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Quality Improvement Project Examining Nurses’ Perceptions Regarding the Use of Technology for Interpretation for Patients with Limited English Proficiency

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Abstract

This study measured the positive and negative aspects of perceptions in nurses regarding technology used in language interpretation for patients who have limited English proficiency (LEP). A sample of forty-seven nurses participated in the study. A trial of Video Remote Interpretation (VRI) was implemented and perceptions were measured for VRI technology as compared to the telephone interpretation technology that was available before the trial. Instrumentation included demographic questionnaires measuring participant characteristics, and questionnaires measuring positive and negative perceptions of technology were administered pre-trial for telephone interpretation technology and post-trial for the VRI technology. Each perception questionnaire included four open ended questions regarding how technology affected patient rapport, communication, and nursing care. There was a significant increase in positive perceptions of VRI compared to telephone interpretation technology ($p=0.000$). There was also a significant decrease in negative perceptions VRI technology when compared to telephone technology ($p=0.000$). Nurses in the Millennial generation showed a significantly higher belief that VRI assisted in the faster completion of duties ($p=0.009$), while the Baby Boomer participants showed a significantly higher beliefs that VRI draws nurses time away from patients ($p=0.017$). The study results support the literature that states VRI technology is preferred by healthcare providers in relation to the effects on nursing time and communication. As predicted by the theoretical framework chosen for this study, the Technology Acceptance model, the VRI technology will have successful adoption and will ensure increased use of this form of certified language interpretation.

Key words: LEP, VRI, Technology Acceptance Model
Chapter 1

This quality improvement project examined nurses’ perceptions of two different certified remote interpretation technologies that were available for communicating with patients with limited English proficiency LEP. Miscommunication associated with LEP leads to decreased patient satisfaction, adverse effects from drug complications, poor understanding of diagnoses, low health literacy, and a greater risk of being misunderstood by their nurse and healthcare providers (Juckett & Unger, 2014; Locatis et al., 2010). When available, in-person interpretation has been demonstrated to be the gold standard for patient care. There are technological remote interpretation options that allow for effective communication in patients with LEP, in the absence of in-person interpretation. In facilities where both certified in-person interpreters and certified remote options are available, healthcare providers (HCP) are not consistently utilizing certified interpretation. Interpretation using family, friends, or other non-certified interpreters, (ad hoc interpretation) is often utilized. Nurses’ perceptions about their ability to communicate with patients who have LEP impacts adoption and consistent use of certified forms of interpretation.

Background

As of 2013, 25 million people in the U.S speak a language other than English at home (U.S. Census Bureau, 2010). An emphasis on the responsibility of nurses to be culturally competent (HHS OMH, 2013), and the release of standards of care in communication, led to many healthcare facilities to implement policies and protocols for interpretation (The Joint Commission, 2011). Additionally, Title VI of the Civil Rights Act mandated that interpretation services be provided for patients with LEP who needed this service, even if no reimbursement for this service was provided (Juckett, 2014). Barriers associated with inconsistent adherence to
protocols (availability of interpreter, technological difficulties, heavy workload, and non-reimbursement for services in most states) were also associated with the use of ad hoc interpreters (family, friends, or staff), for interpretation (Junkett, 2014). The literature reports that ad hoc interpreters who were untrained were more likely to make errors, violate confidentiality, and increase malpractice risks (Junkett, 2014; Quan, 2010). Although the preferred standard for interpretation are certified in-person interpreters, there are other modalities available. In an effort to standardize the education for interpreters, The Certification for Healthcare Interpreters (CCHI) was formed to create a national certification program. This program addresses all of the government requirements and protocols for valid language interpretation (Certification Commission for Healthcare Interpreters, 2010).

**Needs Assessment**

A needs assessment was completed prior to the implementation of the Translational Clinical Project (TCP). Current services for language interpretation included an in-person certified Spanish interpreter who was assigned to the hospital on day shift hours during the week. Before the trial period, interpretation options for night and weekend shifts were telephone interpretation and a few staff members who were designated to translate medical Spanish. The assessment indicated that many of the nurses during night and weekend shifts used ad-hoc interpreters, instead of telephone interpretation services due to barriers and negative perceptions of that technology. Telephone interpretation service offered the translation of 200 languages, available through the use of a single hospital phone, cell phone, or a dual handset phone.

Usage data from current telephone interpretation services were able to be analyzed for this needs assessment. The time period of telephone interpretation data that was analyzed was from January to August 2016. Analysis showed around 95% of the encounters were for Spanish
language translation, and that the majority of usage occurred on night and weekend shifts. Other languages seen on the usage data were Bangla, Mandarin, French, Urdu, Haitian Creole. Upon further analysis, it was found that when telephone interpretation was used for a patient with languages other than Spanish, a multiple telephone encounter was only seen 10% of the time. Based on this analysis, it can be assumed that there were encounters, during the patient’s stay, that no certified interpretation was used.

As a way to remain current in culture competence, as other health facilities in the area had, the hospital system needed to implement VRI services in order to increase the quality of care given to patients with LEP. A partnership was developed between the researcher and the Interpretation Services Department to pilot a project that would trial VRI. The researcher was responsible for collecting the data to evaluate the trial to determine if full adoption was recommended.

**Feasibility**

The feasibility of this project was reviewed. The device used for this project was a video remote interpretation system supplied by InDemand Interpreting, and was also supported by the Kaiser Permanente Grant awarded to the researcher. Training and technological support was provided by InDemand. High definition Wi-Fi was required for the system to work properly and was already in place at the hospital. Total time spent in planning, and implementation, data collection, and evaluation of this quality improvement project was approximately 13 months.

**Problem Statement**

During shifts when there was an absence of a certified in-person interpreter in this project setting, there was an underutilization of certified telephone interpretation services. The standard protocol for interpretation when a certified in-person interpreter was not available was telephone
interpretation. The pilot project introduced a trial of video remote interpretation (VRI) as a new approach to communication with patients who have LEP.

**Purpose**

The purpose of this study was to compare and summarize the nurses’ perceptions of telephone and VRI interpretation technology services. The examination of the perceptions of nurses, regarding the two different interpretation technologies, gave insight into the decision of which technology to adopt and to provide a service that will be preferred by nurses and would increase usage of certified language interpretation to patients with LEP.

**Clinical Questions**

1. What are the nurses’ perceptions of video remote interpretation (VRI) technology compared to the use of current telephone interpretation technology for interpretation services in patients with limited English proficiency?

2. Are there relationships between age and years of experience to perceptions of the two technologies?

**Definition of Terms**

As some of the terms in this study have various meanings, clarifying definitions of those terms were given. In order to given meaning to these terms in relation to the study, the operational definitions were developed. The definitions discussed are perception, aspects, technology, and interpretation.

**Perception.** Merriam-Webster (2015) defined perception as the capacity of comprehension. MacDonald (2011) defined perception as the unique way an individual views a phenomena, incorporating both memories and experiences in the understanding. The concept of perception concept was operationalized for this project as the individual’s viewpoint which
incorporates both the positive and negative aspects of technologies in order to determine their unique perceptions.

**Aspects.** Merriam-Webster (2017) defined aspects as a particular status or phase in which something appears, or may be regarded. The operational definition of aspects is separated into the positive and negative components that make up perceptions. Those components relate to how nurses are affected by technology, and the effect of the technology on the nursing care they provide.

**Technology.** According to Laila, Ahmed, & Mogahed (2011), technology was the interaction of tools and people to achieve a human purpose. The concept of technology was also defined as equipment or a machine that has been developed from scientific knowledge (Merriam-Webster, 2017). In this study, interpretation technology referred to telephone or video equipment that was developed to aid in language interpretation for patients with language barriers or LEP.

**Interpretation.** Communication is a key component in healthcare. Caring for a patient with LEP involves barriers to typical communication. In order to communicate with a patient with LEP, all communication must be interpreted to understand the patient. The simplistic definition of interpretation, is to explain the meaning of something (Merriam Webster, 2017). Yet, communication is more than just translating words. Full interpretation of patient’s meaning involves evaluating visual cues as well (de Carvalho de Rezende, Pontes de Oliveira, Carvalho de Araújo, Guimarães, do Espírito Santo, & Setenta Porto, 2015). Meaning can be derived from sight, or what the patient’s body language or facial expression is trying to tell us. According to De Carvalho de Rezende, et al. (2015), facial expressions are non-verbal communication that can help nurses and patients identify even obscure aspects of verbal communication.
Assumptions and Limitations

It was important to discuss the aspects of the study in which were assumed to be true, those that were unable to be controlled, and how the researcher attempted to limit the impact on the study.

