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Introducing Telehealth to Nursing Students in a Pre-Licensure Program

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INTRODUCING TELEHEALTH TO NURSING STUDENTS IN A PRE-LICENSURE PROGRAM

By

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Abstract

Telehealth has emerged as an enhancement to health care, giving clients greater access to care providers than ever before. It has benefited persons living in remote areas who cannot readily access health services and it has helped clients who have chronic disease conditions that require frequent monitoring, saving themselves and hospitals thousands of dollars. Nurses are an important part of delivering telehealth, yet it is not currently being taught in many nursing courses. The purpose of this project is to introduce telehealth into a pre-licensure nursing program via a learning module and to assess the students' understanding of the material before and after the module has been presented. A two-tailed *t* test was given before and after the module was presented with $p < .05$ which does not support the null hypothesis that there would be no difference between the two tests, along with multiple regression analysis performed on each independent variable compared to the dependent variable with the results being $p > .05$, which upheld the null hypothesis that demographic variables would not influence the outcome of either test. The learning module proved to be effective and could have further applications in pre-licensure nursing programs.

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Chapter I

Introduction

Introduction to the problem

This capstone project emphasizes the importance of nursing students understanding the use of telehealth. Telehealth is becoming an increasing venue for client care; the American Telemedicine Association (2010) requests six mandates from the Obama administration on public policy regarding telehealth, with one of those mandates being to increase funding for telehealth projects. The use of telehealth has become an important subject to the United States government as well. President Obama recognized the need for Telehealth in his State of the Union Address (2011) "It's about a firefighter who can download the design of a burning building onto a handheld device; a student who can take classes with a digital textbook; or a patient who can have face-to-face video chats with her doctor." The use of telehealth is becoming more widespread; at the University of Texas Medical Branch, telehealth has been applied for many years and local home health agencies are employing its use with greater frequency.

The importance of using telehealth

In the United States, five million clients are treated annually for Congestive Heart Failure (CHF) (Thom, et al. (2006), with a direct cost of $29.6 billion to insurance companies and $40 billion being paid out to Medicare beneficiaries. In addition there are associated costs for increased medical doctor office visits and other health care institutions, specifically hospitals. Due to rising costs, more effective methods for treating the client at home need to be explored. The Federal Interagency Forum on Age-Related statistics estimates the growth of the world's elderly population grew to an

average of 795,000 per month in 2004, with estimates of that number increasing. Hospital Compare (2010) indicated the national average for hospital readmission rates for individuals with heart failure was 24.7%.

Congestive Heart Failure is only one of the disease processes in which telehealth has had a significant impact. Other disease processes include Diabetes, Autism, and some forms of mental health. According to the Health Resources and Services Administration for Rural Health (no date), Telehealth is " the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration. Technologies include videoconferencing, the internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications" (para 1).

Needs Assessment

Telehealth is rapidly becoming a viable form of client treatment to improve outcomes and to reduce hospital readmission rates, yet a comprehensive literature review revealed there are very few resources that discuss teaching the concepts of telehealth to pre-licensure nursing students.

Significance of the problem

One of the goals for Healthy People 2020 from the Department of Health and Human Services is to integrate more information technology in health care. To accomplish this goal it will be necessary to instruct nurses about using informatics in their client care, yet very few nursing programs are teaching the concept of informatics with telehealth being a subset of the topic; therefore, nurses are graduating from nursing schools without being informed about telehealth and its uses. Because teaching

telehealth should begin in nursing school at the pre-licensure level, the sample for this study will be nursing students at a community college; a review of the college's required courses for nursing revealed Informatics is not a required course, therefore telehealth is not being taught.

Purpose

The purpose of the project is to introduce the concepts of telehealth to pre-licensure nursing students, to discuss how to use telehealth, analyze situations where telehealth will be of value, and contrast the advantages versus the disadvantages of using telehealth by using a learning module. The purpose also includes evaluating the effectiveness of the learning module.

Research Question

Is the use of a learning module effective in teaching pre-licensure nursing students about telehealth?

Key concepts of telehealth

Telehealth is "the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education and training, public health and health administration" as stated by Bedi and Murthy (2003). Telehealth is a process of telemedicine, which according to Bedi and Murthy (2003) is defined by the World Health Organization:

> The delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries,

> research and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities. (p. 11)

Bedi and Murphy (2003) also clarify other concepts as well; they indicate telehealth systems use different processes to send information to a client's Electronic Medical Record (EMR). Some systems use a "store and forward" method, which allows data to be captured and sent to a healthcare provider at set intervals or upon demand. Other systems use real-time transmissions of information which makes data available to a healthcare provider as soon as the data is captured. This data may be x-rays, laboratory results, Magnetic Resonance Imaging (MRI) or Computerized Axial Tomography (CAT) scans. Because of the real-time applications, telemonitoring or teleconsultation can be accomplished as well, with the client in one location and the healthcare provider in another.

Theoretical Framework

Kolbs Experiential Learning Theory

In the area of constructing teaching modules on telehealth, the students' learning styles have to be considered. The learning module is best suited for D. A. Kolb's (1984) Experiential Learning Theory. The concepts that apply to this learning module are:

Abstract Conceptualization (AE): The individuals who score high in this area use an analytical approach to learning, relying on logical thinking and rational evaluation. These learners tend to be oriented towards things and symbols and less toward people. They do best in authority-directed, impersonal learning situations that emphasize theory and systematic analysis. They don't care for unstructured learning forms that allow

students to “discover” things, like exercises and simulations. Because the learning module is a passive experience, the student has time to reflect on the information learned, especially if the student recorded the audio portion of the module or took notes.

Reflective Observation (RO): The students who score high on this category use a tentative, impartial, and reflective approach to learning. They rely on careful observation in making judgments, and prefer lectures that permit them to take the role of impartial observer. This again is a suitable approach to the learning module. Based on what they have heard, the student can draw inferences about telehealth, such as when would it be best used, and to whom telehealth would be most beneficial.

Kolb also states that some people use several learning styles in combination. This module would be suited for the Assimulator, a combination of the AC and RO. These people score high in the AC and RO areas. They can understand and create theories. They excel in inductive reasoning and synthesizing various ideas and observations into an integrated whole. They are less interested in people and are more concerned with abstract concepts. A theory for them must fit the facts or they will discard it or re-examine the facts. This combination would be suitable, because the use of telehealth requires a set of facts before it is placed into use and while it is being used. The student would have to draw appropriate conclusions and actions for clients who are using telehealth.

Conceptual-Theoretical-Empirical Diagram

Conceptual Model: D.A. Kolb's Experiential Learning Theory

Concepts Studied: Students' learning styles

Middle Range Theory Concepts

Abstract Conceptualization

uses an analytical approach to learning and relies on logical thinking and rational evaluation.

Reflective Observation

uses a tentative, impartial, and reflective approach to learning Relies on careful observation in making judgments and prefers lectures.

Assimilator, a combination of the AC and RO

Can understand and create theories. They excel in inductive reasoning and synthesizing various ideas and observations into an integrated whole.

Empirical Research

Pre-test

Learning Module

Post-test

The use of a pre-test evaluated the nursing students' knowledge of Telehealth. The learning module establishes the rules for using telehealth; this allows the student who uses abstract conceptualization to begin to logically think of instances where telehealth might be useful. The student who uses reflective observation will begin to mentally compare what he or she knows about nursing care and how telehealth can augment, replace, or not replace traditional forms of client treatment. The student who uses assimilation may begin to reflect on what he or she has learned about telehealth and how the processes might be improved or how it might be used in combination with in-hospital treatment.

Chapter II

Review of Literature

Purpose of Literature Review

The purpose of the literature review is to explore existing literature that discusses why telehealth is useful; the review is also used to explore the number of studies that examine specific telehealth devices or services, discusses student learning styles, and to explore literature that exists that discusses instruction to nurses or nursing students about the use of telehealth.

Sampling Strategies

Two hundred articles were reviewed based on several criteria:

1) Article discussed the use of telehealth
2) Article was no more than six years of age (unless no other resource found)
3) Article was written in English
4) Article gave a control and an experimental group
5) Article discussed teaching telehealth to nursing students
6) Article discussed cost of telehealth as opposed to hospitalization for the CHF client
7) Article discussed learning styles of students
8) Article discussed re-admission rates for clients after a CHF exacerbation episode

Of the articles reviewed one hundred and seventy-seven were eliminated because they did not meet the stated criteria.

Keywords or terms: *Re-admission rates, cost, telehealth, informatics, telehealth devices, nursing student's attitudes toward technology, student learning styles, student demographics, and nursing curricula*

Background and Significance

Readmission Rates

The causes of client readmission rates are varied, from the existence of co-morbidities that influence CHF for example to inadequate follow-up care. Delgado-Passler and McCaffrey (2006) state readmission rates occur in 20-50% of clients with CHF between 14 days and 6 months after hospital discharge and 16-25% of those relate to repeat episodes of heart failure exacerbations. Anderson, Tyler, Helms, Hanson, and Sparbel (2005) found factors influencing readmission rates included being discharged early from the hospital in an unstable condition, which resulted in 33-40% readmission rates because of poly-pharmacy, poor nutrition, and socio-economic status.

Cost

Cost is a factor when clients are hospitalized. The actual cost of hospitalizations to the CHF client is illustrated by research performed by Neumann, et al. (2009). CHF is cited as one of the most cost-intensive chronic diseases, being responsible for one to two percent of direct health cost in Western industrialized nations and in Germany. In persons 50 years old or greater, CHF becomes a more frequent primary reason for admissions/re-admissions. The cost to the German public health system was 2.9 billion euros ($3.74 billion). These data were cited as a means of predicting future costs; of this amount, 1.3 billion euros ($1.67 billion) went for hospitalizations. Based on this information, the cost in the United States was estimated to be double that of Germany.

When clients present with CHF, many have other co-morbidities. When this occurs, the cost for hospitalizations increases. Chatre, Weioner, Jayadevappa, & Johnson (2006) examined hospitalization costs in clients with both Alzheimer's disease and CHF. The study involved 904 elderly clients who were sub-divided into four groups: Alzheimer's disease (AD) and CHF (n=240), AD only (n=664), CHF only (n=712), and no-AD and no-CHF (n=2904). Inpatient care accounted for 78% of the total cost for the AD + CHF group, 75% for the AD only group, 82% for the CHF only group, and 74% for the non-CHF, non-AD group. The average length of hospital stay was greatest with the AD + CHF group.

Telehealth has shown promise in reducing costs associated with re-hospitalizations as illustrated by Jerant, Azari, Martinez, and Nesbitt, (2003) "Three post-hospitalization nursing care models for reducing readmission charges were examined during 180 days of follow-up care"(pg 2). The three modalities studied were: 1) video-based home care; 2) telephone calls; and 3) usual care which includes home care visits. The study found CHF related readmission charges were $44,470 at the trial mean cost in the usual care group, $5,850 trial mean for the telecare group, and $7,320 trial mean for the telephone group. These results were 86% to 84% lower in the telenursing groups compared to usual care. Both groups had a significantly lower number of visits to the Emergency Department ($p=0.0342$) and incurred fewer costs ($p = 0.0487$).

Telehealth Systems

There is evidence to support the value of telehealth in the area of client monitoring for certain disease processes through the use of different devices, and several studies have

been done using various telehealth delivery systems; which devices to use often depend on client preference and the client's specific need.

Health Buddy® system is an in-home communication device that allows interaction between the client and the health care provider. LaFramboise, Todero, Zimmerman, & Agrawal, (2003) conducted a random study using this system involving ninety people divided into four groups over two months. The first group (n=26) received telephone management only; the second group (n=23) received five home visits by a research nurse; the third group (n=21) received assessment and education through the Health Buddy® system; and the fourth group (n=20) received a combination of five home visits plus the use of the Health Buddy® system. The specific areas of interest were: self-efficacy, functional status, depression, and health-related quality of life. The results evaluated each area. Self-care efficacy was evaluated using a Scheffe's test which found a significant difference between the four groups with the results of a *p* value of 0.05, indicating the telephone only group demonstrated a decreased confidence in carrying out their self-care needs. The functional test group had a *p* value of 0.005 with no significance between the groups. With all groups together, a six minute walk test was measured at the base line measurement and two months. Fifty- two point two percent of those participating improved their walking distance by ten percent, and 44.8% improved their walking distance by 20%. The depression scale showed 29% of the participants having depression at the beginning of the study, and this improved over time with a *p* value of 0.054, approaching statistical significance. LaFramboise et al. (2003) indicate that the Health Buddy® system did not appear to have any significant advantage over any other approach; however, the use of the Health Buddy® system can be used in place of

another delivery system or in conjunction with another system resulting in possible decreased cost. Other systems such as Phillips Command Station® and mymedic® operate essentially as does the Health Buddy® system.

Some clients need face to face monitoring in order for the physician to examine body language, facial expressions and other assessment items that can only be seen. Some teleheatlh systems like ValueOptions® services utilizing high-definition video conferencing units and IP-based networking enabled the delivery of tele-psychiatry. Value Options ® website (no date) states, "Shortly after implementation, The David Lawrence Center received dramatic evidence of the solution's effectiveness. During a virtual consultation, the attending physician was able to pick up both verbal and non-verbal cues of a patient at risk of a harmful breakdown. The physician was able to immediately affect an intervention through the proper channels and have the client admitted to a hospital for treatment, a potentially life-saving event" (Value Options, p. 1). "The anecdotal evidence of success is supported by the study findings: for a 14-week period from June 28 to October 1, 2010, the service had a 62 percent increase of care delivery to clients over the same period the previous year. That equates to an increase from serving 95 clients and providing 645 services during the June to October timeframe in 2009, to 157 clients served and 1,223 services provided during the same period in 2010." (Value Options p. 2).

Telehealth360® as stated by the website Healthcare Interactive (no date) is an Interactive Voice Response (IVR) model that works in real time and unlike the previously stated telehealth systems, does not require any installation of equipment in the client's home. As soon as clients enter data via their home or cell phone, the data is

immediately available to the medical professional giving access to the client medical record through the system. The system is designed to call clients at pre-selected times, asking clients specific questions about their health status and obtaining several physiological and vital signs in alpha numerical values. Depending on the clients' responses, follow-up telephone calls or additional in-home visits can be made, and the clients' physician can be immediately notified of any significant changes in the clients' status.

Nursing Students' Attitudes

"The recent information technology revolution in healthcare has created demand for nurses with sound knowledge of Nursing Informatics (NI); however, many undergraduate nursing schools across North America do not offer sufficient informatics education" (Pilarski, 2011 p. 1) indicates. Maag, (2006) stated, "Nursing students' predispositions toward technology may be a factor affecting their use of technology in educational and clinical settings" (p. 112). Pilarski, (2011) continues to attest a national survey was conducted to collect attitudinal measures toward technology and data on technology instruction. This was accomplished in order to assist educators with developing informatics technology in their respective curricula. The outcomes indicate the students had an overall positive attitude toward technology; however the students reported formal education in the use of technology applications was low. This shortcoming should be addressed through enhancement of nursing core curriculum. McNeil, et al. (2005) found that half of the undergraduate programs were teaching informatics in some form such as word processing and informatics literacy skills; however, teaching the use of information system data standards, the Nursing Information and Data Set Evaluation Center criteria,

the unified medical language system (UMLS), and the nurse's role in the life cycle of an information system was lacking. Almost 50% of the students felt faculty was "novices" and "advanced beginners" in teaching and using NI applications. Participants reported no future plans to offer NI training in their region.

