate for every context or if certain instruments are better for different scenarios.

Methodology

This study was conducted in an attempt to identify common constructs used in various instruments for measuring patient satisfaction with telemedicine. The current study follows procedures described by MacKenzie et al. (2011) for the development of measurement instruments. As part of the conceptualization phase this research created constructs for measuring telemedicine satisfaction that are consistent with prior research. This study first examined the literature to identify instruments used in measuring telemedicine. Using the 10 step approach described by Hoehle and Venkatesh (2015), the instruments were examined to identify common constructs. Due to page limitations only the results of steps 1-5 are reported.

Papers were extracted based on a survey of the literature conducted by searching the National Center for Biotechnology Information's PubMed database. The database was searched for the terms "telemedicine satisfaction". The survey included 167 papers that were empirically validated. From these results only papers that evaluated patient satisfaction with telemedicine and used previously validated instruments were selected. No attempts were made to determine the extent to which the instrument measured satisfaction. In total 22 instruments were examined.

The instruments were reviewed and coded using a grounded theory approach similar to Hoehle and Venkatesh (2015). This method was selected because of its potential to derive constructs in the creation of an instrument for measuring user perceptions. Each instrument was reviewed independently and open coding was performed on the questions. The questions were reviewed to identify patterns in the data that could lead to the formation of "salient" categories (MacKenzie et al. 2011). The open coding results were then categorized and axial coding was performed. A matrix analysis was used to determine relationships between codes and refine the list. The coding results were reviewed by a second investigator. A third investigator reviewed the results to resolve conflicts. Results were then related to the satisfaction, telemedicine and user acceptance literature.

Results

In total 21 main categories were identified. Some categories were based on the medical condition of the patient such as background information, treatment, and outcome. Others were based on the experience with medical staff such as interaction, relationship, quality and support. There were others that were based on the experiences with the systems such as technology, system functions, and difficulty. Table 1 below contains a list of the results of coding performed in this research.

Table 1: Coding Matrix results for steps 1-5 based on example from (Hoehle and Venkatesh 2015)

Axial Codes	Subcategories	Open Code Ex.	Example questions from surveys	Literature
Background Information	Demographic, Medical history, Current condition	Personal info, demographics, , existing health, medical condition, background	In General you will say your health is? (Ware Jr et al. 1996)	Age, Gender, Experience (Venkatesh et al. 2003)
Treatment	Experience, Type of service	Experience with care /treatment, type of service,	Which type of unit were you on for most of your stay?(Dharmar et al. 2013)	Medical Domain (Hailey et al. 2002)
Environment	Location	Environment, facilities	How satisfied were you with the rooms and facilities? (Dharmar et al. 2013)	Location (Kraai et al. 2011)

Interaction with provider	Provider, Staff, Monitoring	Patient / provider / staff interaction, contact, shows responsibility	During my treatment at <facility > I have been treated with kindness and respect by the staff who provided my stroke rehabilitation (Chumbler et al. 2015)	Professional patient interaction (Williams et al. 2001)
Relationship with provider	Trust	Understanding, trust, patient needs	I would find it difficult to tell this doctor about some private things (Baker 1990)	Trust (Saliba et al. 2012) Relationship (Miller 2002)
Quality of service	Provider, Staff, Competency	Staff quality, ,doctor quality, competency, quality of care	The thoroughness, carefulness, and skillfulness of the specialist you saw? (Doorenbos et al. 2010)	Patient feelings about the service (Williams et al. 2001)
Information availability	Health, Procedures	Knowledge, learning material, staff providing, info for health	The professionals give you all the information you need about the available services (Gagnon et al. 2006)	Knowledge and training (Hjelm 2005; Isabalija et al. 2011)
Outcome	Medical outcome	Result, outcome, life change, habits, followup	Do you think that home monitoring had positive effects on your health? (Ricci et al. 2010)	Result demonstratibility (Venkatesh and Bala 2008)
Support	Provider, Staff, Health, Equipment	Assistance, stay / assistance, assistance / equipment	How well staff have answered your questions about the equipment (Doorenbos et al. 2010)	Facilitating Conditions (Venkatesh et al. 2003)
Cost	Savings	Cost, cost savings, expenses	Telecare reducers the cost of health care (Tsai et al. 2014)	Cost of Care(Hjelm 2005)
Scheduling	Availability, Convenience	Timeliness, scheduling, availibility	The appointments you make with the professionals are obtained quickly (Gagnon et al. 2006)	Scheduling (Gustke et al. 2000)
Duration	Time with doctor, total duration	Duration, time with doctor, convenience	Telecare reduces the time you spend on health-related issues (Tsai et al. 2014)	Reduced waiting times (Mair and Whitten 2000)
Technology	Quality, Reliability	Technology quality,equipment, reliability	I cannot always trust the equipment to work (Demiris et al. 2000)	Technical aspects (Williams et al. 2001)
Usefulness	Information needs, Comfort	Data needs, access to info, flexibility, accessibility,	Does the system provide the precise information you need? (Doll and Torkzadeh 1988)	Usefulness (Wixom and Todd 2005)
Ease of use	Learnability, Ease of use	Communication / equipment difficulty, skill,	I would imagine that most people would learn to use this system very quickly (Kobak et al. 2011)	Ease of Use (Wixom and Todd 2005)
Privacy	Safety	Privacy, safety	How well the telehealth staff respected your privacy (Doorenbos, 2010)	Privacy (Dick et al. 1999)
Comparison of Quality of Care	Other options	Comparison,versus	A nurse cannot examine me over the television as well as in person (Demiris et al. 2000)	Relative Advantage (Rogers 2010)
Usage	Intention, recommendation	Repetition, intention, usage, recommendation	I will continue using the telecare system (Tsai et al. 2014)	Intention (Wixom and Todd 2005)

Overall Satisfaction	Overall satisfaction	Overall satisfaction	Overall how satisfied were you with the service you received (Salisbury et al. 2005)	Overall satisfaction (Williams et al. 2001)
Provider benefits	Convenience, cost	Convenience, provider cost	How important was the info for physician (Ricci et al. 2010)	Provider comfort (Dick et al. 1999)

Discussion

Many of the categories identified followed suggested factors that influence patient satisfaction identified in previous studies. Although a number of main categories were identified some of these categories could be further divided into additional subcategories. For example, the category support was identified based on questions from multiple questionnaires. Some instruments include questions about both provider and staff support. Other instruments focused on questions about support provided for the equipment and for support provided for the medical intervention. Additional testing will assist in refining the categories.

Conclusion and Future work

This study developed constructs based on the grounded theory approach through analyzing existing telemedicine satisfaction instruments. Currently work is being done to link the constructs identified in this study to constructs described in the literature and further define them. The results will be used to create a telemedicine satisfaction instrument. The instrument will be tested for reliability and validity in the next steps of the process using data collected at the partner hospital.

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