Assumptions in research are statements that are considered to be true, although there has not been any scientific testing to prove them to be true (Grove, Burns, & Gray, 2013). It was assumed that participants of the study understood each questionnaire item. It was also assumed that the participants answered the questionnaire items with all effort and honesty. In regards to the instrumentation chosen, it was assumed that validity and reliability that was stated by the author of the questionnaire was correct.

As most limitations are common among research studies, some limitations are unique to each study. While some limitations cannot be controlled, other limitations are minimized to not cause negative effects to the study (Connelly, 2013). A limitation that was specific to this study was the fact that the hospital system, where the study is took place, was in control of the implementation specifics of the technology. The researcher kept frequent communication with those in charge of technology implementation to make sure that protocols outlined in the proposal were followed.

Conclusion

When a patient with LEP requires healthcare, barriers in communication can lead to alterations in health and increased health disparities. Although in-person certified language interpreters were the preferred method of communication with LEP patients, alternatives had to be provided in its absence. Advances in technology for language translation, such as telephone and VRI, has provided communication to LEP patients when an in-person interpreter is
unavailable. Although telephone and video interpretation technology has led to efficient, and safe care of patients, barriers and negative provider perceptions of the technology has led to the continued use of ad hoc services. By analyzing the nurses’ positive and negative aspects of perceptions for the technologies that provide language interpretation, the interpretation service that was most preferred by nurses can be implemented.

The following sections of this paper will review the theoretical framework that provided organization for the study and a review of current literature supporting the evidence based need for change. The paper will also provide the methodology of the study that describes the details of the data collection. The paper will conclude with the analysis of the data, the discussion and the conclusion including the future implications of this study.
Chapter II

Literature Review

The problem statement and purpose of this TCP was proposed to solve a current issue in practice that can positively affect health outcomes for patients with LEP. Evidence based practice change relies on a strong theoretical framework that is supported by research evidence to provide the basis of that change. This section of the review of literature reviews the supporting literature within the concepts of the theoretical framework used for the project from the nurse and or provider perspective. Concepts addressed were external variables, such as barriers to use, attitudes towards use, and the implications to patient care if use technology is not accepted.

Search Description

Searches were conducted in CINAHL, Galileo, PubMed, and EBSCOhost, for peer reviewed, and quantitative and qualitative articles. Search terms for the theoretical framework included “technology”, “healthcare” AND “theoretical framework”. This search yielded 141 articles. After reviewing possible theoretical frameworks available, the Technology Acceptance Model (TAM) fit the overall goal of the TCP and the clinical questions. After further narrowing the search terms for articles related to TAM, four resources and articles were chosen to review the theoretical framework.

The review of literature for the main topic of the TCP included the search terms “LEP” AND “remote interpretation” AND “ad hoc interpretation. This search resulted in approximately 559 articles. Many of these articles were not within the three to five year time frame. Further limitations included removing duplicate articles and only including peer reviewed articles from academic journals. Once the articles were narrowed down by the specifics mentioned above, 86
articles met the criteria. Articles were then reviewed for content and relatability to the translational project in the review of literature.

**Theoretical Framework**

Theoretical frameworks provide knowledge from theory, experience, and intuition which guided nursing practice (McCrae, 2012). Using a theory as a framework for this study helped to organize the study in such a way as to either avoid or address potential problems that may arise (Mitchell, 2013). Technological advances in healthcare can be stressful to healthcare workers, and the adoption of new technology depends on many factors. The Technology Acceptance Model (TAM) is a framework that predicts subsequent use of technology based on the influence of perceptions (Davis, 1989). This framework was suitable for the study as the nurses’ perceptions of the two technologies used for language interpretation was evaluated to help explain and predict future use.

The Technology Acceptance Model (TAM) was developed as a model for Information Systems to predict acceptance and use of new technology (Davis, 1989). According to Davis (1989), the attitude of the user was a major factor in the acceptance and subsequent use of the system. It was not unusual for nurses’ to be non-compliant with new technology requirements at work because of the heavy patient care workload (Kahouei, Mohammadi, Majdabadi, Solhi, Parsania, Roghani, & Firozeh, 2014). In order for nurses to accept a new technology, it must be time saving and easy to use. Davis (1989) described this phenomena as perceived usefulness and perceived ease of use. As both of these are major determinants of behavioral intention to use the technology, perceived usefulness is further defined as “use of technology would increase job performance” and perceived ease of use is “use that is free from effort” (Davis, 1989). Referring to Figure 1, it can be seen that external variables play a preliminary role in perceived usefulness
and ease of use. According to Davis (1989b), these factors were sometimes uncontrollable by the user, and can be technological features of the system and training on the system.

![Technology Acceptance Model (TAM)](image)

**Figure 1.** Technology Acceptance Model (TAM)

Although the TAM was developed as a computer information systems model, the TAM has been used as a framework in many healthcare studies due to the technological advances in patient care. Early healthcare studies that used TAM studied the rollout of electronic health records, but more recent studies in healthcare involved sensor based medication systems and smart pumps. Regardless of the technology being studied, similarities emerged. When examining the external variables, Strudwick (2015) found that since external variables impacted the behavioral intentions to use, emphasis must be placed on training on how and why to use the technology was important. A study examining the nursing acceptance of medication sensor-based technology found that the nurses’ ability to understand the technology and its benefit, was a key factor in perceived usefulness and subsequent use (Kummer, Schäfer, & Todorova, 2013).

**Review of Literature**

**External Variables: Barriers to Use.** There were a number of reasons why certified interpretation services were not utilized that were found in the literature. The most common barriers identified was the increased time required, disruption of schedules, and a delay in
possible life altering treatment (Hsieh, 2015; Masland et al., 2010). A study by Schenker, Perez-Stable, Nickleach, and Karliner (2011), concluded that clinicians just “get by” without interpretation, or use ad hoc interpreters to interpret for patients, because of availability issues. In this same study, it was reported that, nurses were more likely to use little or no interpretation due to time constraints compared to physicians. Other reasons reported by physicians for the underutilization of certified interpreters was distrust when using outside interpreters because of an uncertainty of medical knowledge being interpreted, and patient privacy. Bauer et al. (2014), examined system level factors when analyzing usage of interpreter services, and found that training for the interpretation resources was a barrier. Training, in both the equipment available and training of additional certified in-person medical interpreters, increased the use of services. Reimbursement was also found to be a system related factor related to the barriers in the use of certified interpreters. Although it was illegal not to provide interpreter services, according to Juckett & Unger (2014), these services were not funded or reimbursed by Medicare, Medicaid, or private insurers.

The availability of certified language interpretation was required for communication with diverse clients and is necessary to provide high-quality care to patients (Baurer et al., 2014). In a hospital environment, there were certain times when resources were limited. The use of ad hoc interpreters, or no interpretation at all, were most likely to happen during times when an in-person interpreter was not available. A study examining the satisfaction of night shift and weekend staff nurses showed inadequate communication, training, and available resources were a common theme among survey participants (Powell, 2013). Another study looked at provider perceptions of interpreter services and the frustration regarding the availability of in-person interpreters on weeknights and weekends. Nurses in this study stated if a person was essential for
the care of a patient, like a nurse or an interpreter, then that person should be there around the clock (Michalec, et al., 2015). Studies showed that the implementation of remote interpretation services, via telephone or video, have eliminated the reliance and the need for ad hoc interpretation, and increases availability. (Baurer, Yonek, Cohen, Restuccia, & Hasnain-Wynia, 2014).

**Attitudes toward Using.** The preferred method for medical language interpretation is through a certified in-person interpreter. Research indicated that in regards to privacy, confidence, and understanding patients with LEP, certified in-person interpretation ratings were higher than those of the remote options (Locatis et al., 2010). One of the main differences in the preference of in-person interpretation, over telephone and video technological options, was related to culturally competent care. During in-person interpretation, the establishment of the patient-provider bond was enhanced because of a better understanding of the cultural background which was provided by the interpreter (Locatis et al., 2010; Nápoles et al., 2010; Price, Pérez-Stable, Nickleach, López, & Karliner, 2012). According to Nápoles et al. (2013), healthcare providers were 2.5 times more likely to understand the cultural background of a patient with in-person interpretation, over any other method. In a qualitative study examining culturally competent care, connectedness was a central theme (Sobel & Metzeler-Swain, 2016). Patients reported that the less English they spoke, the more vulnerable it made them feel, and the harder it was for them to ask for interpretation services. Being able to assess and provide the best form of interpretation service available was of utmost importance.