Because informatics (telehealth) is being recognized as a viable tool in managing various disease processes, several universities are trying to integrate teaching about the subject in their curriculum. Gallagher-Lepak, Scheibel, and Campbell-Gibson, (2009), conducted staff training sessions at The University of Wisconsin to develop telehealth courses for Theoretical Foundations of Nursing, Community Health Nursing, Nursing Management, and Leadership, and Research. The faculty (n=26) were trained in new technology and on how telehealth content was added into the nursing curriculum. The five nursing degree granting institutions of the University of Wisconsin provided training to faculty on informatics and telehealth. The faculty was given a pre and post-training survey, Informatics and Computer Self-Assessment, to evaluate their knowledge before and after training. The survey is built on a one to five scale, with one being no knowledge and five being high knowledge. The scale consisted of 45 questions. The results indicated faculty scored 2.5 (52.02 %) on informatics skills at the beginning of the training, and scored a 3.22 (63.55%) after training. In the area of use of informatics knowledge the faculty initially scored 2.38 (48.04%), but after the training they scored 3.22 (63.55%). The students who took the courses after the faculty were trained in teaching telehealth and informatics indicated they understood how the role of telehealth will help treat clients. Most, however, expressed concern the client still needed human, one-on-one interaction with nurses and telehealth should not be used exclusively; they

were more favorable to the idea of combining telehealth with human interaction with the client.

Because computerized learning is becoming more prevalent in schools, investigating students' attitudes toward technology is important. Johnson, Lillis, and Hall, (2010) conducted a study to discover how Irish nursing students viewed technological supports in the clinical laboratory setting at the University of Limerick, Scotland in the Department of Nursing and Midwifery. The study indicates undergraduates of a Bachelors of Science nursing program were instructed on components of Microbiology Immunology and Infection Control. The theory component was taught on-line in a series of learning modules. The laboratory component was taught via students video-recording a specific skill. Before demonstrating the skill the students were required to study the specific skill through the Digital Nursing Archive (DNA), the Skills Laboratory instructor would in turn demonstrate the skill. Students were then randomly selected to perform the skill correctly and videotape their performance. The video recording was later reviewed and critiqued by faculty. In relationship to the students' view of technology, some of the comments by the students were quoted as: "found that this experience did enhance my learning. It provided us a chance to re-visit our skills demonstration and learn from our mistakes." "…doing it practically and being video recorded it enhanced our ability to do the procedure and by being video recorded we can critique ourselves." All students strongly agreed using the Digital Nursing Archive enhanced their learning. The other modes of technology discussed were using a system called Moodle which was a content management system that encompassed the laboratory sessions; the content was in the form of power points, video clips, and PDF format lectures. A Likert-type questionnaire

was used to analyze the satisfaction with using technology in teaching the skill module. Forty-four responded with a 4.5 agreement on the five point scale, with five being greatly satisfied. The students expressed satisfaction with this type of learning as well. The negative aspects cited were minor difficulties with accessing material, and general uncomfortableness of being video recorded.

Fydryszewski, Scanlan, Guiles, Tucker (2010) examined outcomes and students' perception of course quality of an undergraduate phlebotomy program that used either classroom delivery or a web-based course. The student learning outcomes were measured by final exam performance and perceptions of course quality. Seven principles that were mentioned for good practice are: 1) encourages contact between students and instructor; 2) develops reciprocity and cooperation among students; 3) uses active learning techniques; 4) gives prompt feedback; 5) emphasizes time on task; 6) communicates high expectations, and 7) respects diverse talents and ways of learning. Students had the option to enroll in either the traditional course or the web-based course. Of the 62 students enrolled, 33 enrolled in the live program and 29 in the web-based program. The final study sample was 30, with 19 in the live program and 11 in the web-based program. Two tests were administered, covering part one and part two of the course. The scores for the part one test from the live classroom mean was 88.79, with the web-based mean being 87.27. For the part two test, the live classroom mean was 85.32 with the web-based group scoring 87.09. Therefore, there was no real significant difference in cognitive outcomes between the two methods of course delivery. In the area of student satisfaction, the students' with live instruction rated contact with the

instructor higher than those in the web-based course. The overall satisfaction with the courses was not significantly different the study noted.

Creedy, et al. (2006) examined graduating nursing students' perceptions of their computer literacy skills and use of technology and how this influenced the students' satisfaction. The study recognizes the use of technology in nursing education is growing, but there is a wide variety of satisfaction ratings with web-based learning from poor to very positive. The study examined four important areas based on a conceptual framework offered by Billings for evaluating technology based educational approaches. A survey was used asking students about their computer literacy skills producing a response rate of (n=266). The four areas are computer literacy: internet accesses, approaches to learning, and faculty support. The survey consisted of a sixty-five item questionnaire addressing 7 areas were distributed among the participants. The mean scores for each area were: information literacy skill rating - 32.37 (range 8 -40); for development of information literacy skills – 24.40 (range 9-45); for frequency of access to internet material – 31.56 (range 11-55); for quality of internet material – 16.92 (range 5-25); for usefulness of internet material – 17.84 (range 5-25); for perception of support – 47.65 (range 14-70); and for satisfaction 28.63 (range 5-35). Younger students entering nursing programs may have already been exposed to computer usage while they were in secondary school, whereas the older student who is entering a nursing program may have not. It was noted that female students were more resistant to computer technology than their male counterparts. Technical problems with computer hardware, software and internet connections are a source of difficulty for students, as well as affordability of computers. The findings on approaches to learning were mixed, with some students

reflecting positive outcomes or experiences with web-based learning where others were negative. No significant differences were found.

Regarding faculty competencies, the students identified a lack of support and training related to computer and internet use. The students indicated understanding the content of the course was "hindered until they become sufficiently competent to manage the technical aspects of course delivery." Students from three campuses where the study was conducted rated the quality and usefulness of the internet enhanced material fair to above average; they reported learning resources and support was "somewhat useful" to the development of their information literacy skills. The overall satisfaction with web-enhanced learning was good.

Student Learning Styles

In the area of constructing teaching modules on telehealth, the students' learning styles have to be considered. Ryan, (2004) indicated according to Dunn and Dunn (1993) learning styles involve four major perceptual strengths – visual: those who learn by seeing; auditory – those who learn by listening; tactile – those who learn by manipulating materials in their hands; and kinesthetic – those who learn by doing and getting their whole body involved. Educators can incorporate elements of these within their curriculum to satisfy those learning styles.

Not every student who is in college is a young adult, and not everyone is taking undergraduate degree courses. Therefore the needs and learning styles of the adult learner in advanced degree courses must be considered when discussing teaching Telehealth across the curriculum spectrum. Renfro-Michel, O'Halloran, and Delaney, (2010) recognize graduate students may not be traditional learners. These students may

have full-time jobs while completing their degree, so catering to their needs is important. One of the methods used to address their needs is teaching "hybrid" courses, which refers to teaching some elements of a course face-to-face with other parts being taught on-line. Renfro-Michael, et al. (2010) examined adult learning styles as a means to understand and meet the needs of their learners in an adult classroom. The study first considered what Knowles (1986) used as assumptions about adult learners: "adults need to know; need to be self-directing; need to have their unique experiences taken into account; need to have their learning geared to their readiness to learn; need to have their learning organized around life tasks or problems; and need to have their intrinsic motivation tapped" (Renfro-Michael, et al. 2010, p. 14). Renfro-Michel, et al. (2010) sought to understand to what degree of positive impact on student learning did a hybrid counseling course have that used a variety of on-line learning tools. The pedagogical tools used were video podcasts, which consists of recorded lectures along with power points. Also used was "Second Life" (SL) a virtual reality world; when the students joined they created a virtual "self" to which they interacted with, and created objects. Because the "students are able to directly affect the world with which they interact, SL combines visual, auditory, tactile, and kinesthetic learning styles." Renfro-Michel, et al. (2010) compared learning outcomes of adult students who were enrolled in traditional (predominately lecture and power point) and hybrid sections of a group counseling course. Each group of students was given a pre- and post- test for the course. The pre-test given to both groups were not statistically significant, but the post-test was, in that the hybrid students performed better. This was attributed to this group having better

learning tools, and the ability to re-visit areas of the course sessions than the traditional group. The only negative aspect of this study was the sample size was small, n=24.

The age of prospective students entering into the nursing profession has changed. This especially holds true with community college based curricula. According to Colleges.com, the average age of the Community College student is over 30. It is important to examine the effect of learning new technology on the older student. Cox, (2008) discovered there was no significant difference in attitudes of the students about using technology in the classroom and their learning styles. The average age of the student of Cox's study was 21-35. Attitudes toward the use of technology were measured using Lukow's Attitude Toward the Use of Technology Survey (ATUTS), and learning styles were measured using the Kolb Learning Style Inventory (LSI).

Of significant note according to Cox (2008), a student's attitude toward the use of technology is influenced by how the student sees the relevance of using technology and prior experience with technology.

Rakap, (2010) explored the concept of learning styles. The research questions asked were: 1) How do individual learning styles/preferences influence adult learners' knowledge acquisition in a web-based special education course, 2) What is the relationship between adult learners' computer skills and learning in a web-based special education course, and 3) Is there a difference on student success based on prior experience with web-based courses? The study was done with adult special-education instructors taking web-based courses to enhance their learning about teaching special education. Assessment of learning styles of the 46 adult learners was performed using the Visual, Aural, Read/Write, and Kinesthetic (VARK) questionnaire by Fleming and

Mills (1992) which includes 13 multiple choice questions to evaluate preferred learning styles. The students were enrolled in four web-based courses in order to obtain the Autism Endorsement through the state of Florida. Prior to enrolling the students took a Self-Evaluation of Technology Use survey to evaluate their computer use, knowledge and skills.

The study compared the results of the VARK questionnaire and the Self-Evaluation questionnaire. The results demonstrated learning styles do have an impact on computer skills and learning. Students with a preferred learning style of read/write outperformed students with other styles, specifically in the area of quizzes. The median grade for this group was 55.133, giving a standard deviation of 6.151. Students with kinesthetic preferences typically scored lower, with a median grade of 42.250 with a standard deviation of 6.224. Those students with aural and visual preferences scored between these two extremes. It was also found the more students with more advanced computer skills outperformed those with less advanced skills.

The results demonstrate on-line instructors need to become familiar with different learning styles and become comfortable with teaching using a variety of methods such as videos, chat rooms, discussion boards and creating group assignments. Students with poor computer usage skills may need to take a computer tutorial to assist them prior to taking on-line courses, or "a user manual on explaining how to use various functions of the course website might be placed at the main page" (Rakap, 2011, p. 114).

Discussion

The use of technology to enhance learning has been demonstrated to be very useful. In the area of telehealth, the student must be comfortable first in the use of computers in

order to understand the principles behind telehealth. Therefore, it would be advisable to have students take a computer literacy exam required by most programs, both written and practical before being allowed to take nursing courses. Many students may be older and might find computer technology intimidating, so their attitudes about the use of computers may be one of fear. The exams would help identify inequities between older students and younger students entering the nursing field for the first time. A random sample of ten nursing programs revealed that all programs required a computer course to be in their respective nursing programs. How a student approaches the use of technology may mean the difference between being successful or not in a course.

Many college courses are given "on-line" or through a hybrid course, where students come in several times a semester for face-to-face instruction, with the rest of the course taught on-line. In regard to creating a learning module on a CD-ROM, the content can be uploaded into a computer file for the student to view and be tested on the content later. That is why the student must have at least an introduction to on-line courses.

If we desire our students to be versed in the areas of "best practice" it is essential we include information technology in their course work. Telehealth is a form of technology and is becoming more commonplace. Nurses working in the traditional hospital setting may not encounter telehealth, but if their clients are being discharged to home needing additional monitoring, the nurse could suggest to physicians this technology to improve client outcomes. The clients' needs require the nurse to at least understand what telehealth is and how it is applied.

Gaps in Literature

While there are numerous articles that discuss the impact of telehealth on different disease processes, there is a lack of literature that discusses how to incorporate telehealth instruction into a nursing school curriculum. A review of several databases such as CINAHL, Ovid, ERIC, Academic Search Complete, and Pro-med produced four articles discussing this subject.

Conclusion of findings

A thorough, systematic, scientific review of the effects of specific telehealth systems demonstrates a positive effect on treating the CHF client and can be used with other disease processes such as diabetes. Because telehealth is being used with a greater frequency in treating disease processes, teaching nurses about its concepts becomes important. Introducing the concept of telehealth early and throughout course curriculums would be beneficial to nursing students, utilizing various students' learning styles.

Chapter III

Methodology

Section I

Introduction

In order to have an effective impact on nurses using telehealth, it would be logical to introduce the subject and teach it across the curricula spectrum, within pre-licensure to post-graduate pedagogy/androgogy. Many school programs have required computer learning courses, but very few appear to address the use of telehealth. It would be advantageous to teach the beginning concepts of telehealth which does require a fundamental knowledge on how to use a computer within a nursing program curriculum.

Statement of Purpose

The purpose of the project was to introduce the concepts of telehealth to nursing students, to discuss and apply how to use telehealth, analyze situations where telehealth will be of value, and contrast the benefits versus the detriments of using telehealth through the use of a learning module (Appendix G). The audience was pre-licensure nursing students in a community college Associates Degree of Nursing program.

Research design

The project used a One-group Pre-test/Post-test design. The pre- and post-test was administered under the same conditions.

Using Kolbs Learning Theory, the course module was designed with ever-increasing complexity. The course objectives in the module followed this template:

Introduction to Telehealth

Learning objectives: At the end of this module the student will

1) Describe what telehealth means.
2) Explain what telehealth is used for and what information can be transmitted via telehealth device/system.
3) Describe the components make up a telehealth system.
4) Discuss the nurse's responsibility using telehealth.
5) Assess when telehealth would be an appropriate venue for a client.
6) Discuss the advantages and the disadvantages of using telehealth.
7) Differentiate between telehealth and telemedicine
8) Discuss the nurse's role in telehealth monitoring
9) Analyze the regulations and practice resources that govern the use of Telehealth.
10) Compare/contrast between three different telehealth systems.

Rationale

Telehealth permits closer monitoring of clients at home by calling them at selected intervals, soliciting information such as vital signs, weight, and oxygen saturation levels. Most systems are capable of reminding clients when it is time to take their medications, as well as of performing a short assessment (vital signs, oxygen saturation level, and weight) or a longer assessment which covers additional areas such as food intake, water intake, and sodium intake. When certain pre-set parameters are exceeded, healthcare workers are notified and appropriate interventions can be taken, possibly eliminating the need for the clients to receive a home health visit, go to their local Emergency Room or

being readmitted to the hospital for an exacerbation of the disease process. In order for the various systems to be used effectively, the qualified nurse needs to understand the basic concepts behind telehealth, when it is appropriate to use telehealth and its economic benefits; therefore having it as part of a course curriculum would be appropriate. With this knowledge the qualified nurse may also suggest its use to physicians. Telehealth is also used in clinics and hospitals to transmit data to healthcare providers; it is important for nurses to understand their role in assisting physicians and clients to provide the receiving healthcare provider accurate information.

Resources

The resources used for this project were:

1. The use of a computerized audio-visual system.
2. Paper to print pre and post tests
3. Printing costs of the capstone project
4. Cost of using a classroom for 3 hours
5. Cost of scan-tron cards

Telehealth Learning Module

After reviewing the desired objectives, a learning module was created using a combined power-point, audio-lecture format. The form the module took was directly related to the students who learn best by audio and visual means. Kinesthetic learning could not be adequately addressed in this module due to possible replication of the project and not having the same items available to the learner to touch and examine. However, students were encouraged to take notes during the lecture in order to satisfy this need.

The lecture and power-point was derived from the literature that discussed how telehealth was developed, its early uses, current uses, and nurses' responsibility in using telehealth. The module was designed without animation, excessive use of color or links to other sites so that the student could focus on the content of the module.

Once the lecture and power-point were created, a pre- and post-test was designed to assess the project participants' knowledge about telehealth before and after receiving instruction about the same via the learning module.

Section II

Target Participants

A convenience sample of thirty students attending a college in Southeast Texas was used for this capstone project. All participants were actively in Medical-Surgical nursing courses that are part of the curricula required to obtain a Registered Nurse's License.

The inclusion criteria for the project was all participants had to be 1) enrolled in a Medical-Surgical nursing course, 2) at least 18 years of age, 3) a person who had no audio or visual problems and who understood the English language. Exclusion criteria included 1) those persons who were not enrolled in a Medical-Surgical nursing course, 2) persons who had audio or visual problems and who did not understand the English language, and 3) any person who had worked with telehealth in the past, who had prior knowledge about telehealth, or who was a client that had used telehealth. Demographic information obtained from the participants was age, education level, gender, race, and previously obtained degrees.