Technological interpretation options were invented to fill the gap when in person interpretation was not available. The first technology for language interpretation was through remote telephone services. Telephone language interpretation was an acceptable alternative to in-
person interpretation, because it was easy, time efficient, and offered many languages, especially remote languages (Masland et al., 2010). Telephone services were managed by a network system that made numerous languages available through the use of a single hospital phone, cell phone, or a dual handset phone.

Video interpretation offered the same services, with the added benefit of the patient and interpreter being able to see each other. According to Masland et al., (2010) video interpretation closely resembled in-person services, but had the efficiency of remote services. Video remote interpretation consisted of a mobile unit, normally on a stand, that can be easily moved to each patient room. The video remote service used network Internet connections that provided a camera for visualization of the patient and provider (Price et al., 2012). It was this visual aspect that created the ability to educate patients to equipment efficiently. One of the most important factors, in regards to cultural competence, was that video interpretation was able to pick up on subtle facial gestures of a client visit, that would have ordinarily been missed with telephone only interpretation (Jacobs, Fu, & Rathouz, 2012; Price et al., 2012).

Although the two forms of interpretive technology resulted in a higher utilization of certified services, studies showed that there were differences in the preference of interpretation using telephone and video remote options. Qualitative studies resulted in negative comments of sound quality, an inconvenience of handing the phone back and forth to client, and the lack of a personal connection with telephone interpretation (Hsieh, 2015; Locatis et al., 2010). Michalec, Maiden, Ortiz, Bell, & Ehrenthal (2015) found that providers felt the relaying of information back and forth via telephone causing complication as well as having to repeat the information many times. According to Nápoles et al. (2013), who compared video remote interpretation and in-person interpretation, found that when there was an absence of an in-person interpreter, video
interpretation was superior to ad hoc interpretation and increased access to services without any compromise to quality. Although video remote interpretation perceptions were mostly positive, one study showed negative perceptions of slow connectivity issues, and some lack of eye contact with patients (Locatis et al., 2010). Overall, when comparing the remote video and telephone interpretation services, video remote interpretation was found the preferred choice, all with statistical significance (Locatis et al., 2010; Price et al., 2012).

**Implications.** When a patient is not offered a means to communicate during a health related encounter, many consequences occur. According to Sobel and Metzel-Swain (2016), patients with language barriers feared going to the hospital because of not being able to understand and being “at the mercy of the system.” The use of ad hoc interpretation, or no interpretation at all, can led to decreased patient satisfaction, errors, unnecessary testing, and possible malpractice risk (Juckett & Unger, 2014). Ad hoc interpretation led to privacy and ethical considerations. Although it is still done in some cases, it must be noted that the use of children to interpret for a patient is not only problematic but forbidden in some states because of ethical issues. (Juckett & Unger, 2014). According to Masland et al. (2010), LEP patient may miscommunicate or withhold information due to domestic violence issues, or embarrassment of speaking in front of family or friends. This type of miscommunication leads to one of the most important reasons of providing improved language services; the possible decreasing of health disparities and outcomes for LEP patients (Nápoles et al., 2010). In the ED, one study found that, among Spanish speaking patients, the risk of the patient leaving before care was given, was significantly reduced once video interpreting was implemented (Jacobs, Fu, & Rathouz, 2012). Another example of the implications of miscommunication was during discharge instructions. The underutilizing of certified interpretation services led to substandard discharge instructions,
and resulted in poor patient compliance and follow-up due to misunderstanding (Baurer et al., 2014; Masland et al., 2010).
Chapter III

Methodology

Based on the needs assessment data, in the absence of a certified in-person interpreter there was an underutilization of certified telephone interpretation services. A trial project was proposed to implement a trial of VRI technology in place of the current telephone interpretation. The purpose of the project was to provide insight into the perceptions of these two forms of interpretation technologies which will predict subsequent acceptance and use. Outcome variables for this study were the nurses’ perceptions of technology. In order to answer the clinical questions, the study methodology will be detailed.

Clinical Questions

The following clinical questions were developed in response to the problem and study purpose.

1. What are the nurses’ perceptions of video remote interpretation (VRI) technology compared to the use of current telephone interpretation technology for interpretation services in limited English proficiency patients?

2. Are there relationships between age and years of experience to perceptions of the two technologies?

Study Design and Setting

A descriptive study design was used to collect data during a pilot project at designated units at a large hospital system in the southeast. The quality improvement project took place during a twelve week time period between June 2017 to August 2017. The hospital system made the decision to trial the InDemand Video Remote Interpretation Services across their hospitals to address the need of their patients with LEP and to increase the use of certified language
interpretation. Due to the diversity of the population of the area in which the hospital is located, approximately 15% of the patients, on any given day, require an interpreter. Of the languages served, Spanish and French are the most common.

**Previous Services**

In-person Spanish Certified Language Interpreters (CLI) were scheduled on weekdays from nine in the morning to five in the evening at one hospital facility and day and night coverage at another facility, with minimal weekend coverage. Interpretation options, for times when there was no access to an in-person interpreter, there was telephone interpretation service, and a few staff members who were cleared to translate medical Spanish. Many of the nurses during these hours still relied on ad-hoc interpreters, despite telephone interpretation services, due to barriers and negative perceptions. Telephone interpretation service offered translation of 200 languages, available through the use of a single hospital phone, cell phone, or a dual handset phone.

**Sample**

The participants of this study was a convenience sample derived from the Registered Nurses (RN) in interested departments within Wellstar Health System, with the available population of approximately 215 RNs. All RNs meeting the inclusion criteria were recruited. Inclusion criteria for the sample included: 1) any RN willing to fill out a demographic, and the telephone questionnaire 3) cared for LEP patients 4) and was willing to complete the VRI questionnaire. The exclusion criteria would include: 1) personnel who were not licensed RNs 2) RNs that were not scheduled to work during the trial. No specific number of participants were required for the study.
Recruitment

A recruitment flyer was posted in the lounge, locker room and bathrooms that provided the meeting dates and times for the project informational meeting. Multiple informational meetings took place to reach all RNs within all shifts. The purpose of the study, procedures, and questions were answered during the meeting. Each consenting participant was given a copy of the consent which included the researcher’s contact information (See Appendix A). Participation was completely voluntary and the RN could withdraw from the study at any time.

Data Collection

Data collection occurred in two phases. The pre-trial phase occurred after participants were consented to participate in the study, and involved data collection based on the telephone interpretation service that was in place before the VRI training and trial began. The post-trial phase occurred after the VRI trial period had ended, and involved data collection once the participants had the opportunity to use the VRI service.

Pre-Trial. During the informational meetings, all consenting participants began the pre-trial portion of the study by completing a brief demographic questionnaire and the pre-trial telephone questionnaire. The Participant Demographic Questionnaire was used to collect demographic information about the participants. The Positive and Negative Perceptions of Technology was used to measure the positive and negative perceptions of telephone interpretation technology use (Kiekkas, Karga, Pouloupolou, Karpouhtsi, Papadoulas, & Koutsojannia, 2005). Total time to complete consents and initial surveys took less than 15 minutes. The researcher was present to answer any clarifying questions in the study by using definitions provided by the original author of the instrument.
Participants were made aware that training would occur whether or not they agreed to participate in the study. Training sessions were completed at each unit with a representative from the VRI service and the researcher. After training was completed, the VRI trial period began. The VRI service was used for any patient with LEP on units chosen for the pilot VRI trial.

Following each encounter, a quality rating was collected from the RN’s regarding each interpretation session. This quality rating is built into the VRI encounter and is based on a scale of one (lowest rating) to five (highest rating). The trial period was initially 30 days, but due to issues with connectivity during the beginning of the trial, the trial was extended to 60 days.

**Post-Trial.** After the completion of the VRI trial period, RN’s perceptions of the VRI technology were assessed on the chosen units for those participants who completed the pre-trial questionnaires, received the training, and had an opportunity to use VRI service. The *Positive and Negative Perceptions of Technology Use* questionnaire, regarding the VRI technology, was administered and took less than 15 minutes to complete. Data was obtained from the InDemand online portal to track nurse ratings of each interpretation session using the VRI.

**Instrumentation**

The demographic questionnaire was developed by the researcher. Referring to Appendix B, there was a total of eight items on the *Participant Demographic Questionnaire*. Items included in the questionnaire were gender, age, unit worked on, years of nursing experience, primary language spoken, any secondary languages spoken, experience with telephone interpretation, and experience with VRI interpretation.

According to the outcome variables and the operational definitions that were developed, an instrument was chosen to measure perceptions of technology. Permission was received from the original author of the *Positive and Negative Perceptions of Technology Use* instrument. This
instrument has been used in the past to study technology in the ICU setting, with a Cronbach’s alpha of 0.87 for the positive perceptions and 0.78 for the negative perceptions (Kiekkas, Karga, Pouloupoilou, Karpouhtsi, Papadoulas, & Koutsojannia, 2005). The ability to alter any items to make it more applicable to the current study was granted by the author and was done by this researcher. Alterations to the questions involved different wording of the questions for a better fit for interpretation service, versus an ICU setting. For example, the original question of “Increases patient risk from mechanical faults?” was changed to “Increases patients risk due to technological faults?” Another question alteration was “Extracts time/attention of nursing personnel away from patients?” was changed to “Draws time/attention of nursing personnel away from patients?” The changing of the word extracts to the word draws removes negative connotation from the question.

The pre-trial questionnaire began by asking the average number of times telephone interpretation was used per week. The main portion of the pre-trial questionnaire included a total of 14 items on which the participants used a Likert scale to describe the positive and negative perceptions of telephone technology, from one (Strongly Disagree) to five (Strongly Agree). On the second page of the questionnaire were four qualitative questions (developed by this researcher), in which each participant explored their experiences with caring for a patient with limited English proficiency regarding telephone interpretation technology. The pre-trial telephone questionnaire also included a question regarding quality rating of telephone interpretation, which a scale of one (lowest rating) to five (highest rating) was used. The quality rating of telephone interpretation was compared to the VRI rating that was collected with each interpretation session.
The post-trial questionnaire began with asking the number of times VRI was used during the trial period. The main portion of the post-trial questionnaire included a total of 14 items on which the participants used a Likert scale to describe the positive and negative perceptions of VRI technology from one (Strongly Disagree) to five (Strongly Agree). On the second page of the questionnaire were four open-ended questions (developed by this researcher), in which each participant explored their experiences with caring for a patient with limited English proficiency regarding VRI interpretation technology. Refer to Appendix C and D for instrumentation used for study.

**Data Analysis**

Data from questionnaire items was entered and analyzed using SPSS for Windows, version 23. A number of missing data points were identified during data cleaning and the determination was made to manage these using a mean replacement value. Three missing data points for participant ages were replaced with the mean age (37.94) and two missing data points for “number of times telephone interpretation used” was replaced with the mean “1” (1.48).

Pre-trial demographic and telephone questionnaires totaled 71 participants. Referring to Figure 1, 24 participants were lost to follow up due to no longer being employed, being on leave of absence (LOA), and loss or opportunity (participants who did not use the VRI). The data from participants who did not complete the post-trial questionnaires were removed before analysis. Referring to Appendix D, the flow of the participants can be seen.

Descriptive statistics were used to give results on demographic questionnaires, including means and standard deviations. The ages reported were placed in age groups according to generational age groupings (Millennials, Generation X, Baby Boomers). Frequencies, means, and percentages were ran on responses from the two technology questionnaires. Non-parametric
testing using Kruskal Wallis was used to detect relationships between age and years of experience to perceptions of the technology. Post hoc analysis was used to determine differences between the pairs of groups. Open ended questions on the both pre-trial and post-trial questionnaires were reviewed, aggregated, and reported by themes. All statistical analysis used \( P < 0.05 \) to determine statistical significance.

**Human Subjects Protection**

In order protect the confidentiality of the participants, all data that was collected was aggregated and de-identified. De-identification was ensured by assigning a code to each nurse for the ability to compare pre and post implementation questionnaire. Only the code was used on each questionnaire. Participant’s (nurse’s) names/code information was kept in a codebook stored in a secured cabinet. The codebook, demographic surveys, all questionnaires, and analyzed data were kept in a locked secure file in the researcher’s office. After the completion of the project, the data will remain in the secured area for a period of three years, and will then deleted or destroyed. The information regarding the protection of the participants was included and approved through the Internal Review Board (IRB) of Georgia College and State University and through the research institute of the hospitals where the study took place.
Chapter IV

Results

This translational clinical project involved implementing VRI as an alternative technological method of interpretation for patients with LEP. Descriptive statistics on demographic data and questionnaire responses, and correlational analysis for relationships between demographic data and questionnaire results were used to answer the clinical questions. Before any analysis was completed the demographic and questionnaire data was analyzed for normality. Shapiro Wilk for age, years of experience pre-trial telephone, and post-trial VRI questionnaires resulted in data that was not normally distributed, as all data resulted in significant values being less that the chosen alpha level ($p = 0.05$). Non parametric testing was used on all analysis.

Sample Characteristics

Registered nurses participating in the study ($n = 47$) worked in the Emergency Department (66%) and the Mother Baby unit (34%). The majority of nurses were female (85%) and had more than 10 years’ experience (49%). Age groups of the participants were separated into generational age groupings of Millennials (51%) ages 23 to 36, Generation X (31%) ages 37 to 52, and Baby Boomers (13%) ages 53 to 61. Nurses’ had English as their primary language (100%), and of the nurses who spoke a secondary language (13%), mostly spoke Spanish (50%). Although all nurses had experience with telephone interpretation (100%), only a small amount of participants had experience with VRI (4%). Participants reported using the telephone interpretation an average of 1.40 ($SD=.48$) times per week and used the VRI an average of 3.15 ($SD= 2.49$) times during the trial period. Additional specific participant characteristics can be seen by referring to Table 1.
Instrument Reliability

Internal consistency was analyzed on the Positive and Negative Perceptions of Technology Questionnaire. Cronbach’s alpha coefficient for the pre-trial telephone questionnaire was found to be 0.88 for positive perceptions and 0.78 for negative perceptions. Post-trial VRI questionnaire Cronbach’s alpha was 0.87 for positive perceptions, 0.92 for negative perceptions. Internal consistency was good overall for both questionnaires survey items.

Clinical Questions

Clinical Question 1. What are the nurses’ perceptions of video remote interpretation (VRI) technology compared to the use of current telephone interpretation technology for interpretation services in limited English proficiency patients? In order to answer the first clinical question descriptive frequencies and percentages were analyzed for significant difference. Using Wilcoxon signed ranks to compare pre and post-trial questionnaire means, VRI was found to be significantly higher in all positive perceptions, and significantly lower in negative perceptions compared to telephone interpretation. Result specifics regarding each questionnaire items for telephone interpretation and VRI can be seen by referring to Table 2. The rating (1-5) given to telephone interpretation technology, was found to be a mean of 2.82 ($SD=0.947$). By accessing the portal for the VRI service, the average rating for the length of the trial was found to be 4.5, no individual responses on rating were able to be analyzed.

Open ended question were also used to answer clinical question one; What are the nurses’ perceptions of video remote interpretation (VRI) technology compared to the use of current telephone interpretation technology for interpretation services in limited English proficiency patients? Table 3 displays the themes and percentages of participant responses found in the open ended questions regarding telephone interpretation technology and VRI technology. Table 4 and
Table 5 displays a collection of open ended quotations for each technology. There were four open ended questions: *How did the use of the telephone interpretation system effect your ability to establish a rapport with your patient? How did the interpretation system effect the nursing care that you provide? Describe the impact of using the interpretation system on the quality of the communication you had with your patient? Is there anything else you would like to share about your experience with caring for a patient with limited English Proficiency?*

Open ended question one; *How did the use of the telephone interpretation system effect your ability to establish a rapport with your patient?* This question showed participant telephone rapport themes were split between decreasing communication (21%), and increasing communication (21%). A statement that supported the themes in regard to telephone interpretation and patient rapport was “telephone interpretation increases communication over not having any form of interpretation at all”. Responses regarding VRI technology showed nurses believed VRI increased rapport (30%) and increased patient comfort (40%). A humorous quote from a nurse found that patient rapport was better with VRI as it was “much better than Spanglish charades”.