Setting

The project took place in a college classroom in Southeast Texas. The classroom had sufficient seating to accommodate thirty persons comfortably and had sufficient lighting and ventilation. The classroom had working audio-visual equipment available. Noise level was controlled by closing the classroom door as needed. Once the pre-test (minus the answer key) (Appendix A) and instruction began no persons were allowed to enter or leave the classroom unless an emergency situation arose. Participants had been previously instructed that if they left the classroom during the pre-test, module, or post-test they would be disqualified. No participants left the classroom during these times, nor did any emergency situations occur.

Evaluation plan

Formative: Three meetings were conducted with Preceptors to discuss study design, course objectives and what was required to meet those objectives. Prior to meeting with Preceptors, the Primary Administrator had all of the needed paperwork requested by the Preceptor completed and ready for review. Also presented to the Preceptors was a time-line for completing the study. The Project Administrator considered and applied suggestions made by the Preceptor(s) to improve work on the study. The course work advisor reviewed paperwork presented by the Primary Administrator for scholarly presentation.

Summative: Prior to receiving information about telehealth via the instruction module, each participant completed a demographics questionnaire (Appendix B) and had administered to them a pre-test that consisted of 30 questions about telehealth. The test included knowledge based, analysis based, application based, and multiple-multiple type

questions. One week after presentation of the telehealth instruction module the post-test consisting of the same 30 questions as the pre-test was administered. The test questions addressed each stated objective in order to validate if the objectives were met. A multiple regression analysis between the difference of the pre- and post-test scores using demographic descriptive statistics was performed as well as a paired sample t-test. For the t-test, the independent variable was the course module with the dependent variable being the test scores. The null hypothesis was there would be no change in the pre- and post-test scores. For the multiple regression analysis, the participants' demographic information became the independent variables with the test scores being the dependent variables; the second hypothesis was the demographic variables would not have an influence on the outcomes of the pre and post-test.

Section III

Procedure Steps

1. Written permission was obtained from the college President in Southeast Texas.
2. Permission was obtained from the IRB committee at Gardner-Webb University to conduct the project after the proposal was approved. Being that college has no IRB committee, the rules from Gardner-Webb University's IRB was adopted for this project.
3. Written consents from participants were obtained (See Appendix C) to participate in project.
4. On the designated day agreed upon by the Nursing Faculty of the college, before the participants entered to take the pre-test, numbers were assigned to every other seat in the room. The participants were allowed to sit randomly in those seats. The participants wrote down the number on their chair on the demographic questionnaire and to the pre-

test. The test administrator wrote down the first initial and last name of the persons taking the pre-test along with their corresponding questionnaire/test number (See Appendix D).

5. The pre-test was administered (See Appendix A) to consenting participants. Attached to the pre-test was a demographic questionnaire (See Appendix B) to assist in detecting any test results variables based on this information. The pre-test and demographics questionnaire took no more than 50 minutes to administer.

6. As soon as pre-test had been administered, the telehealth instruction module was shown which took no more than forty-five minutes.

7. The pre-test, demographic data and names list were kept in a secure location (a locked file cabinet to which the Project Administrator does not have access) kept by the Nursing Department's Administrative Assistant at the college in Southeast Texas after the test was given.

8. One week after the telehealth module was presented, the names list was retrieved and the students were given the post-test, having the same number attached to it as the pre-test and demographic data. The post-test was administered under the same conditions as the pre-test and was kept in the same secure location as the pre-test and demographic data.

9. After the post-test was given, the participants were given a debriefing that informed them about what was being studied, what would be done with the results of the project and where they may find those results. The participants were offered an opportunity to ask questions during this time.

10. After the pre-and post-test were given using Scan-tron cards, the tests were scored using Scan-tron software and the tests were subjected to item analysis.

Chapter IV

Results

Formative: After the Preceptors for the Project Administrator reviewed the content of the test questions and the objectives for the learning module, minor changes were made before any presentation of the module was accomplished.

Summative: There were originally thirty participants in the capstone project. There were seven withdrawals; five withdrew from the project for personal reasons; two did not attend the final session of the project namely taking the post-test and were withdrawn. No reason was given for not attending. There was good demographic representation within the sample participants as follows: age ranges were from 18-60; there was seven males and 16 females; the majority had attended school between 14 and 16 years; racially there were two African Americans, eleven Caucasians, two Asians, two Native Americans, and six Hispanics; all participants had at least a high school diploma with eight having obtained an Associate's Degree. While no specific formula was used to recalculate the sample size to achieve statistical significance, 23 appeared to be an adequate size based on the results of the paired *t* test explained in the statistical analysis section.

Item analysis

The item analysis of the pre-test (Attachment E) which is delineated as Exam one, version A, and post-test (Attachment F) which is delineated as Exam two, version A, had 23 participants taking the tests, resulting in a medial score of 15.44 and a mean score of 16.04 on the pre-test and a median score of 19.13 and a mean score of 19.13 on the post test. The possible number of points on both tests equaled 30. The high score was 23 and

the low score was 11.00 on the pre-test, with the high score of 24 and a low score of 13 on the post test.

Point biserial is the correlation between the right and wrong answers on a given item and the total scores the participant receives when summing up the remaining scores. According to Varma, S. (no date) indicates point biserial is a special correlation between "a dichotomous variable (the multiple choice score which is right or wrong, (0 or 1)), and a continuous variable (the total score on the test) pg. 3. The variables range from -1.0 to 1.0; a large positive biserial indicates the participants that did well on the overall test are also getting the items right, and those with a low biserial are not. On the pre-test, the total point biserial was 0.28, and on the post-test, 0.34. Four of the questions on both tests contained a negative point biserial, indicating the question may need to be reviewed and possibly changed. Reasons for the overall low point biserial may be that some questions were confusing or the correct response was not readily evident to the persons who scored high. Seventeen questions on both tests contained responses that no one chose. Lastly, examining the responses on both tests, it was noted on the pre-test, 19 questions had responses that no student chose; on the post-test, 21 had responses that no student chose. To correct both of these issues, the distracters need to be written in such a manner so they may appear to be a correct response.

The reliability coefficient using the Kuder-Richardson formula 20 (KR 20) for both tests was < .90. The KR 20 is used to measure the reliability of a test as indicated by Tucker (2007); while both the pre- and the post-test were homogenous, the low KR 20 score can be explained by the level of difficulty of the test, the spread in the scores, or the length of the test. The low KR 20 scores may also be influenced by 1) utilizing

increasingly difficult question styles; for example, several questions are knowledge based, while others require application of previous nursing knowledge; and 2) the participants had no previous knowledge of the module content on the pre-test, providing an expected lower score. Each test contained 30 questions, and the participants were allowed 45 minutes to take each test, providing adequate time to read the questions and to select a multiple choice response. Another factor may be the participants' preparation between tests; the participants were allowed to review notes they took during the module presentation, but it was noted several of the participants did not take notes. This could have resulted in a low score on both the pre- and post-test, yet the scores on the post-test were generally higher than on the first. Comparing the two tests together, the highest scores are separated by one point, with the lowest scores being separated by two points.

The participation in the project was voluntary, with no positive or negative consequences attached to participation or non-participation. This may have lessened the importance of studying the material between the pre- and post-test. In turn, this may have resulted in the participants' having little more knowledge about the subject material when taking the post-test as they did when taking the pre-test.

Statistical analysis

A paired-sample 2 tailed t-test was performed with the results of t= (22) 4.556, $p<.05$, with $n=23$. The result show there was a significant difference between the pre and post-test. Table one provides the Means and standard deviations for the pre and post test scores, using SPSS analysis.

Table 1.

Paired Samples t test for the Telehealth pre and post test scores

	M	**SD**
Pre Telehealth Scores	16.04	2.63
Post Telehealth Scores	19.13	2.66

Pair 1 pretest - posttest	-4.556	22	.000

Using a histogram to illustrate the frequency of scores, the same results are shown in figures one and two.

Figure 1.

Frequency of pre test scores among project participants

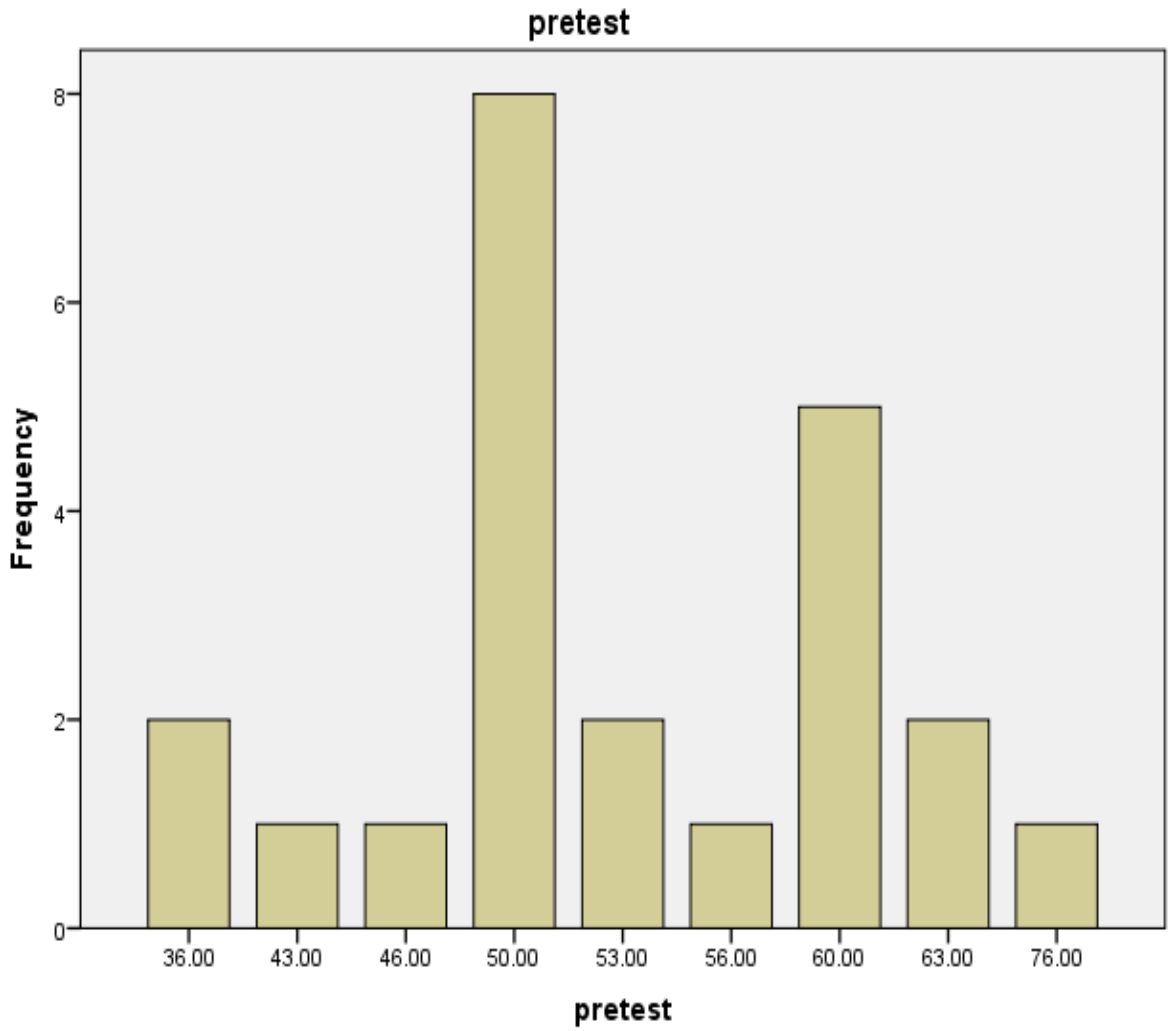
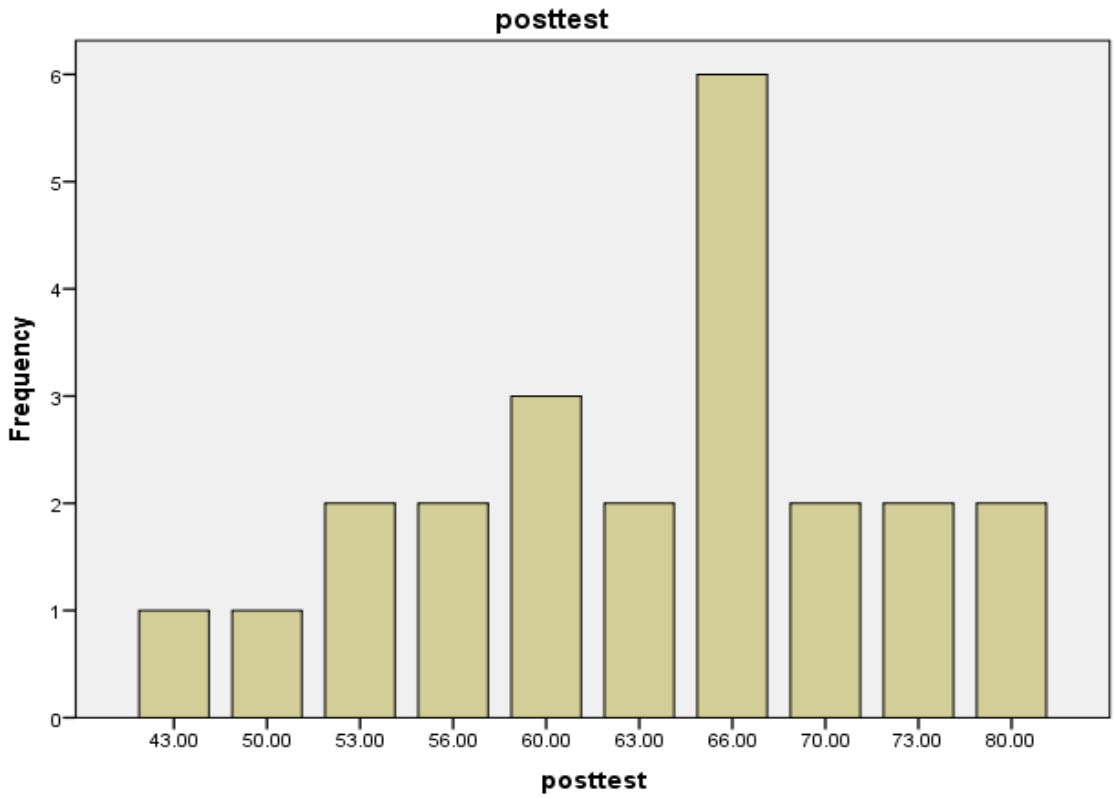


Figure 2.

Frequency of post test scores among project participants



The pre-test and post-test demonstrate a normal distribution pattern, but the peaks of the histograms occur at different places other than the mean of each graph.

The results do not support the null hypothesis that there would be no significant difference between the pre-and post-test with the learning module as the intervention. Therefore, the use of a learning module proved to be effective in teaching pre-licensure nursing students about telehealth as evidenced by the pre- and post-test scores.

Additionally, a multiple-regression analysis was performed, beginning with all of the independent variables compared with the dependent variables; no significant factors were noted, so there was no need to proceed any further. The null hypothesis was supported in this instance because of this finding.

Chapter V

Discussion

The purpose of this project was to introduce the concept of telehealth. The project was undertaken because there is a gap in literature that discusses teaching the concepts of telehealth to pre-licensure nursing students. The objectives of the module were created based on available, published knowledge about the concepts and types of telehealth. From there the module itself was created that discussed each of these objectives. In turn, the tests were created from the module.

In order to test the effectiveness of the module, namely imparting knowledge about telehealth, the use of a pre-test and post-test framework was employed. The pre-test was administered and the module was presented immediately thereafter. One week was allowed to pass and the participants were given the post-test. The rationale behind waiting one week was to investigate if the participants retained the information presented in the module, as opposed to immediate recall if the post-test had been administered right after the presentation of the learning module.