Open ended question two; *how did the interpretation system affect the nursing care that you provide?* One of the themes of how telephone interpretation affected nursing care was that nurses believed that telephone interpretation negatively affected the time they had for care (44%). On nurse stated “it (telephone interpretation) seemed to have taken a lot longer so I wasn’t able to provide the best care to my other patients”. Conversely, 30% of the statements showed that VRI had a positive effect on the nurses’ time for care. A statement that showed the positive effect on nurses’ time was “VRI was simple to use, made my job easier, and was easier for me to give care when you removed barriers of communication.”
Open ended question three; *describe the impact of using the interpretation system on the quality of the communication you had with your patient?* The themes found for this question regarding telephone interpretation technology revolved around the quality of communication and logistical issues. While 30% of the responses had to do how telephone interpretation technology decreased the quality of communication, 28% found that telephone interpretation increased the quality of communication. While one nurses stated that “things definitely gets lost in translation with the telephone... I find I communicate less with my patients who are non-English speaking due to difficulties with telephone interpretation.” Another nurse stated that “the telephone interpretation helps me to effectively care for patients, instead of muddling through broken English.” The theme of logistical issues is related to responses that dealt with nurses who had issues with using the telephone services, and equipment difficulties. Although only 18% of the responses were about logistical issues, all the quotes were very similar to this nurse who stated “the telephone decreases the quality of communication especially since sometimes we have to pass phone back and forth.” Responses about VRI technology and the quality of communication resulted in a theme that showed increased communication due to patient comfort (19%). One nurse stated “Patient was calm and smiling, versus being confused with telephone. Both nurse and patient was able to elaborate more with video.”

Open ended question four: *Is there anything else you would like to share about your experience with caring for a patient with limited English Proficiency?* Although this open ended question didn’t ask about specific characteristics of telephone interpretation, only two themes were found amongst the responses. Effect on time (36%) and the visual aspect of interpretation (35%) were almost equal. One nurses stated in regard to time “Technology should ease burden of work versus adding to it. It does increase some communication but lots of time is lost.” In
regards to responses relating to the visual aspect of communication, one nurses stated, “Neither I or the patient are comfortable when translating on the phone because we can’t see who we are talking to.”

Clinical Question 2. Are there relationships between age and years of experience to perceptions of the two technologies? In order to answer the second clinical question, Kruskal-Wallis analysis was used to determine differences in the groups of age and years of experience to the perceptions of pre- and post-trial telephone and pre and post-trial VRI technologies. Significant differences were found between the three age groups and nurses perceptions of VRI contributing to a faster completion of nursing duties (H(2)= 8.724, p = 0.013) and VRI drawing nurses’ time away from patients (H(2)= 6.170, p = 0.046). Using Mann Whitney U and the corrected Bonferroni corrected alpha level (p = 0.017), Millennial nurses had significantly higher beliefs that VRI contributes to a faster completion of nursing duties than Baby Boomer nurses (p = 0.009); Baby Boomers had significantly higher beliefs that VRI draws nurses time away from patients more than Gen X nurses (p = 0.017). No differences were found between years of experience. No differences were seen between telephone and VRI technology questionnaire items and years of experience, or pre-trial telephone questionnaire items and age groups.

Conclusion

Analysis of the positive and negative perceptions of telephone interpretation and VRI were completed from the 47 Registered Nurses’ who consented for the study. In Clinical Question 1, descriptive analysis showed there was a significantly higher perception found in the positive perceptions of VRI over telephone interpretation, and a significantly lower negative perception of VRI over telephone interpretation for all questions of the questionnaires. In Clinical question 2, correlational analysis found that millennial nurses had a significantly higher
belief that VRI contributed to the faster completion of nursing duties. Baby Boomer nurses also
were found to have a significantly higher belief that VRI drew time away from patients. No
significant relationships were found between VRI and nurses’ years of experience. There were
also no relationships found between telephone interpretation and nurses’ age or years of
experience.
Chapter V

Discussion

This descriptive study compared and analyzed the positive and negative perceptions of the telephone interpretation and VRI technologies used for language interpretation. This study also sought out to determine any relationships between the demographic characteristic of the participants and the perceptions. The results of each clinical question will be discussed along with support from literature, as well as how the results relate to the Technology Acceptance Model and the generation groupings of the participants. Strengths, limitations, and implications for nursing practice will also be discussed. Chapter V will conclude with a discussion of future research that is suggested to fill any gaps in the knowledge of perceptions of technology used for language interpretation.

Summary of Study

This paper outlined the clinical problem of the underutilization of certified language interpretation in the absence of an in-person interpreter and the analysis which supported the need of the study in the clinical setting. The purpose of the VRI trial was to implement a new form of language interpretation technology since the current telephone services were being underutilized. The following clinical questions were proposed:

1. What are the nurses’ perceptions of video remote interpretation (VRI) technology compared to the use of current telephone interpretation technology for interpretation services in limited English proficiency patients?

2. Are there relationships between age and years of experience to perceptions of the two technologies?
A review of literature was completed to provide background knowledge on the use of technology for language interpretation for patients with LEP, and to review the implications of not using certified language interpretation. The units that were interested in the data collection provided RNs who worked in the Mother Baby unit and the Emergency Department who cared for a large number of patients with LEP each day. The total number of participants at the end of the study differed from number of participants from the pre-trial portion of the study due to loss of opportunity, or variations in the patient census that included patients with LEP, which provided the RN the opportunity to use the VRI technology. A total of 47 RNs participated in the study.

The results of the data analysis showed that the perceptions of VRI technology were significantly higher than those of telephone interpretation technology. When looking at the perceptions of VRI technology and the age groups of the participants, significant relationships were found. Millennials in the study were found to have had a significantly higher belief that VRI technology led to the faster completion of nursing duties. Conversely, the participants in the Baby Boomer generation had a significantly higher belief that VRI drew more of the nurses’ time away from patients. No relationships were found between telephone interpretation technology and age or years of experience or between VRI technology and years of experience.

Discussion of Findings

The findings of the study will be discussed for each clinical question. The findings will also be discussed based on the relevance to the review of literature, the Technology Acceptance Model (TAM).

Clinical Question 1. What are the nurses’ perceptions of video remote interpretation (VRI) technology compared to the use of current telephone interpretation technology for
interpretation services in limited English proficiency patients? RN’s who participated in this study were questioned on different aspects of the positive and negative perceptions of telephone interpretation and VRI technologies. The Technology Acceptance Model (TAM) was chosen as a framework on the basis of that positive and negative perceptions are derived from the factors of perceived usefulness and perceived ease of use of the technology, and how the perceptions ultimately influencing attitudes and intention of future use.

**External Variables.** At the forefront of the TAM is how external variables can impact perceived usefulness and perceived ease of use of technology. Specifically to this study, external variables identified were nurses’ time and video connectivity. The questionnaire items in this study that measured the effect of nurses’ time was whether or not: the technology contributed to the faster completion of duties, and if the technology draws time away from patients. Both the questionnaire and the open ended questions regarding telephone interpretation showed time being a significant factor in why there was an underutilization of that technology. This finding differs from a study found in the literature. Locatis, et al. (2010), found that providers ranked telephone interpretation over video interpretation when it comes to wait times.

The external variable of the VRI connectivity issues, Kummer, et al. (2013) states that successful adoption and effectiveness of system implementation is a key factor of perceived usefulness. Video connectivity with the VRI service was brought up in many of the participants open ended responses, which could have been a factor for some of the participants, but did not seem to impact the overall perceptions of the VRI technology. The VRI trial was extended to give an opportunity for nurses that developed a negative perception of the VRI technology to use the service again after the connectivity issues were resolved. After the VRI devices were added
to the main network, connectivity improved and the nurses reported less issues with video streaming.

**Perceived Usefulness.** In the pre and post-trial questionnaire the factor of perceived usefulness can be found in a few of the questionnaire items. According to Lin, Chiou, Chen, & Yang (2016), perceived usefulness is the nurses’ subjective belief that the technology will improve their performance at work. The three questions that referred to perceived usefulness in the questionnaire, asked if the technology would: guarantee a higher effectiveness of care, guarantee a higher patient safety, or contribute to the restriction of nursing autonomy. The results of this study suggests that nurses’ believed that VRI helped them provide better and safer care due to the increased usage and increased communication.

**Ease of Use.** Ease of use can be defined as how the nurses’ belief the technology would be effortless (Lu, Hsio, & Chen, 2012). A study by Lin et. al. (2016), found that nurses’ perception of ease of use depended on if they felt the technology was easy to learn, or easy to use. The significantly higher results of VRI over telephone was seen in the question of “easier completion of nursing duties”. The open ended questions responses also validated that nurses believe that VRI provided a technology that was easy to use. It is important to note that when new technology is implemented, even it is deemed useful, it still adds to the patient workload. This aligns with one of the comments from the open-ended questions. Therefore it is imperative for the implementation of the technology to include thorough training in order not to add to the already stretched workload of nurses (Baurer, et al., 2014).

Based on the TAM and two factors that predict acceptance and use of technology, the overall perceptions of VRI technology suggests that subsequent use of this form of technology will be more readily used than telephone interpretation technology.
**Clinical Question 2.** Are there relationships between age and years of experience to perceptions of the two technologies? Results from the analysis of determining relationships of perceptions of interpretation technology and the age of the participants revealed significant findings that align with what is currently known about generational characteristics. Individuals from different generations have varied attitudes, priorities, and even communicate and engage with people differently (AHA, 2014).

The relationship found between millennial nurses and the perception of VRI technology leading to the faster completion of nursing duties is not surprising. Millennials, who were born between 1980 and 2000, were born into the world of technology and is highly adaptable to change and is very dependent on technology (Hendricks & Cope, 2012). In this study the millennial age group accounted for 51% of the sample, and according to a report from the American Hospital Association (2014), by 2020 millennials will account for 50% of the nursing workforce.

Another relationship that was found showed the baby boomer generation significantly believed that VRI technology drew the time away from the patient. Baby boomers, who were born within the years of 1946 and 1964, are less familiar with technology. The form of electronic communication that they are more comfortable with is the telephone or fax machines, and this generation is concerned with changes regarding technology (AHA, 2014). According to a study by Keepnews, Brewer, Kovner, and Shin (2010), Baby Boomers may require more structured training when it comes to information systems for full acceptance to occur.

Understanding the differences of generations can help explain the non-significant results of the perceptions of telephone and age or years of experience. Telephone technology has been a part of the lives of all generations in the nursing workforce and is associated with distant
communication. There was also no relationship found between years of experience and VRI technology. Age of nurses and years of experience are not synonymous. An older nurse does not always mean the nurse has been in practice for many years. It is a better measure of clinical significance for the relationship between age and perception of technology because of generational differences. Understanding generational differences can help with implementation and sustainability of new technology.

**Strengths**

Strengths of this project primarily had to do with support. The company that provided the VRI technology service provided entry to the online portal management system which gave the researcher access to the usage data and ratings for data analysis. Another strength of this project was the support that came from the hospital system. The head of interpretation services acted as a liaison between the company and the hospital system to facilitate the contractual and financial requirements for the VRI trial to take place.

**Limitations**

There were a few limitations of this study that may have affected the results of this study. The sample for this study only included staff from the Mother-Baby unit and the Emergency Department of one health system, which may not allow for generalization of study findings for nurses’ perceptions from other units or other regional or national hospitals. The smaller sample size was mainly due to the loss of participants from the lack of opportunity those nurses’ had to trial the VRI technology. Variations in the census of patients with LEP had an effect on the availability of nurses’ not having a patient with LEP assigned to them.

Another limitation of this project was due to the connectivity of the VRI service involving Wi-Fi. Although preliminary Wi-Fi and Bandwidth testing occurred in both hospitals,
connectivity issues still occurred in certain areas of the ED and the Mother-Baby Unit. Although the connectivity issues were improved when the VRI service was connected to the main network, perceptions of the technology may have been affected. According to the TAM (Davis, 1989), if the nurses’ do not feel like the technology has an ease of use, perceptions and future use may be impacted.

**Implications and Recommendations**

The study suggests that, according to the TAM, successful adoption of the VRI will occur. Based on supported literature, increasing certified language interpretation will result in positive implications for patients with LEP. Based on the data analysis of the questionnaire and the open-ended questions, a mixed modality of language translation service is recommended. As supported by literature, in-person interpreters is still the recommended first line of service, yet when unavailable, telephone services are adequate, and VRI provides an improved substitute for in-person interpretation (Price, et. al., 2012). By being able to have multiple modalities available, nurses’ will have to opportunity to use which ever form of language interpretation that they perceive to be the most helpful for patient care and their time. Due to some of the generational differences in the perceptions of the technologies available for language interpretation, it is recommended that further, and ongoing training to be provided to either new nurses’ or the nurses in the Baby Boomer generation. Focused training that is supported by evidence based practice will further increase perceptions and comfort of the use of certified language interpretation.

**Conclusion**

This paper outlined the clinical problem of the underutilization of certified interpretation in the absence of an in-person interpreter and needs analysis which supported the importance of the
study in the clinical setting. After the review of literature provided the theoretical framework for the study, and the background and implications of the use of language interpretation, two clinical questions were developed. The data analyzed from the 47 nurses’ provided the much needed proof for the clinical setting to implement the most preferred for of technology use for language interpretation in patients with LEP. According to the Technology Acceptance Model, perception impacts future use of a technology. By implementing a technology that is perceived to have a positive impact on patient care and nursing duties will have a positive impact on the health outcomes of patient with LEP.
References


http://www.census.gov/quickfacts/table/POP815214/00
Table 1

**Demographic Characteristics of Participants**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>14.9</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>85.1</td>
</tr>
<tr>
<td><strong>Unit</strong></td>
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<td></td>
</tr>
<tr>
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<td>34</td>
</tr>
<tr>
<td>Emergency Department</td>
<td>31</td>
<td>66</td>
</tr>
<tr>
<td><strong>Age Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millennial</td>
<td>24</td>
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</tr>
<tr>
<td>Generation X</td>
<td>17</td>
<td>36.2</td>
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<tr>
<td>Baby Boomer</td>
<td>6</td>
<td>12.8</td>
</tr>
<tr>
<td><strong>Years of Nursing Experience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5 years</td>
<td>16</td>
<td>34</td>
</tr>
<tr>
<td>5-10 years</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>23</td>
<td>49</td>
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<tr>
<td><strong>Primary Language Spoken</strong></td>
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<tr>
<td>English</td>
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<td>100</td>
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<td><strong>Secondary Language Spoken</strong></td>
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<td>6</td>
<td>12.8</td>
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<td>No</td>
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<td>87.2</td>
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<td><strong>Language</strong></td>
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<tr>
<td>Spanish</td>
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<td>50</td>
</tr>
<tr>
<td>Other</td>
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<tr>
<td><strong>Experience with Telephone</strong></td>
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</tr>
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<td>Yes</td>
<td>47</td>
<td>100</td>
</tr>
<tr>
<td>No</td>
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<td>0</td>
</tr>
<tr>
<td><strong>Experience with VRI</strong></td>
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<tr>
<td>Yes</td>
<td>2</td>
<td>4.3</td>
</tr>
<tr>
<td>No</td>
<td>45</td>
<td>95.7</td>
</tr>
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</table>
Table 2