Measures were taken to decrease the number of factors that may have influenced the outcome of the pre- and post-test measures. First, any person with prior knowledge or experience with telehealth was not considered for the project. Second, all participants signed a consent that included a promise not to read or view any material about telehealth while they were participating in the project. Third, there was no discussion about telehealth from the Project Administrator before the pre-test, during the viewing of the module, after the viewing of the module, and not before the post-test. Fourth, the participants were not allowed to leave the project setting during any testing or viewing of

the module. This decreased the chance that any participant could use a hand held device that could browse websites about telehealth. All prudent, appropriate measures were taken to decrease any outside influences on test results.

The learning module received positive feedback from the students such as: "I appreciate learning about telehealth because it has given me the awareness that I need to possibly suggest it at my future workplace."; "I never knew about telehealth before, but now I'm excited to know patient's have a means of being monitored at home."; and finally, "This was very worth my learning; it sounds like a great thing to have!" Faculty also gave positive feedback as well; for example: "Telehealth sounds like an innovative way to provide client care; I'm pleased you have designed this learning module." Another faculty member commented, "The students have been very excited about this module; they have been talking about how to apply it in the clinical setting!"

Implications of findings

The learning module has proven itself effective in imparting basic knowledge about telehealth and the nurse's role in using it. It was suitable to Kolb's learning styles as identified in the theoretical framework. The student who best learns by abstract conceptualization or reflective observation or a combination of both (assimilation) would benefit the greatest by using this module's format.

To further investigate the effectiveness of the module, it would need to be presented to various nursing classes and have their knowledge tested in some form. If the module continues to demonstrate effectiveness, it can be published and be made available to various nursing schools. Telehealth is rapidly becoming a viable form of healthcare as demonstrated by Jerant, et al. (2003) in reducing health care cost; due to this and other

factors, teaching telehealth's basic principles should become part of a nursing program's curriculum. Because there is no module of its kind that has been published, no comparison could be drawn between this module and another.

Limitations

Because the module is part of a pilot project as are the measurements (the pre- and post-test), validity and reliability of the findings have not been firmly established. In order for this to happen, the module, along with the instruments, would have to be peer reviewed, adjustments made, and then the module along with the instruments would have to presented in multiple settings. The sample size although adequate, was small (n=23); a larger sample size may yield different results than found in this study. The item analysis demonstrated a need to rewrite several questions and responses to achieve an improved biserial score and an improved KR (20).

Delimitations

The project was limited to a small community college setting. This was done because this was a pilot project and because of the small amount of time available to complete the project. Also, limited funds were available to conduct this project, all being provided by the Project Administrator.

Recommendations

If time and funds permit, it is suggested to future researchers to increase the sample size if possible in order to detect any major differences between the pre- and post-test results. Also, even though this learning module was presented in the form of a power point/lecture, future researchers may desire to include more visual data, such as pictures of a telehealth unit or possibly a short video of someone using a telehealth system. It

may also be of interest to present this module to several groups of students in different types of pre-licensure programs.

Examine the pre and post-test questions and responses for clarity. Reword question distracters so they are very similar to the correct responses in order to achieve an even amount of responses.

Conclusion

As the need grows for frequent monitoring of clients with chronic conditions to possibly decrease hospital readmission rates, client and insurance costs and to improve client outcomes, more nurses will be needed that have a foundational knowledge of telehealth in that this form of monitoring has proven itself to be effective. Because of the increased use of telehealth, educating nurses about its use could be beneficial; consequently beginning this educating process in nursing school exposes the student to this form of monitoring. Once the student has graduated and is in practice they may recall this information about telehealth and could possibly apply it in nursing repertoire. Currently, very few colleges are teaching informatics courses that would ordinarily include telehealth as a sub-topic. This is why the learning module was created in order to address this gap in nursing education in some programs.

In order to test the quality and effectiveness of the module, pre- and post- tests were given. There was statistical evidence to support the concept that the module did increase the participants' knowledge of telehealth. By educating pre-licensure nursing students about telehealth, we increase the possibility they may suggest or competently use this form of health care in their practice, thus improving client outcomes in treating various disease processes.

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Appendix A

Telehealth

Pre-Test with Answer Key

Your number_____

Instuctions:

Read each question carefully and select the best answers. Mark the answers on the Scantron form. Only those answers on the Scantron answer sheet will be counted when grading. Answers left blank or with multiple marks will be counted as wrong. Carefully erase stray marks.

1. The definition that best describes telehealth is

   a. the delivery of medical care at a distance using electronic communication devices
   b. the use of a device that provides one-way communication between a client and medical personnel.
   c. a system by which the client can send data to his/her medical care givers.
   d. the use of a video camera to record a clients status.

   Correct answer A – according to the University of Texas Medical Branch Electronic Health Network, telehealth is the use of electronic information and telecommunications technologies to support long distance clinical health care." Retrieved from: http://www.utmb.edu/teletraining/th101getPayment.asp

2. The use of a health care provider at a hub site communicating with a presenter and a client at a remote site to render medical care using telecommunication equipment technologies best describes

   a. Telehealth

   b. Telecommunication

   c. Telemonitoring

   d. Telemedicine

Correct answer D – According to the University of Texas Medical Branch (UTMB) Tele-training Department, telemedicine is the is the actual use of electronic information to deliver health care, involving a Provider, Presenter, equipment, and a Patient. Retrieved from: http://www.utmb.edu/teletraining/th101getPayment.asp

3. A client has been re-admitted to the hospital for an exacerbation of Congestive Heart Failure once in the past two years. He lives 10 miles away from a hospital. The appropriate venue for follow-up treatment for the client would be

a. Telemedicine

b. Quarterly wellness check-ups

c. Telehealth

d. Dietary consults

Correct answer B – Because the client is not having frequent exacerbations, quarterly follow-up is the best choice and he does not live far away from a facility. The clients who have difficulty getting to facilities because of the client's location or those clients who have frequent exacerbations are best suited for telehealth monitoring. Anderson, Helms, Hanson, and DeVidler (1999) studied unplanned hospital readmissions from the home care perspective. They found readmissions to hospitals occurred on average 18 days after a previous hospitalization.

4. Which statement(s) by a client indicates she has a correct understanding regarding the use of telehealth?

a. "I will have to indicate on the machine if my blood sugar is high or low."

b. "I can rely on the computer to tell me what to do if my blood sugars get out of whack."

c. "I will have to go to the hospital if my blood sugars get bad because a nurse can't come to see me."

d. " Once the Dr.'s computer calls me, I can talk to him if I have questions."

A. A and B
B. A and D
C. C and D
D. B and C

Correct answer is B – Most in home telehealth devices require clients to "key in" results from blood glucose levels, vital signs, and weights. This is done so those monitoring the client can see these results and determine if she needs a follow-up phone call or even a home health visit by an RN, therefore C is incorrect. The telehealth monitoring system can only ask assessment questions, not give advice so B is incorrect. Some telehealth models use a camera as part of their system, so the client can talk to their caregiver if needed (Dansky, Vasey, and Boweles, (2008)). Many systems use a store-forward program that allows clients to input information and that can be retrieved later by a health care professional such as the Health Buddy® system uses. http://www.bosch-telehealth.com/content/language1/html/5656_ENU_XHTML.aspx

5. The nurse explains to a client the components of a telehealth system that will be installed into the clients home are a

a. data collection device.

b. webcam.

c. blood pressure cuff.

d. scale for weight.

e. microphone.

A. a, b, c, e

B. a, b, c, d

C. b, c, d,e

D. a, b,d, e

Correct answer(s) B; an additional microphone is not necessary since the computer has one built into its system. All the others are used to collect digital data about the client that may be necessary to arrive at treatment decisions. Dansky, Vasey, and Bowles (2008) show an illustration of a telehealth system.

6. Telehealth is typically used by home health agencies for _____clients with

a. diabetes.

b. liver transplant

c. cerebral vascular accident

d. amputation

Correct answer: A - The diabetic client benefits from telehealth as do other disease processes. See http://www.homecareinteractive.net/home_th.php

7. A client has had her fourth re-admission in the past six months to the hospital for exacerbations of Congestive Heart Failure. Telehealth can best benefit her because it can

a. remind her to weigh herself only and key the results in.

b. have her key in her weight, and vital signs only.

c. tell her what medications to take.

d. alert caregivers when her weight and vital signs are elevated.

Correct Answer D – the Electronic Medical Record (EMR) portion of the system can have pre-set parameters keyed in to alert caregivers if those parameters have been exceeded; this allows the caregiver to make a follow-up telephone call or make a home visit. See http://www.homecareinteractive.net/home_th.php

8. The physician needs the results of his client's ECG quickly. His client lives 100 miles away. Telehealth may be able to help in that it can

a. store the ECG and transmit the data "prn".

b. transmit the ECG in real time.

c. send heart rates but not ECGs

.

d. fax the ECG requested.

The correct answer is B – some telehealth systems can send information in "real-time" so the Dr. can see the ECG right away, according to UTMB in their telehealth training module (2010). Retrieved from: http://www.utmb.edu/teletraining/th101getPayment.asp . Some systems also use a "store and forward' program so the information can be retrieved if the MD needs it at a later time, but because he needs it right away, A is not correct. C is not correct in that telehealth systems can do both of these functions as indicated by UTMB in their telehealth training module (2010). Retrieved from: http://www.utmb.edu/teletraining/th101getPayment.asp. D is not correct because telehealth does not need the use of a fax the communication device uses a telephone or computer interface again as noted by UTMB's teletraining module 101.

9. A primary nurse's role in telehealth for nurses is to

a. decide what treatment is best for a client.
b. triage clients when they exceed set parameters.
c. order labs as needed.
d. Call each client daily on telehealth monitoring.

Correct answer B – McGonigle and Masrtrian (2009) in their book *Nursing Informatics and the Foundation of Knowledge,* (pg. 275) indicate the main responsibilities of the nurse is to triage clients when they exceed pre-set limits or parameters." A and C are incorrect in that they exceed the scope of practice for nurses; D is incorrect in that it defeats the purpose of telehealth monitoring.

10. A client indicates by a telehealth assessment he has fallen several times this week but has sustained no injuries. The nurse's best action would be to

a. arrange a home health visit for the next day for strength evaluation.
b. tell the client to go to his local Emergency Room
c. visit the client and ask his physician for a physical therapy referral.
d. tell the client to use the walker that was left for him on the first visit.

Correct answer C - McGonigle and Masrtrian (2009) in their book *Nursing Informatics and the Foundation of Knowledge,* (pg. 275) also state the nurse's duties is work with other clinicians to develop intervention strategies to assist the client. Asking for a physical therapy referral would help identify what interventions may be needed to help reduce his falls. A is not correct because the client may experience more falls by next week; B is not correct because the nurse hasn't any information that would justify a visit to the ER; D is not correct because the nurse doesn't have an assessment of his current condition to any kind of recommendations.

11. The set parameters stored in an Electronic Medical Record are used for

a. monitoring compliance issues.
b. Medicare and Medicaid reimbursements.
c. tracking medication effectiveness.
d. alerting health care providers.

A. A and C

B. B and C

C. B and D

D. A and D

The correct answer is D; Electronic Medical Records can have alerts set in them when vital sign, blood glucose, or weight parameters are exceeded so that a health care provider may call the client to do a further assessment – Many systems have this capability according to http://www.homecareinteractive.net/home_th.php . If a client is consistently not taking their vital signs or blood glucose levels, the nurse can get this information and further evaluate the client.

12. The use of telehealth communication can help reduce costs associated with hospitalization by

a. totally replacing physician office visits.
b. decreasing hosptalizations.
c. telling the client what medications to take.
d. increasing the number of home health visits.

Correct answer: B.

Close monitoring can identify when signs and symptoms of exacerbations of disease processes are present permitting early intervention, thereby decreasing the number of hospitalizations for exacerbations of certain disease processes.

13. Medication compliance is an issue for many people. Telehealth can help with this by

a. calling clients daily to remind them to take their medications.
b. sending clients a print out of all of their medication times.
c. notifying a home health nurse to call clients to take their medications
d. calling the physician when clients don't take their medications.

Correct answer A – most telehealth EMRs can be set to call the client when it is time to take their medications. http://www.homecareinteractive.net/home_th.php All other choices are incorrect in that most telehealth systems aren't programmed to do this.

14. The disadvantages of a home based telehealth system is

a. lack of personal visits, lack of freedom, risk of "hacking" personal information.
b. cost, lengthy questionnaires, time involvement.
c. losing costly equipment, risk of damaging equipment, technology problems.
d. complicated instructions, unclear communication, inconsistent calls.

Correct answer A - Part of the use of telehealth involves decreasing visits by nurses or visits to the physician's office so the "human touch" factor can be lost; using most telehealth systems require clients to be at designated places (usually the home) to input their assessment information at specific dates and times; because telehealth requires the transmission of data via computer or telephone, the risk of unauthorized access to health information is minimal, but is still possible. Loss of the human touch is discussed in Legal Considerations for Nurses Practicing in a Telehealth Setting" in *The Online Journal of Issues in Nursing.* Cost is not usually an issue because Medicare and Medicaid and insurers pick up the cost of telehealth as indicated by the website http://www.homecareinteractive.net/home_th.php. Answer C may be a disadvantage, but it is a rare occurance with most systems; answer D is not correct in that the client is given instructions and a demonstration of how to the system on their first visit. Communication issues aren't a problem as a general rule; most EMR's are programmed to call clients at pre-set intervals so there should not be any inconsistencies.

15. A nurse is working a 7p to 7a shift in a National call center in Texas and receives a call from a client in North Carolina (NC); the nurse's best course of action would be

a. go ahead and take the call.
b. transfer her call to someone in NC
c. find out if NC has a compact agreement with TX
d. ask the client to call her physician

Correct Answer C – While there is no definitive answer to practicing nursing across state lines, Carolyn Hutchinson in her article, "Legal Considerations for Nurses Practicing in a Telehealth Setting" in *The Online Journal of Issues in Nursing* indicates fifteen states have adopted compact licensure agreements that recognizes licensure from each member state without having the individual take another member state's NCLEX exam. If NC and TX are compact states, then the nurse can take the call from the client.

16. Most states now require nurses that engage in telehealth care to be certified in telehealth practice.

a. False
b. True

Correct answer A – States are not requiring nurses to be certified in telehealth care. The American Academy of Ambulatory Care Nursing (AAACN) and the American Nurses Association (ANA) have published numerous standards of practice as it relates to telehealth nursing according to Legal Considerations for Nurses Practicing in a Telehealth Setting" in *The Online Journal of Issues in Nursing.*

17. Equipment for an Immediate Voice Response system

a. is easy to use
b. is easy to install.
c. rental costs is minimal.
d. is not required.

Correct answer – D According the website www.homecareiteractive.net/home_th.ph there is no equipment to be installed, but relies on the client's telephone as a source of communication.

18. A common method of collecting data for many telehealth systems is

a. Immediate Voice Response (IVR) system
b. Video camera link
c. Store-and Forward system
d. Computer keyboard

C – is the correct response. LaFramboise, L., Todero, C., Zimmerman, L., & Agrawal,S. (2003) indicates "store and forward" is a function that allows clients to input data during the day and the system calls a toll free number at night and downloads the information.

19. Telehealth systems in clinics may have the advantage of _____that is lacking in many home-based systems.

a. E-mail to professional's office

b. having health care professionals present

c. a fax linked to the professional's office

d. instant computer library access

Correct answer B – clinics and physician offices that use telehealth may have a video link between themselves and the care consultant; the device must be hand held for examinations and this may not be practical for home health needs. Because there are professionals present, any abnormal findings can be addressed immediately. http://www.amdtelemedicine.com/telemedicine-equipment/dermatology/amd-2500-general-exam-camera.html

20. An advantage of an Interactive Voice Response (IVR) system is that it_____.

a. works in 'real time".

b. has very little delay for data transmission.

c. can carry on "normal" conversation.

d. calls health care providers when client hangs up.

Correct response A – the IVR according to the website http://www.homecareinteractive.net/home_th.php allows health care personnel immediate access to a client's EMR as soon as the client keys in their values. Based on the client's keyed values, the system can ask the client for responses that again can be keyed in over the telephone. While the client is on the phone a health care provider can be connected immediately with the client.