*Pre and Post Questionnaire Item Results*

<table>
<thead>
<tr>
<th>Positive Perceptions of Technology</th>
<th>Pre-Phone Mean Likert (SD)</th>
<th>Post-VRI Mean Likert (SD)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guarantees a higher effectiveness of nursing care?</td>
<td>3.7 (1.02)</td>
<td>4.62 (.53)</td>
<td>.000</td>
</tr>
<tr>
<td>Guarantees higher patient safety?</td>
<td>3.6 (1.07)</td>
<td>4.70 (0.55)</td>
<td>.000</td>
</tr>
<tr>
<td>Contributes to easier completion of nursing duties?</td>
<td>3.0 (1.22)</td>
<td>4.60 (0.61)</td>
<td>.000</td>
</tr>
<tr>
<td>Contributes to the faster completion of nursing duties?</td>
<td>2.6 (1.12)</td>
<td>4.47 (0.80)</td>
<td>.000</td>
</tr>
<tr>
<td>Offers the potential for continuous improvement of personnel?</td>
<td>3.2 (0.99)</td>
<td>4.36 (0.67)</td>
<td>.000</td>
</tr>
<tr>
<td>Contributes to the increase of prestige of nursing personnel?</td>
<td>2.8 (0.98)</td>
<td>4.28 (0.99)</td>
<td>.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negative Perceptions of Technology</th>
<th>Pre-Phone Mean Likert (SD)</th>
<th>Post-VRI Mean Likert (SD)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases patient risk from errors in personnel?</td>
<td>3.1 (1.10)</td>
<td>1.83 (1.09)</td>
<td>.000</td>
</tr>
<tr>
<td>Contributes to the increase of stress of nursing personnel?</td>
<td>3.5 (1.12)</td>
<td>1.94 (1.01)</td>
<td>.000</td>
</tr>
<tr>
<td>Draws attention of nursing personnel away from patients?</td>
<td>3.4 (0.98)</td>
<td>2.00 (0.98)</td>
<td>.000</td>
</tr>
<tr>
<td>Draws time of nursing personnel away from patients?</td>
<td>3.6 (1.06)</td>
<td>1.96 (0.98)</td>
<td>.000</td>
</tr>
<tr>
<td>Contributes to the loss of sensitivity of nursing personnel about patients?</td>
<td>3.3 (1.02)</td>
<td>1.87 (.88)</td>
<td>.000</td>
</tr>
<tr>
<td>Contributes to the increase of overall hospitalization costs?</td>
<td>3.0 (0.72)</td>
<td>2.26 (1.89)</td>
<td>.001</td>
</tr>
<tr>
<td>Contributes to the restriction of autonomy of nursing personnel?</td>
<td>2.6 (0.88)</td>
<td>1.89 (0.94)</td>
<td>.000</td>
</tr>
<tr>
<td>Increases patient risk from mechanical faults?</td>
<td>3.3 (0.97)</td>
<td>2.21 (1.10)</td>
<td>.000</td>
</tr>
</tbody>
</table>

*Note.* Significant at p < 0.05.
Table 3

*Telephone and VRI technology Open Ended Question Themes*

<table>
<thead>
<tr>
<th>Open Ended Question</th>
<th>Pre- Telephone Survey</th>
<th>Post-VRI survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>How did the use of the telephone interpretation system effect your ability to establish a rapport with your patient?</td>
<td>Impersonal 31</td>
<td>↑Rapport 30</td>
</tr>
<tr>
<td></td>
<td>↓ Communication 21</td>
<td>↑Patient comfort 40</td>
</tr>
<tr>
<td></td>
<td>↑ Communication 24</td>
<td>↑Communication 21</td>
</tr>
<tr>
<td>How did the interpretation system effect the nursing care that you provide?</td>
<td>Negative Effects on Time 44</td>
<td>Positive Effects on Time 30</td>
</tr>
<tr>
<td></td>
<td>Questions 8</td>
<td>↑Education 20</td>
</tr>
<tr>
<td></td>
<td>Accuracy 28</td>
<td>↑ Confidence in communication 25</td>
</tr>
<tr>
<td></td>
<td>Suitable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td>Describe the impact of using the interpretation system on the quality of the communication you had with your patient?</td>
<td>↓ Quality 30</td>
<td>Ease of Use 38</td>
</tr>
<tr>
<td></td>
<td>Logistic Issues 18</td>
<td>Patient Comfort 19</td>
</tr>
<tr>
<td></td>
<td>↑ Quality 28</td>
<td>Visual Aspect 16</td>
</tr>
<tr>
<td>Is there anything else you would like to share about your experience with caring for a patient with limited English Proficiency?</td>
<td>Prefer other method 56</td>
<td>Technical difficulties 46</td>
</tr>
<tr>
<td></td>
<td>Frustration 20</td>
<td>Prefers/Enjoys over telephone interpretation 54</td>
</tr>
<tr>
<td></td>
<td>Effects Time 24</td>
<td></td>
</tr>
</tbody>
</table>
Table 4

**Pre-Trial Telephone Open Ended Questions and Quotations**

<table>
<thead>
<tr>
<th>Pre-Trial Telephone Question</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>How did the use of the telephone interpretation system effect your ability to establish a rapport with your patient?</td>
<td>“No rapport develop. Only able to accomplish tasks. Not personable.” “More impersonal than in person or video.” “I feel like when I am not talking &quot;with&quot; or &quot;to&quot; patient.” “Sometimes the patient does not understand how to use the phone.” “Fragmented. Interpreter has to repeat instructions which is frustrating patient. Seems like we don’t care.” “More difficult to build rapport. Tends to lead to less communication.” “Gave patient some relief that they were being understood.” “Able to communicate faster than waiting for in person interpreter.”</td>
</tr>
<tr>
<td>How did the interpretation system effect the nursing care that you provide?</td>
<td>“Slowed down care for my patients.” “Delayed care and usually delayed getting an interpreter on the line.” “Slows me down! Is an irritation but something that has be done if we can’t use the in person interpreter.” “I question knowledge of interpreters. I have to reword instructions, so I question if patient is understanding me.” “Questionable- often times a patient still appeared to be confused with the plan of care.” “Able to effectively care for patients instead of muddling through broken English.” “I feel confident that the patient and family understand the plan of care. I try to group calls together.” “Helps me understand them and puts them at ease.”</td>
</tr>
<tr>
<td>Describe the impact of using the interpretation system on the quality of the communication you had with your patient?</td>
<td>“Poor quality of communication, there is not a real way to make sure the patient and interpreter understand what needs to be said.” “Limited at best.” “Things definitely get lost in translation.. I find I communicate less with my patients who are non-English speaking due to difficulties with translation.” “Difficult going back and forth with telephone for conversation.” “It impedes communication. It is difficult to utilize and it doesn’t seem safe.”</td>
</tr>
<tr>
<td>Is there anything else you would like to share about your experience with caring for a patient with limited English Proficiency?</td>
<td>“Takes time to use telephone so more time has to be allotted.” “Increases time to take care of patient and extra time is not always available.” “The only thing I don’t like about the telephone is hunting down the phone # and double phone.” “It increases time with patient and takes away time from others.” “Live interpreters are preferred.” “Better in person than phone.” “Video would be better and more conducive to rapport.” “Not sure how comfortable they are talking to the person on the phone when they don’t see.”</td>
</tr>
</tbody>
</table>
### Table 5
**Pre-Trial Telephone Open Ended Questions and Quotations**

<table>
<thead>
<tr>
<th>Post-Trial VRI Question</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>How did the use of the telephone interpretation system effect your ability to establish a rapport with your patient?</td>
<td>“Much better than &quot;Spanglish Charades&quot;” “Helped with rapport because it is a great mode of communication.” “Quicker response and helped me communicate with my patients better.” “Made patients feel safe and comfortable to talk.” “Helped rapport because accuracy of info was better. More confident in communication.” “It helped patients feel like they were understood and knowledgeable regarding treatment.” “Patients appreciated face to face interpreter as it was more transparent.” Allowed me to communicate easier than I did before with patient education.” “Patients able to express their needs better when barriers removed.”</td>
</tr>
<tr>
<td>How did the interpretation system effect the nursing care that you provide?</td>
<td>“Simple to use. Made my job easier. Easier to care when you remove barriers.” “More precise care because nurse and patient understood each other.” “Allowed for explanation of procedures physician assessment and questions from family.” “Quicker access to service than telephone.” “More thorough and personal care.” “Able to communicate with my patients so much better because of ease of use.” “Efficient care without being awkward.” “Very efficient. Less time consuming. Patients prefer over telephone.” “Provided less errors.” “Was able to provide more in-depth education.”</td>
</tr>
<tr>
<td>Describe the impact of using the interpretation system on the quality of the communication you had with your patient?</td>
<td>“Patients were more willing to talk.” “Patient was never surprised about plan of care.” “Faster interpretation which improved patient satisfaction.” “Patient loved they could see interpreter.” “Patient felt we cared and that we made an effort to accommodate them.” “Improved communication, less errors, faster service than telephone.” “Quality of communication was better due to nurse and patient clear communication because of SEEING interpreter.” “I used the system more than I ever would have used telephone or in house interpreter” Able to elaborate more with video.” “Helped with language and cultural barriers.”</td>
</tr>
<tr>
<td>Is there anything else you would like to share about your experience with caring for a patient with limited English Proficiency?</td>
<td>“VRI helps because of body language and showing patients we care.” “I enjoyed using the new technology.” “Higher stress when we cannot communicate with patient VRI decreased stress!” “AMAZING” “All around a better experience.” “Made my job less stressful and easier. Love it!” “Great to have interpreters with less common languages.” “Lots of connectivity issues.” “Lots of technical difficulties. Embarrassing in front of patient.” “Connection reliability was limited at times.” “VRI was great. WIFI was bad.”</td>
</tr>
</tbody>
</table>
Appendix A

INFORMED CONSENT

I, ________________________________, agree to participate in the research, Quality Improvement Project Examining Nurses' Perceptions Regarding the Use of Technology for Interpretation in Limited English Proficiency Patients, which is being conducted by Jessica Marcus, who can be reached at 404-444-5051, jessica.marcus@bobcats.gcsu.edu. I understand that my participation is voluntary; I can withdraw my consent at any time. If I withdraw my consent, my data will not be used as part of the study and will be destroyed.

The following points have been explained to me:

1. The purpose of this study is to examine nurses’ perceptions of the use of telephone and video remote interpretation (VRI) technologies that is offered during the pilot project.
2. The procedures are as follows: you will be asked to fill out a questionnaire measuring positive and negative aspects of telephone technology after consent has been obtained. Each consented participant will attend a training session for VRI technology. Nurses will utilize the VRI for communication for patients with limited English proficiency (LEP) during evening, night, and weekend hours, or whenever the in-person interpreter is not scheduled for Spanish language translation. Nurses who have used VRI services in the four week pilot project time period will complete the questionnaire that measures positive and negative aspects of VRI technology.
3. Your name will not be connected to your data. Therefore, the information gathered will be confidential.
4. You will be asked to sign two identical consent forms. You must return one form to the investigator before the study begins, and you may keep the other consent form for your records.
5. You may find that some questions are invasive or personal. If you become uncomfortable answering any questions, you may cease participation at that time.
6. This research project is being conducted because of its potential benefits, either to individuals or to humans in general. The expected benefits of this study include: increased technological skill for nurses, improved communication and health outcomes for patients, improved cultural competence of nurse during LEP patient encounters.
7. You are not likely to experience physical, psychological, social, or legal risks beyond those ordinarily encountered in daily life or during the performance of routine examinations or tests by participating in this study.
8. Your individual responses will be confidential and will not be released in any individually identifiable form without your prior consent unless required by law.
9. The investigator will answer any further questions about the research should you have them now or in the future (see above contact information).
10. In addition to the above, further information, including a full explanation of the purpose of this research, will be provided at the completion of the research project on request.
11. By signing and returning this form, you are acknowledging that you are 18 years of age or older.

Signature of Investigator ___________________________ Date ________________

Signature of Participant ___________________________ Date ________________

Research at Georgia College involving human participants is carried out under the oversight of the Institutional Review Board. Address questions or problems regarding these activities to Dr. Tsu-Ming Chiang, GC IRB Chair, CBX 090, GC, email: irb@gcsu.edu; phone: (478) 445-0863.
Appendix B

Participant Demographic Questionnaire

Directions: Please read each question carefully and only choose (1) answer.

1. **Gender**
   - [ ] Male
   - [ ] Female

2. **Unit Worked On**
   - [ ] Mother Baby
   - [ ] Emergency Department

3. **Age**
   _______

4. **Years of Nursing Experience**
   - [ ] < 5 years
   - [ ] 5-10 years
   - [ ] >10 years

5. **Primary Language Spoken**

6. **Is there a secondary language spoken?**
   - [ ] Yes
   - [ ] No
   **If Yes, then what language**
   ____________________

7. **Have you had experience with telephone interpretation in the past?**
   - [ ] Yes
   - [ ] No

8. **Have you had experience with video remote interpretation in the past?**
   - [ ] Yes
   - [ ] No
Appendix C

Please read each item carefully and choose (1) answer that best reflects your perceptions of TELEPHONE interpretation technology. Your responses are de-identified and aggregated in order to protect your identity.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Guarantees a higher effectiveness of nursing care?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2. Guarantees a higher patient safety?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. Contributes to easier completion of nursing duties?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. Contributes to the faster completion of nursing duties?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5. Offers the potential for continuous improvement of personnel?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6. Contributes to the increase of the prestige of nursing personnel?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>7. Increases patient risk from errors of personnel?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>8. Contributes to the increase stress of nursing personnel?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>9. Draws attention of nursing personnel away from patients?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10. Draws time of nursing personnel away from patients?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>11. Contributes to the loss of human sensitivity of nursing personnel about patients?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>12. Contributes to the increase in overall hospitalization costs?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>13. Contributes to restriction of autonomy of nursing personnel</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>14. Increases patient risk from technological faults?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
To answer the next questions, I would like for you to think about your experiences caring for a patient with limited English Proficiency (LEP).

1. How would you rate the quality of telephone interpretation for communication with LEP patients?
   (1) Being the lowest rating and (5) Being the highest rating? ________

2. How did the use of the telephone interpretation system affect your ability to establish a rapport with your patient?

3. How did the use of the telephone interpretation system affect the nursing care that you provide?

4. Describe the impact of using the telephone interpretation system on the quality of the communication you had with your patient?

5. Is there anything else you would like to share about your experience with caring for a patient with limited English Proficiency?
Appendix D

Please read each item carefully and choose (1) answer that best reflects your perception of Video Remote Interpretation (VRI) technology. Your responses are de-identified and aggregated in order to protect your identity.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Guarantees a higher effectiveness of nursing care?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>2.</td>
<td>Guarantees a higher patient safety?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>3.</td>
<td>Contributes to easier completion of nursing duties?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>4.</td>
<td>Contributes to the faster completion of nursing duties?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>5.</td>
<td>Offers the potential for continuous improvement of personnel?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>6.</td>
<td>Contributes to the increase of the prestige of nursing personnel?</td>
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<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>7.</td>
<td>Increases patient risk from errors of personnel?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>8.</td>
<td>Contributes to the increase stress of nursing personnel?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>9.</td>
<td>Draws attention of nursing personnel away from patients?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>10.</td>
<td>Draws time of nursing personnel away from patients?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
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<td>o</td>
<td>o</td>
<td>o</td>
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<td>Contributes to the increase in overall hospitalization costs?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>13.</td>
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<td>o</td>
<td>o</td>
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</tr>
<tr>
<td>14.</td>
<td>Increases patient risk from technological faults?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>
To answer the next questions, I would like for you to think about your experiences caring for a patient with limited English Proficiency (LEP).

1. How did the use of the video interpretation system affect your ability to establish a rapport with your patient?

2. How did the use of the video interpretation system affect the nursing care that you provide?

3. Describe the impact of using the video interpretation system on the quality of the communication you had with your patient?

4. Is there anything else you would like to share about your experience with caring for a patient with limited English Proficiency?
Appendix E
Flowchart of the participant progress through study

Potential RNs for recruitment
N=215

Consented RN’s (n=71)

Pre-Trial Telephone

Excluded: (n=0)
a) VRI Training (n=71)

Post-Trial VRI

Lost to follow up: (n=10)
a) No longer an employee (n=6)
b) On leave of absence (n=4)

Loss of Opportunity: (n=14)
a) Did not use VRI due to no LEP patient assignment (n=14)

Analyzed (n=47)
Appendix F

IRB Approval

 DATE: 2017-04-26
 TO: Jessica Marcus
 FROM: Tsu-Ming Chiang, Ph.D. Chair of Georgia College Institutional Review Board

Dear Jessica Marcus,

The proposal you submitted, "Quality Improvement Project Examining Nurses' Perceptions Regarding the Use of Technology for Interpretation in Limited English Proficiency Patients," has been granted approval by the Georgia College Institutional Review Board. You may proceed but are responsible for complying with all stipulations described under the Code of Federal Regulations 45 CFR 46 (Protection of Human Subjects). This document can be obtained from the following address:

http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html

The approval period is for one year, starting from the date of approval. After that time, an extension may be requested. It is your responsibility to notify this committee of any changes to the study or any problems that occur. You are to provide the committee with a summary statement. Please use the IRB Portal (https://irb-portal.gcsu.edu/) to request an extension, report changes, or report the completion of your study.

Finally, on behalf of IRB, we would appreciate your time to fill out a short survey (click the link below) to provide us with feedback. Best wishes for your study.

https://docs.google.com/forms/d/1WX9nbdq2kyiLaT8P6vLstGB1LrIG
|_GqNSXxT2k/viewform?c=0&w=1&usp=mail_form_link