21. A nurse receives notification via cell phone that a home health client has a BP of 190/90 and a pulse of 94. The nurse's best response would be to

a. access the client's EMR.

b. notify the physician immediately.

c. call the client to obtain more information.

d. do nothing and see what the next reading is.

Correct response C – Telehealth systems can send information to nurses in order to determine if a home visit is needed. Calling the client is therefore the best response. http://www.homecareinteractive.net/home_th.ph

22. A client fails to properly input information into a telehealth system several days in a row. The nurse's responsibility would be to

a. call the client to perform an assessment.

b. make a home visit to get the data.

c. review with the client how to use the system.

d. trouble shoot the equipment.

The correct response is C – the nurse's responsibility is to insure the client knows how to use the equipment when it is initially installed. McGonigle and Masrtrian (2009) in their book *Nursing Informatics and the Foundation of Knowledge,*implies this in Chapter 19 pg. 298.

23. The EMR system alerts a home health nurse of a client issue; the nurse calls the client and quickly resolves the situation. The nurse's best, next, action is to

a. notify the supervisor on call of the issue.

b. place a follow-up visit to the client the next day.

c. do nothing since a visit did not occur.

d. document the issue and what was done.

Correct response D – McGonigle and Masrtrian (2009) in *Nursing Informatics and the Foundation of Knowledge,* in Chapter 19 pg. 303 indicates nurses must still be vigilant about documenting visits both on-site and off; any time contact is made between the nurse and the client a "visit" has occurred.

24. The four processes where nurse's use telehealth are knowledge

a. acquisition, processing, generation, and dissemination.

b. processing, sharing, dissemination, and publishing.

c. generation, processing, acquisition, and publishing.

d. dissemination, generation, processing and sharing.

Correct response A - McGonigle and Masrtrian (2009) in *Nursing Informatics and the Foundation of Knowledge,* in Chapter 19 pgs 306-307 state the four processes are knowledge acquisition, knowledge processing, knowledge generation, and knowledge dissemination.

25. A nurse is preparing to make a schedule home visit for a Congestive Heart Failure client who states her legs are swelling. To find the client's weight and vital sign trends the nurse would need to access the client's EMR. The nurse would access the EMR by

a) cell phone or computer

b) Fax or computer

c) Computer or telephone

d) Fax or cell phone

Correct answer A -

The client's EMR can be accessed by most systems through a computer terminal or laptop. http://www.homecareinteractive.net/home_th.ph A fax is of no use because the information still would have to be gathered and sent to the nurse if it were possible; A telephone usually does not have a screen to display information so it would not be helpful.

26. A nurse is completing client documentation as part of the EMR on a laptop in her home. Her daughter gets on the system and begins reading about this individual. The nurse should have_____to prevent this from happening.

a. logged-off her computer when she left it

b. put the computer on screen saver mode

c. told her daughter not to use the system

d. closed the computer lid

A - According to the Health Information Portability and Accountability Act (HIPPA) it is the authorized individual's responsibility to secure client records, including logging off computer systems when not in use to prevent unauthorized access.

27. A nurse encounters a telehealth device he isn't familiar with; his best action would be to

a. call his immediate supervisor.

b. ask the client how to use it.

c. find the operation information.

d. call the manufacturer.

Correct answer C-

The Canadian Nurses' Associations indicate in their position statement regarding the role of the nurse in telehealth that it is the nurse's responsibility to develop "competencies relevant with the technologies being used" which would include taking the opportunities to learn about new pieces of equipment they may encounter. http://www.cna-nurses.ca/cna/documents/pdf/publications/ps89_telehealth_e.pdf

28. A nurse cannot hear a client's breath sounds via video transmission based telehealth system. The nurse's responsibility would be to

a. arrange to make an in-home visit.

b. call the manufacturer of the equipment.

c. have the client make an appointment with his physician.

d. document the breath sounds could not be heard.

Correct response – A - the nurse's primary responsibility is to accurately assess the client's condition; this would necessitate making an in-home visit to check the client's breath sounds because the electronic system is not working correctly.

29. A nurse is reviewing data on an EMR and notices a client's blood pressure is exactly the same each time the system has requested the client to "key in" the blood pressure reading. The nurse's best action is

a. call the client and verify the blood pressure readings.

b. make a home visit to insure the client or caregiver understands how to key in the information.

c. explain to the client or caregiver the importance of recording blood pressures accurately.

d. make a home visit and verify the client or caregiver knows how to check blood pressure.

Correct response – D Part of the nurse's responsibility in telehealth is that first the client or caregiver knows how to carry out the operations they have been asked to do; in this case it is to take the blood pressure. The best method of doing this is to make a home visit and have the client or caregiver return demonstrate the proper method of taking a blood pressure reading and that the client or caregiver has obtained the correct reading.

30. During a video based telehealth visit a nurse was overheard telling someone the client was "SOB"; later the nurse was sued for slander. The lawsuit could have been prevented by

a. refraining from using acronyms during a client visit.

b. never talking to another party while a visit is in progress.

c. clarifying any terms used during a visit.

d. never calling the client names in front of anyone.

Correct response – C During any visit with a client it is the nurse's responsibility to clarify any terms the client may not know, including acronyms. A physician was successfully sued for torturous slander for making insulting statements about a client to two medical assistants in *Roush v. Southern Arizona Ear, Nose & Throat* (Ariz. App. Div.2 . The term "SOB" may be misconstrued as an insulting remark by a client who does not understand the acronym's meaning leading to a potential lawsuit as illustrated in this lawsuit.

Appendix B

Demographics questionnaire

The purpose of this form is for statistical purposes only and will not be shared under any circumstances with anyone not associated with this project. No names or other identifying information will be published without the permission of the participants in this project.

Please circle the letter that applies to you:

1. My age is:

   a. 18-28

   b. 29-39

   c. 40-59

   d. 50-59

   e. 60 or >

2. My gender is:

   a. Male

   b. Female

3. The numbers of years I have attended school are:

   a. </= 11.

   b. 12

   c. 14

   d. 16

   e. 18

4. My race is:
    a. African American
    b. Caucasian
    c. Asian
    d. Native American
    e. Mid-eastern
    f. Pacific Islander

5. My highest education degree obtained was:
    a. High School Diploma
    b. General Education Degree (GED)
    c. Associate's Degree
    d. Bachelor's Degree
    e. Master's Degree
    f. PhD or other Doctoral Degree

Appendix C

Informed Consent to Participate in a Capstone Project

Principle Administrator: Dwayne F. More, MSN, RN
Gardner-Webb University
409-392-6384

Title of Capstone Project: Introducing Telehealth to Nursing Students in a Pre-Licensure Program

You are invited to take part in a capstone project to evaluate a Telehealth learning module's effectiveness. Your participation would require you to take a multiple choice pre-test of thirty questions in which you will be given forty-five minutes to answer and then watch a forty-five minute video discussing telehealth which is essentially providing health care from a distance over a form of telecommunication media, and in one week after the video take the same test given consisting of thirty questions, again taking forty-five minutes to complete. The testing and video will be conducted and shown in a convenient classroom for all concerned. Participation in this project is strictly voluntary and will not affect any course grade. This project is not part of any course. Non-participation will not affect any course grade. Participation in this project will not be counted as extra points for any course, nor will refusal to participate result in any deduction of points from any course a student may be enrolled in. All persons who choose or who do not choose to participate in this project will be treated equally and fairly by all parties connected to this study. This research project has been reviewed by the Committee for the Protection of Human Subjects (CPHS) of Gardner-Webb University in Boiling Springs, North Carolina.

Description of the Research

Purpose. The purpose of this research is to evaluate the effectiveness of a new learning module for pre-licensure nursing students about Telehealth.

Procedure. If you agree to take part in this project you would be asked to:

Stay after class for two hours on the day of the pre-test and video, and for forty-five minutes on another day of the following week to take the post-test. You will need to be in the assigned classroom at the designated time on each of these days.

Stay in the classroom during the entire time of the pre-test and video and for the post test. You also agree that leaving the classroom during any of the designated times will disqualify you from the project.

Complete a demographic questionnaire for the purpose of contrasting responses from the pre and post testing based on demographic variables.

Refrain from investigating or viewing any information about telehealth during the time you are participating in this project.

Time Commitment. You will be asked to be in a designated classroom for two hours on one day, and for forty-five minutes on another day, all within a consecutive two week period.

Potential Risks. There are no risks to any participants to this project in that it requires no special effort or exercise that one would not normally do in a classroom setting.

Potential Benefits. The benefits of this project will be to expand your knowledge of a form of health care and be able to recognize when it may be useful for your future patients.

Alternatives. There are no alternatives to this project other than non-participation

Study Withdrawal. You also may withdraw from this project at any time for any reason.

Cost, Reimbursement, or Compensation. There will be no cost for you related to this project. You will not be compensated for taking part in this project.

Confidentiality. You will not be personally identified in any reports or publications that may result from this project. Any personal information about you that is gathered during this project will remain confidential. A unique number will be used to identify you in the project and only the administrator will know your name.

Questions. The principal administrator will be glad to answer any questions at any time. If you have any questions, you may contact the principle administrator, Dwayne More at (409)-392-6384.

Signatures. Sign below only if you understand the information given to you about the research and choose to take part. Make sure that any questions have been answered and that you understand the project. If you have questions or concerns about your rights as a research subject, call the Committee for Protection of Human Subjects at (713) 500-3985. If you decide to take part in this research project, a copy of the signed consent form will be given to you.

Signature_____ Date_____
Time_____

Print Name_____

Signature of Person obtaining
consent/assent/permission_____

Print Name of Person obtaining
consent/assent/permission_____

CPHS Statement:

This project has been reviewed by the Committee for the Protection of Human Subjects of Gardner-Webb University at Boiling Springs, North Carolina. For any questions about research subject's rights, or to report a research-related injury, call the CPHS at (713) 500-398

Appendix D

The purpose of this form is for accuracy of numbers transcribed on tests and demographics questionnaire corresponding with the individual participating in the project. The use of this information is for statistical purposes only and will not be shared. No names or other identifying information will be published without the permission of the participants in this project.

Number on Chair	**First Initial and Last Name**
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Standard Item Analysis Report On Exam1 Version A

Course #: 1000
Instructor: Dwayne More
Course Title: Intro to Teleheatlh
Description: brief overview on telehealth
Day/Time:
Term/Year:

Total Possible Points: 30.00
Median Score: 15.44
Highest Score: 23.00
Standard Deviation: 2.63
Mean Score: 16.04
Lowest Score: 11.00
Student in this group: 23
Reliability Coefficient (KR20): 0.28
Student Records Based On: All Students

No.	Correct Group Responses			Point	Correct	Response Frequencies - * indicates correct answer										Non
	Total	Upper 27%	Lower 27%	Biserial	Answer	A	B	C	D	E						Distractor
1	91.30%	100.00%	83.33%	0.24	A	*21	0	2	0	0						BDE
2	26.09%	66.67%	0.00%	0.63	D	9	7	0	*6	0						CE
3	43.48%	50.00%	50.00%	0.05	B	2	*10	11	0	0						DE
4	30.43%	33.33%	50.00%	0.22	B	3	*7	7	5	0						E
5	4.35%	0.00%	0.00%	0.20	B	9	*1	8	4	0						E
6	65.22%	83.33%	50.00%	0.26	A	*15	1	7	0	0						DE
7	100.00%	100.00%	100.00%	0.00	D	0	0	0	*23	0						ABCE
8	65.22%	83.33%	50.00%	0.32	B	4	*15	0	4	0						CE
9	60.87%	66.67%	16.67%	0.35	B	1	*14	0	8	0						CE
10	13.04%	33.33%	0.00%	0.53	C	16	2	*3	2	0						E
11	34.78%	50.00%	33.33%	0.16	D	10	1	4	*8	0						E
12	91.30%	100.00%	100.00%	0.12	B	2	*21	0	0	0						CDE
13	65.22%	50.00%	83.33%	-0.13	A	*15	8	0	0	0						CDE
14	56.52%	83.33%	50.00%	0.25	A	*13	1	5	4	0						E
15	17.39%	33.33%	0.00%	0.34	C	15	4	*4	0	0						DE
16	43.48%	66.67%	33.33%	0.35	A	*10	13	0	0	0						CDE
17	8.70%	0.00%	0.00%	-0.12	D	18	1	2	*2	0						E
18	39.13%	50.00%	16.67%	0.22	C	8	3	*9	3	0						E
19	82.61%	66.67%	83.33%	-0.17	B	1	*19	0	3	0						CE
20	47.83%	66.67%	16.67%	0.25	A	*11	2	9	1	0						E
21	52.17%	83.33%	33.33%	0.25	C	5	6	*12	0	0						DE
22	56.52%	50.00%	66.67%	0.05	C	6	4	*13	0	0						DE
23	100.00%	100.00%	100.00%	0.00	D	0	0	0	*23	0						ABCE
24	60.87%	66.67%	50.00%	0.22	A	*14	3	3	3	0						E
25	43.48%	66.67%	33.33%	0.29	A	*10	3	10	0	0						DE
26	100.00%	100.00%	100.00%	0.00	A	*23	0	0	0	0						BCDE
27	73.91%	100.00%	66.67%	0.20	C	6	0	*17	0	0						BDE
28	65.22%	83.33%	33.33%	0.50	A	*15	0	2	6	0						BE
29	47.83%	83.33%	0.00%	0.58	D	6	2	4	*11	0						E
30	17.39%	0.00%	16.67%	-0.05	C	14	5	*4	0	0						DE

Standard Item Analysis Report On Exam2 Version A

Course #: 1000
Course Title: Intro to Teleheatlh
Day/Time:

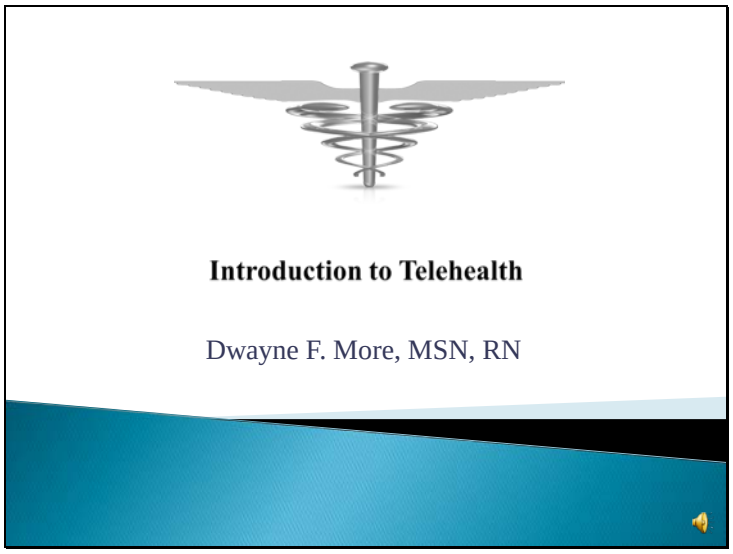
Instructor: Dwayne More
Description: brief overview on telehealth
Term/Year:

Total Possible Points:	30.00	Median Score:	19.58	Highest Score:	24.00
Standard Deviation:	2.66	Mean Score:	19.13	Lowest Score:	13.00
Student in this group:	23	Reliability Coefficient (KR20):	0.34		
Student Records Based On:	All Students				

No.	Correct Group Responses			Point Biserial	Correct Answer	Response Frequencies - * indicates correct answer										Non Distractor
	Total	Upper 27%	Lower 27%			A	B	C	D	E						
1	65.22%	66.67%	66.67%	0.04	A	*15	0	8	0	0						BDE
2	47.83%	83.33%	33.33%	0.35	D	8	3	1	*11	0						E
3	26.09%	33.33%	16.67%	0.16	B	1	*6	16	0	0						DE
4	43.48%	83.33%	16.67%	0.42	B	6	*10	4	3	0						E
5	52.17%	66.67%	50.00%	0.21	B	3	*12	4	4	0						E
6	73.91%	83.33%	50.00%	0.29	A	*17	0	6	0	0						BDE
7	95.65%	100.00%	83.33%	0.33	D	0	0	1	*22	0						ABE
8	82.61%	83.33%	66.67%	0.15	B	4	*19	0	0	0						CDE
9	78.26%	100.00%	16.67%	0.58	B	1	*18	0	4	0						CE
10	52.17%	66.67%	16.67%	0.37	C	9	2	*12	0	0						DE
11	60.87%	50.00%	66.67%	-0.13	D	6	1	2	*14	0						E
12	100.00%	100.00%	100.00%	0.00	B	0	*23	0	0	0						ACDE
13	86.96%	83.33%	100.00%	-0.22	A	*20	2	0	1	0						CE
14	78.26%	83.33%	50.00%	0.42	A	*18	1	4	0	0						DE
15	39.13%	50.00%	16.67%	0.26	C	13	1	*9	0	0						DE
16	43.48%	66.67%	50.00%	0.25	A	*10	13	0	0	0						CDE
17	4.35%	16.67%	0.00%	0.23	D	17	2	3	*1	0						E
18	30.43%	50.00%	16.67%	0.11	C	13	1	*7	2	0						E
19	91.30%	100.00%	83.33%	0.31	B	0	*21	0	2	0						ACE
20	73.91%	83.33%	50.00%	0.25	A	*17	2	4	0	0						DE
21	73.91%	83.33%	66.67%	0.22	C	3	3	*17	0	0						DE
22	78.26%	66.67%	100.00%	-0.09	C	1	4	*18	0	0						DE
23	100.00%	100.00%	100.00%	0.00	D	0	0	0	*23	0						ABCE
24	95.65%	100.00%	100.00%	-0.07	A	*22	0	0	1	0						BCE
25	30.43%	50.00%	16.67%	0.32	A	*7	6	10	0	0						DE
26	95.65%	100.00%	83.33%	1.48	A	*22	0	0	0	0						BCDE
27	78.26%	100.00%	50.00%	0.46	C	5	0	*18	0	0						BDE
28	69.57%	100.00%	16.67%	0.64	A	*16	1	2	4	0						E
29	30.43%	33.33%	33.33%	0.07	D	7	7	2	*7	0						E
30	34.78%	50.00%	50.00%	0.10	C	12	3	*8	0	0						DE

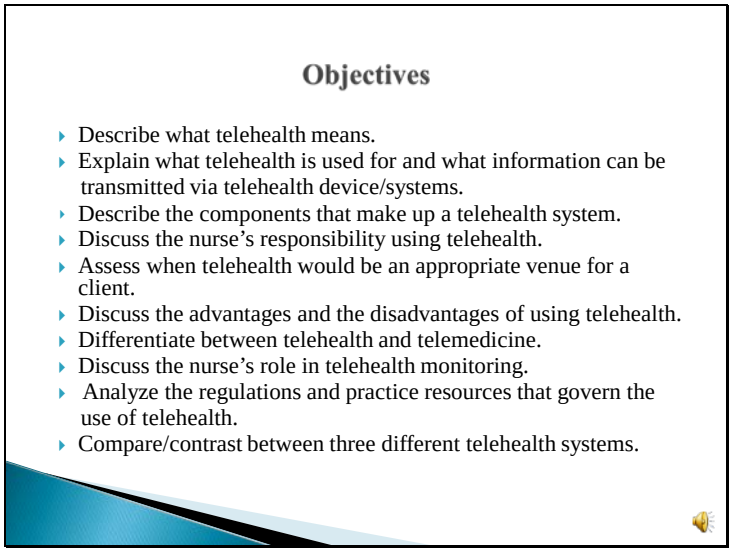
Appendix G

Slide 1

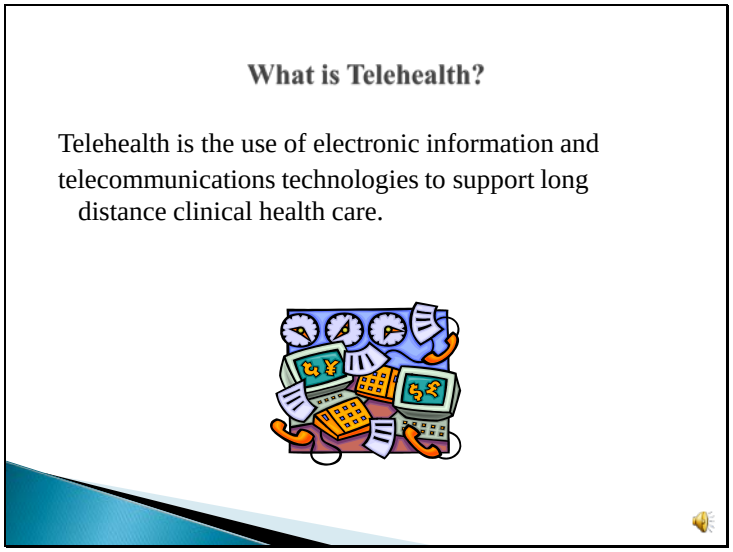


In the United States as of 2006 five million clients were treated annually for Congestive Heart Failure (CHF). Sixteen to twenty-five percent of persons discharged from the hospital were readmitted within 2 weeks to 6 months after discharge. The cost of treating CHF as of 2006 was $29.6 billion to insurance companies, and $40 billion to Medicare. Reducing the number of readmissions becomes important to not only decrease costs but to improve patient outcomes. One such method that has demonstrated effectiveness at reducing hospitalizations is Telehealth.

Slide 2

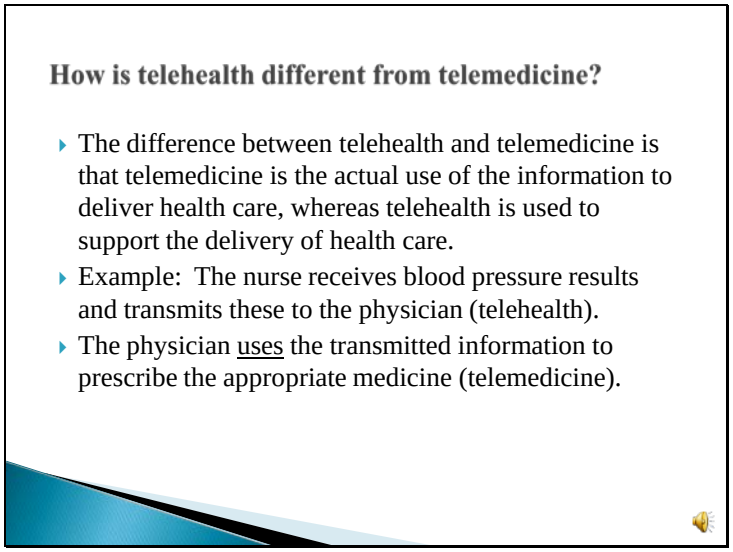

Objectives
Describe what telehealth means.
Explain what telehealth is used for and what information can be transmitted via telehealth device/systems.
Describe the components that make up a telehealth system.
Discuss the nurse's responsibility using telehealth.
Assess when telehealth would be an appropriate venue for a client.
Discuss the advantages and the disadvantages of using telehealth.
Differentiate between telehealth and telemedicine.
Discuss the nurse's role in telehealth monitoring.
Analyze the regulations and practice resources that govern the use of telehealth.
Compare/contrast between three different telehealth systems.

Slide 3



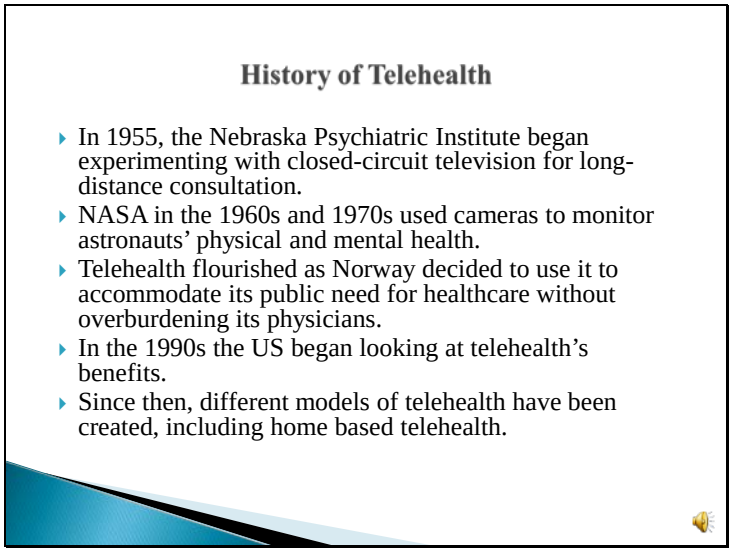
Before the invention of telehealth/telemedicine, people in remote areas of the country had a difficult time accessing physicians to meet their health care needs, or if a client was in one place and a specialist was in another, travel to see the specialist was often next to impossible. When clients were discharged from hospitals, monitoring them for signs of exacerbations of their illnesses sometimes proved difficult. With the invention of telehealth, monitoring of clients became easier. Telehealth is the use of electronic information and telecommunications technologies to support long distance clinical health care.

Slide 4



In literature readers will often see the term telemedicine and may confuse it with telehealth. It is important to distinguish between the two, although they are for the same purpose and that is providing client care.

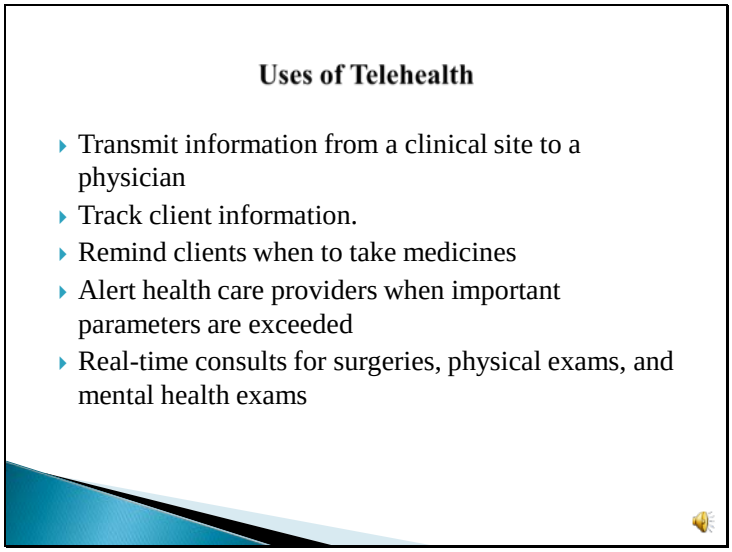
Slide 5



In 1955, the Nebraska Psychiatric Institute began using closed circuit television to provide routine distance education and teleconsultation between itself and a remote state mental hospital. In 1965, cardiac surgeon Michael DeBakey performed open-heart surgery and transmitted the procedure live to a hospital in Genieva, allowing him to describe the process and to answer questions.
NASA began using telehealth in the 1960s and 70's to monitor astronauts' physical and mental health as well with much success.
The country of Norway discovered using telehealth was highly beneficial because many parts of the country are remote and access to care providers is limited. Physicians did not want to leave the larger cities therefore the use of telehealth for routine examinations and treatment became highly favored within the country. In the United States, a renewed interest occurred in telehealth in the 1990s because of escalating costs, the need for greater access for all populations and a need for improved quality of care. The advantages of telehealth were emphasized when improvements were noted in rural care and prison care. There has been rapid growth in the use of prison teleheatlh because of the results achieved in Texas in reducing security risks, and transportation costs of prisoners from a facility to a hospital all the while meeting the prisoners' guaranteed right to access quality health care.

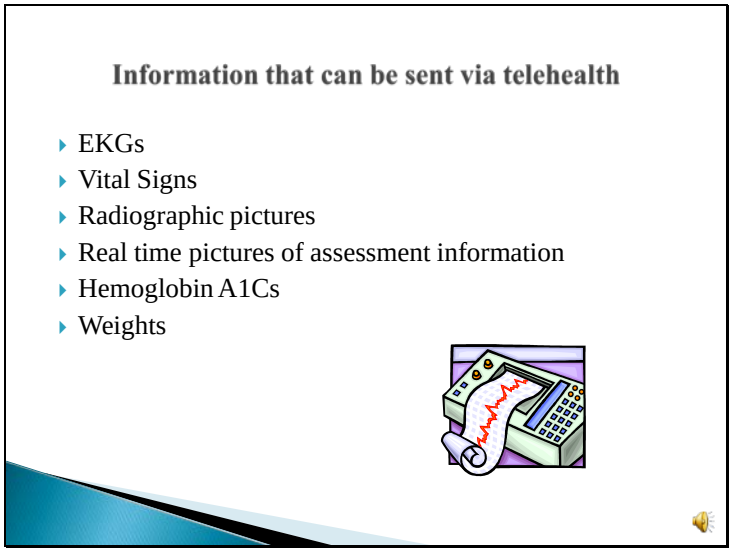
As computer technology has grown, so has the application of telehealth, including home-based telehealth systems.

Slide 6



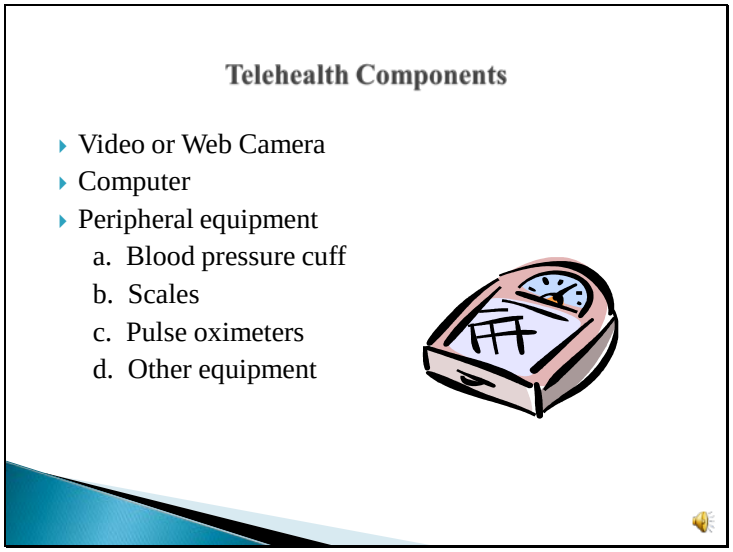
One of the key elements of telehealth is the transmission of data from a clinical site to a physician. As mentioned earlier, clients that live in remote areas without healthcare providers benefit from the use of telehealth, as do those clients who are incarcerated.
Information that is transmitted via some form of telehealth can be stored in the clients record, allowing healthcare providers to obtain a history of the client's assessment data, including labs, vital signs, physical assessment information, and MD orders.
Certain telehealth systems can call clients at various times of the day and through the use of a telemonitor or telephone can remind the clients to take medications.
When clients are placed on telehealth, an electronic record is created for them at the telehealth communications hub which may be a physician's office or a home health care agency.
Parameters for vital signs, blood glucose readings, and other data can be programmed into the health record. When the client enters data that exceeds those parameters, automatic alerts are sent to the health care providers via telephone, pager, fax, or in some cases an I-pad with the client's name, telephone number, and the parameter exceeded. Some applications will allow the healthcare provider access to the client's health care record allowing the healthcare provider to see a history on the client.
During exams or surgeries, it is now possible to consult a specialist to obtain added information to aid in treating the client.

Slide 7



With today's computer applications, increasing amounts of data can be sent using a teleheath system. EKGs, vital signs, radiographic pictures, real time pictures using a hand held camera device, lab data, and weights all can be sent to a provider and stored into the client's electronic health record or can be viewed in real-time.

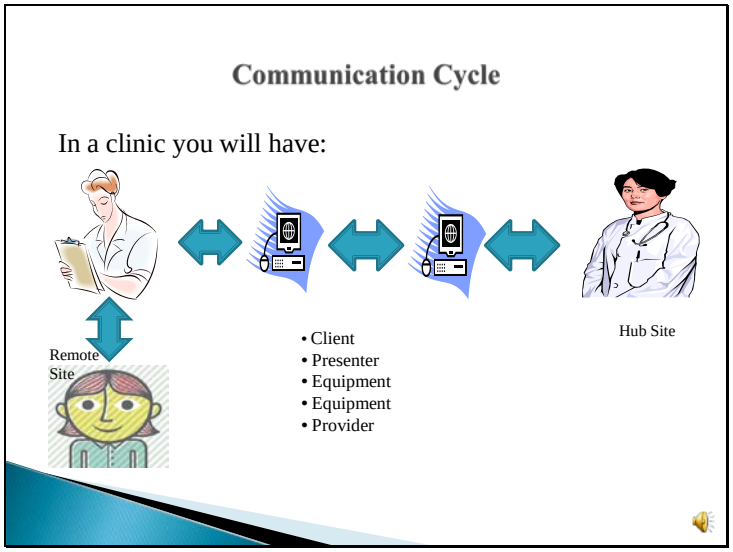
Slide 8



In many cases where telehealth is used, especially in the home, a communication station which is essentially a mini-computer is installed. Peripheral items can be added such as web cameras, blood pressure cuffs, scales, stethoscopes and other equipment that plug into the communication station. Many of the communication devices have a video camera already installed. The client is able to take their own readings and that information is automatically sent to the health care provider. In other systems, there are no peripheral devices that can be connected to the communication device and the client must purchase the necessary equipment, take their own readings, and then key in the results on a computer type screen or via a telephone.

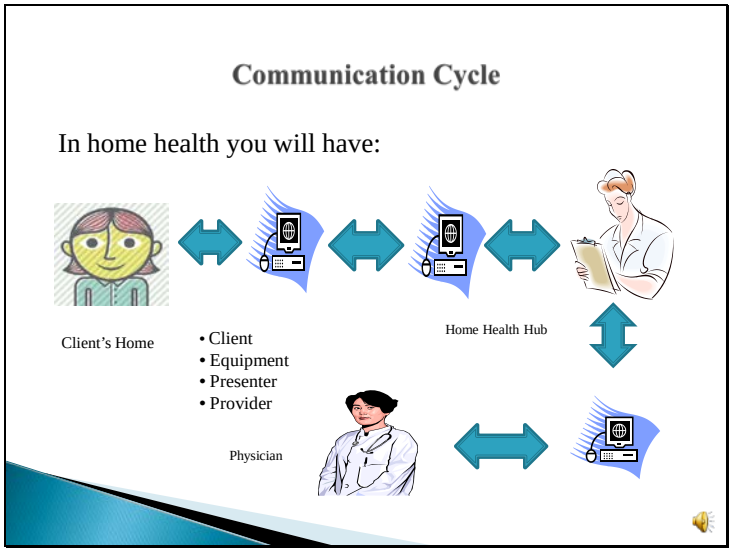
In a clinic system, the same process can be used, but more applications can be applied such as transmission of EKGs and radiographic images.

Slide 9



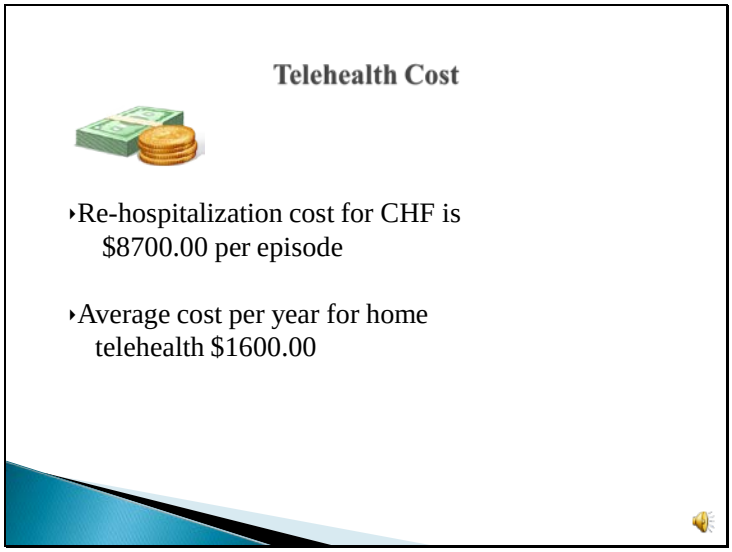
How data is obtained and transmitted is different between a clinic site and a home health site. In the clinic, the client and a health care provider/presenter such as a nurse communicate with each other. The healthcare provider transmits the information via computer to another computer which is being monitored by another healthcare provider at a hub location. The provider at the hub site may write orders which are communicated back to the provider at the remote site who will then communicate those orders to the client.

Slide 10



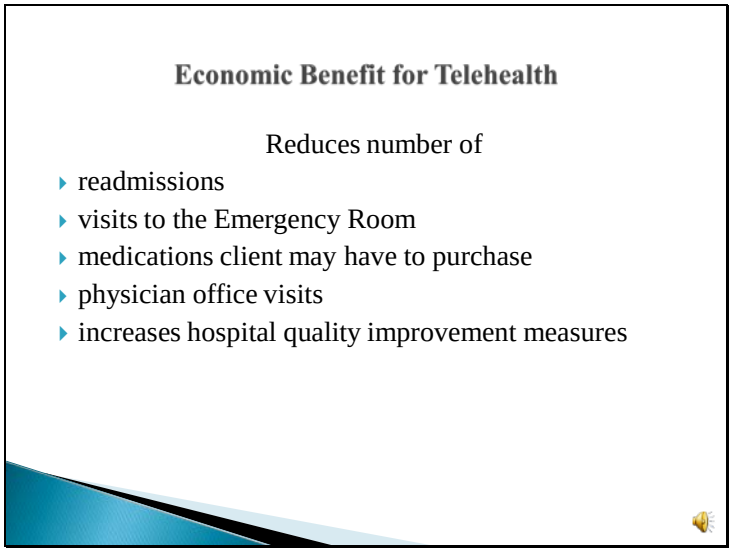
When the client is using a home-based system, the communication starts with the patient who enters data into a communication device in the home, which in turn is received by computer system in a home health hub. A health care provider transmits data that exceeds set parameters via a communications device such as a computer to a physician who will in turn decide what action to take, and communicate that information back to the health care provider who will then communicate back to the client.

Slide 11



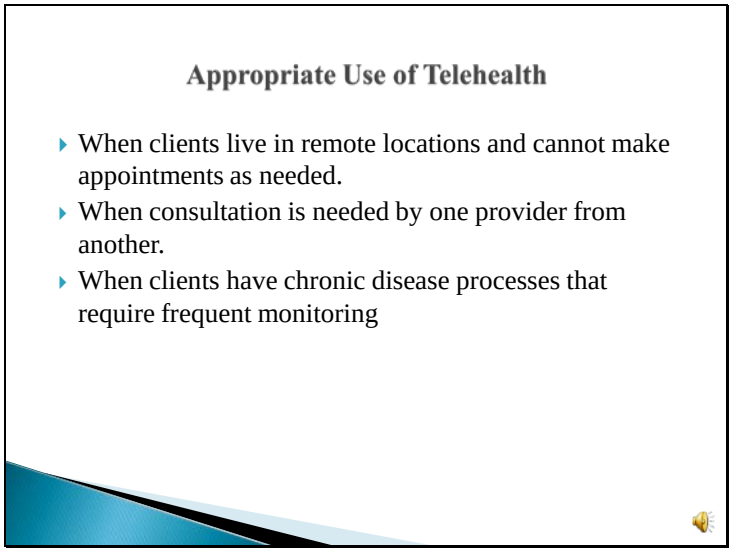
Costs for re-hospitalizations with any disease process can be expensive; Medicare guidelines now indicate that if a client is re-hospitalized for the same condition within a thirty day period, they will not pay for it; consequently, private insurance may soon follow Medicare's example in order to reduce their costs. At present, re-hospitalization expenses for CHF are $8700.00 per episode. The cost in the United States is $3.3 billion for CHF alone. Contrast this with the cost of telehealth. The average cost to use home telehealth is $1600.00 per year per person. This is less than the cost of a one-time re-admission episode for a client with CHF. When the patient is at home, there is no associated costs that occurs in the hospital such as housekeeping, dietary, phlebotomy, pharmacy, etc. This greatly reduces payouts from insurance companies and individual costs.

Slide 12



Because clients interact often with the telehealth provider by entering data at prescribed intervals, indicators of an impending exacerbation of a disease process can be assessed, and appropriate interventions can be taken. If the interventions are taken, the client may avoid going to an emergency room, or being readmitted to the hospital. Because trends can be identified from the data gathered through telehealth, education needs for the client can be identified; for example, the client whose blood pressure continues to elevate, yet who is not following a sodium restricted diet. Consequently, the client may be placed on additional medications to control the blood pressure because the dietary non-compliance was not identified. If the client received a home health visit as a result of telehealth monitoring to re-educate him/her about the diet, the additional medication need may be eliminated. Also, if the client is monitored effectively, the client may also reduce the number of physician office visits as well. If the physician is not seeing the same persons frequently, his/her productivity will increase because he/she will be able to see more clients. Hospitals are monitored by accrediting agencies for quality improvement. Part of this quality improvement is having low re-admission rates for certain disease processes. Telehealth may help improve this measure by enabling clients to be monitored from home rather than being in a facility thus reducing readmission rates.

Slide 13



Who then would be appropriate candidates for telehealth?

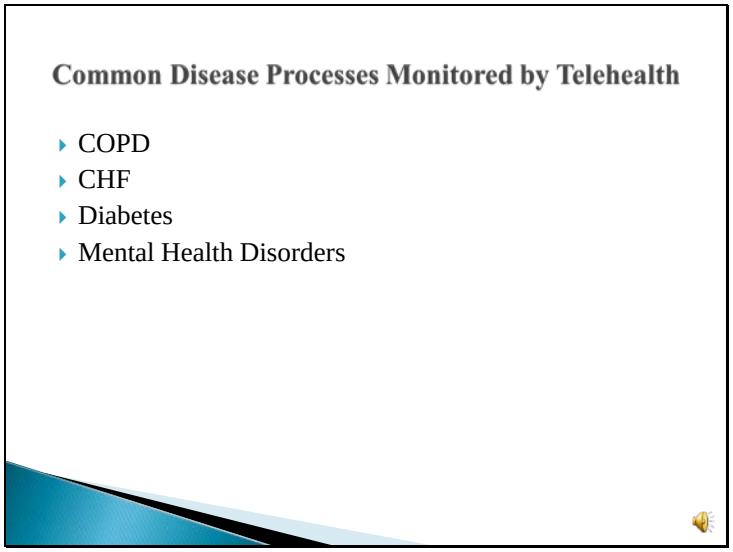
The first group would be persons who live in remote areas who cannot make frequent trips to see physicians. Recall this was the one of the first groups where telehealth was first used. If a client has a difficult time reaching a physician's office the client may not be able to keep appointments as needed.

Another application of telehealth is in the area of consultation. Often hospitals or physician's offices do not have ready access to specialists; through the use of telehealth, these persons can be consulted even though they may be some distance away from the person(s) requesting the consult. The telephone by the way was the first form of telehealth that was used to consult a specialist.

The trend in today's hospitals is to discharge clients as soon as possible in order to reduce costs. Consequently, clients are being discharged to home often before they are ready. This is especially true with the client who has a chronic disease process such as COPD, CHF, or diabetes. These persons are ideal candidates for home telehealth because they can be monitored more closely, from every day contact to several times a week by the telehealth provider.

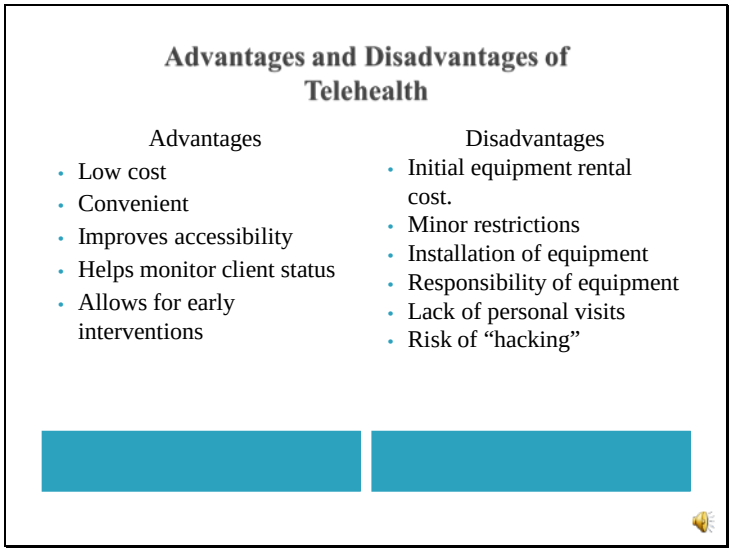
Persons who do not qualify are those who have infrequent exacerbations of their disease processes or who live close to facilities. Persons who have exacerbations greater than every six months would be appropriate candidates for telehealth.

Slide 14



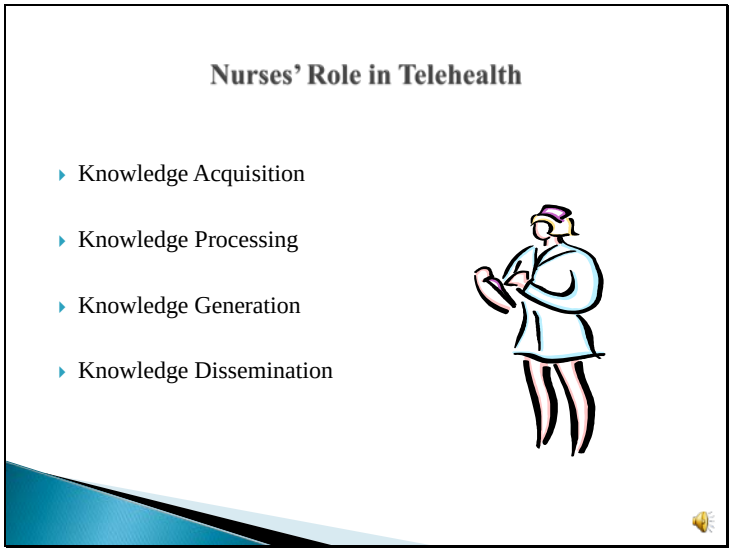
COPD, CHF, and Diabetes require close, daily monitoring by the client, requiring the client to perform some type of daily or more frequent assessment. These disease processes exacerbate rapidly if not monitored carefully. Mental Health Disorders also are monitored using telehealth by having the client input data in response to questions asked by the system.

Slide 15



Disadvantages – the equipment that is installed in a client's home usually has rental cost attached to it. The client may have to pay for that cost out-of-pocket if their respective insurance company does not pay for it.
Minor restrictions – most telehealth monitoring systems are set to call the client at certain intervals to request information. Consequently the client would have to be home in order to provide the same and for some persons this may pose an inconvenience.
Installation of equipment – the client must be visited at the home by someone who will install the equipment (computer communication device and peripherals if needed) and the equipment must be kept in a safe place – away from fire, high traffic areas, etc.
Responsibility – once the equipment is installed, the client is responsible for keeping the equipment from being misused or broken – if the equipment is damaged then the client may be asked to pay for the damage or replacement cost.
Lack of personal visits – because the client is being monitored by the telehealth provider, visits from health care personnel may be reduced in the home care setting; client's often look forward to seeing a home care provider for a variety of reasons – asking questions about their care, reassurance they are monitoring themselves properly, or just the need for a friendly visit from someone; when this is lacking, the client may perceive the telehealth monitoring agency as impersonal.
Risk of hacking – because telehealth data is sent through electronic means and stored in a computer, a risk of hacking is always present, hacking meaning the illegal, unauthorized obtaining of sensitive data by tapping into communication devices or accessing computerized records. Most Electronic Medical Records require an ID and password to gain access to information. Because of this and other measures, it is becoming increasingly difficult for unauthorized persons to gain access to that data; however, it is still possible for this to happen.

Slide 16



The nurse's role in the use of telehealth involves four processes.

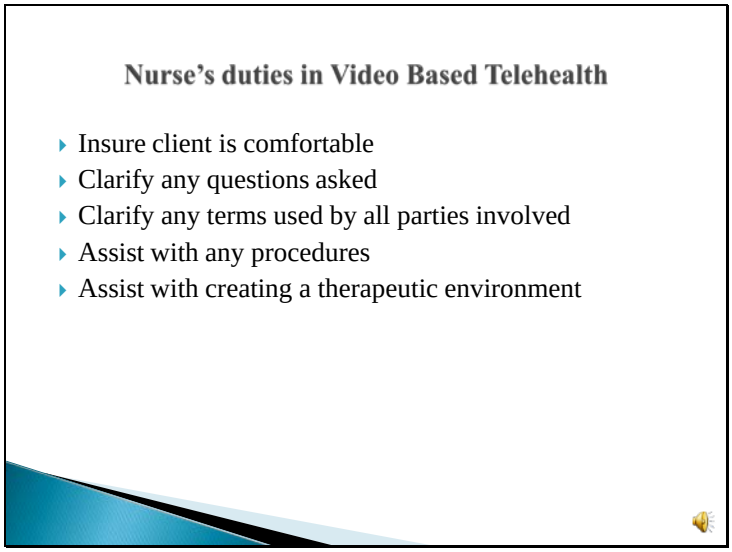
The first, knowledge acquisition, involves the nurse receiving information from a telehealth device through a variety of communication modes, such as the telephone or computer.

The next step would be knowledge processing which involves synthesizing information received about the client to get an up-to-date view of the client's status and sees where this information fits into the client's clinical picture.

Knowledge generation involves using the nurse's own skills and clinical knowledge about the disease process, which data applies to the client and what is the best action to take.

Knowledge dissemination, the last step, determines how the knowledge will be used and disseminated, such as calling the physician, obtaining a change in an order, calling the patient with any changes in treatments, and continuing to monitor the client.

Slide 17



During video based telehealth, there is a health care provider at a remote location performing an assessment by what he or she sees and hears. The client needs to be comfortable during this process as much as possible because they will often be asked to move or turn a certain way and to hold a particular position. Also the assessment may involve them exposing body parts to a video camera for review by the health care provider. Therefore the client must be kept warm and their dignity must be maintained as much as possible.

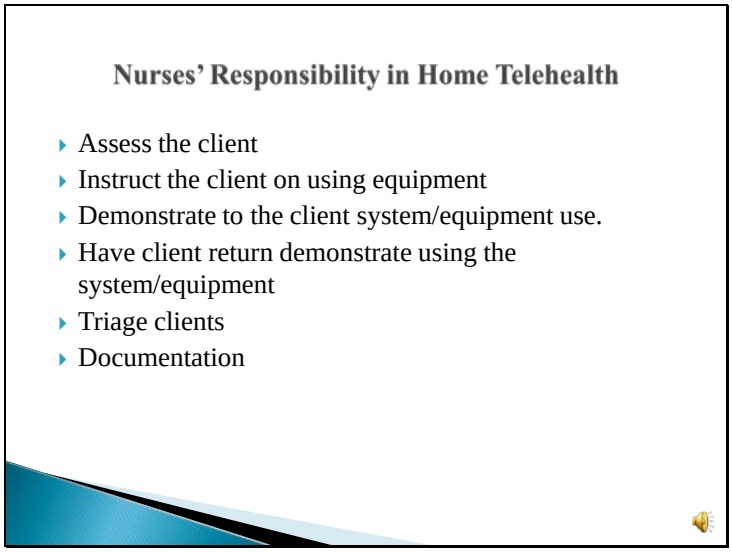
During this time the client may ask questions of the nurse and the provider. The nurse must assist in facilitating any exchanges between the client and care provider or between themselves and the client. This includes clarifying unfamiliar terminology or acronyms.

The nurse may also assist with any procedures being directed by the health care professional that is being consulted as well.

All parties must remain professional at all times. Remember the client can hear anything being said by all parties involved and they may be able to see everything that is done as well.

The nurse can assist in creating a therapeutic environment by providing adequate lighting, reducing back ground noise, again making sure the client is comfortable and by being a client advocate during any part of the assessment or procedure being done.

Slide 18



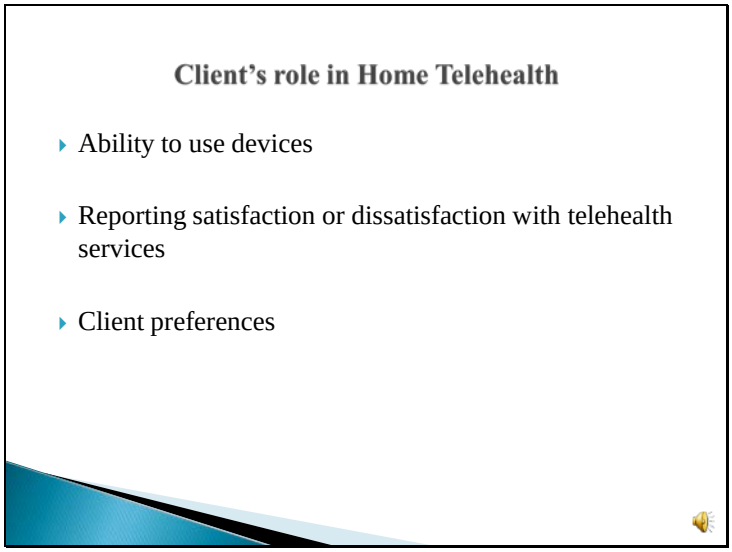
One of the nurse's primary responsibilities in the home is to make sure the client can carry out procedures such as taking their own pulse, blood glucose, blood pressure's etc. If the client is unable to do so, then instruction on how to perform these procedures is needed. The nurse must also be aware that if the client is not physically or cognitively able to perform these procedures another person must be available in the home to do those things for the client. Another essential element of assessing is reviewing the clients chart or EMR. To access the EMR the nurse would need to use a computer access system such as a laptop or computer terminal to gather this data.

The nurse should demonstrate how to use any equipment left in the home and have the client return demonstrate the same to validate understanding. Therefore the nurse should know how to use equipment that they are unfamiliar with.
Many systems have a demonstration program built in the communication device and will ask the client to input the data requested on a screen that is part of the device. Other systems that rely on the telephone as the communication device will call the client and ask the client to input certain values as part of the demonstration on how to use the system.

Another role of the nurse is triage. In the home health setting, the nurse is the person receiving calls about clients with exceeded parameters. The nurse must call the client to further investigate the cause and may also need to make a visit with the client. Also, like any other nursing discipline, the nurse must also assess the complete client while making a visit and request referrals as appropriate. For example, if the nurse finds out the client has fallen several times at home, the nurse would be responsible for informing the client's physician and requesting a referral for physical therapy.

As with any other type of nursing, the nurse is still responsible for documenting via a nurse's note any contact made with a client, whether that contact was through the telephone or an in-home visit. Remember the elements of good documentation are what the issue was, what was done about it, and what the results of what was done were.

Slide 19



The client's first role is to agree to use whichever telehealth system made available to them. The client must understand they will be required to take their own vital signs, blood glucose levels, weights, and pulse oximetry readings often on a daily basis, therefore they must be able to use the measuring devices. They will also need to input the information via the communication device provided by the monitoring agency or through the telephone keypad. The client must be available to input the data when called by the monitoring agency. Finally if set parameters are exceeded, the client needs to understand he or she will receive a follow-up telephone call from a health care provider.

The client will be asked if they are satisfied with the service provided through questionnaires in writing or over the telephone by the service provider. When telehealth is introduced, the client will be asked at what times they prefer to be called by the monitoring system in order to obtain information about the client.

Slide 20

Telehealth is affected by legal, ethical, and regulatory issues that nurses must be aware of. In the US, fifteen states have adopted compact licensure agreements that recognize the license from each member state. This becomes important if a nurse is working with a call center and receives information via telehealth about a client located in another state; the nurse is still required to act upon that information as appropriate even though that nurse is not licensed in the client's state. Because telehealth involves caring for client's without being present, the question has arisen "Is this type of care nursing?"

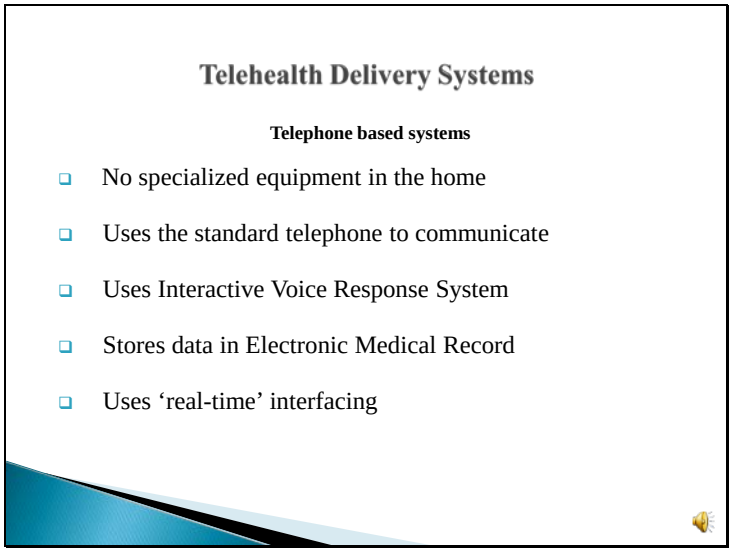
The definition of nursing according to Florence Nightingale is "the taking charge of the personal health of individuals and to put the individual in the best possible state and allow nature to act upon him." This definition is still recognized as being valid by today's nurses. The question has arisen if telehealth nursing is still nursing because it does not involve direct client care. The International Counsel of nurses recognizes it as a form of nursing because it still involves providing care for the client.

There are currently no requirements for nurses who work with telehealth to obtain a certification to do so.

As nursing becomes more "computerized" keeping the client's information as confidential can be daunting. The Health Care Information Portability and Accountability Act (HIPPA) require all information about clients to be kept confidential and to be shared only with those persons involved in the client's care. In order to accomplish this task, nurses must make client's records inaccessible to unauthorized persons by logging off systems even if the nurse is leaving the computer terminal for a few minutes. Laptops are a convenient way for nurses to input or review

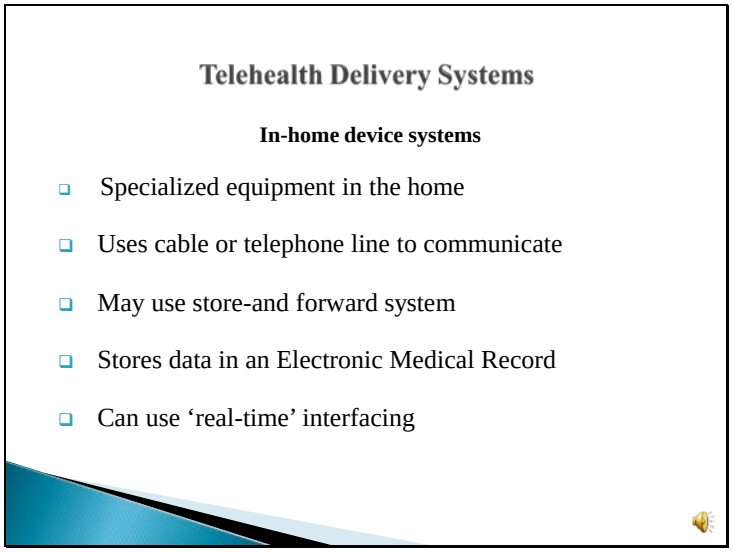
data, often from the comfort of their own home. Leaving an EMR open and unattended can invite others in the home to read material they should not have access to, therefore keeping client's information secure at all times is essential.

Slide 21



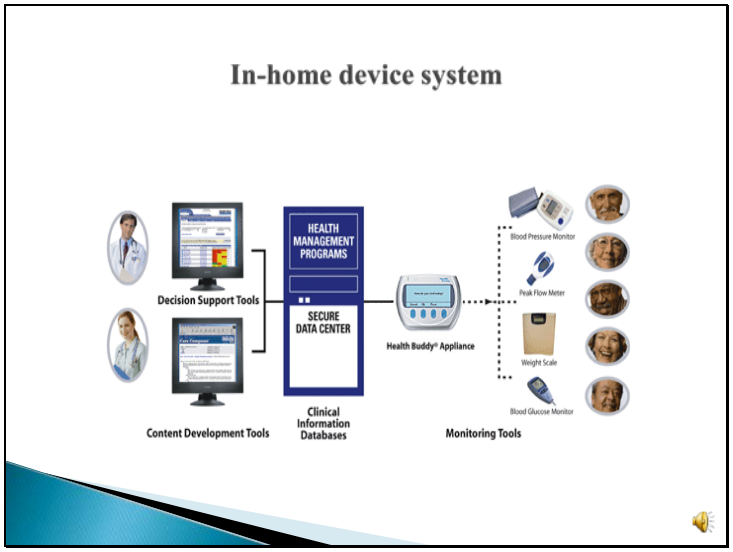
As the use of telehealth grows, especially in the home health setting, nurses may encounter different types of devices or systems. One such system that is gaining popularity relies on the telephone as a means of transmitting data. The advantage to this system is there is no specialized equipment that is installed in the client's home, eliminating the need to rent or be responsible for the same. The client would have to purchase a blood pressure cuff and reliable scales. If the client is going to take their own blood pressure and pulse, an electronic cuff is often recommended. Otherwise, someone else would have to measure these readings for the client. The system uses the Interactive Voice Response System. Based on the data keyed in by the client, the system will ask other sets of questions to further assess the client's condition. Essentially the client is called by the system at set intervals. The computerized voice will ask the client for data such as their blood pressure, pulse, and weight. The values can be keyed in or the client may say what the values are. The information is stored in the client's electronic medical record. If the values the client keys in or states exceed the parameters set by the physician, the computer will ask questions to perform a further assessment. Because the system responds to voice as well as keyed values it is voice responsive. At the same time the information is sent to an "on-call" person. This person then calls the client to obtain further information, thus "real-time" interfacing. These same values can also be sent to the client's physician via I-pad, fax, or telephone. Orders can be then called in to the agency that is using the telehealth system.

Slide 22



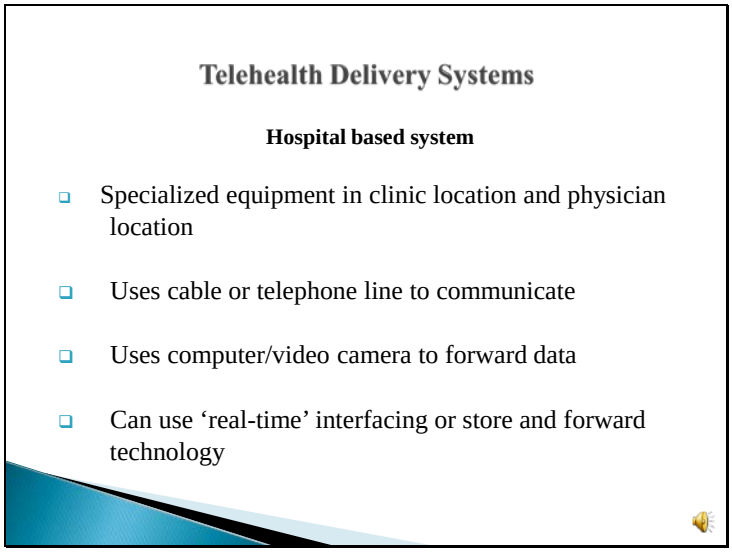
Some systems require installation of communication equipment in the client's home, sometimes with peripheral equipment such as electronic blood pressure cuffs and scales. The communication equipment often is a touch screen and with some systems a form of video capture. If the system uses peripheral devices the client takes their vital signs and weight at intervals throughout the day and that information is stored in the communications device. If the system does not use peripheral devices, the client will have to obtain their own values and by use of the touch screen input the data. At a pre-ordained hour, the information for a particular day is transmitted into the client's electronic medical record at the health provider agency or office. There are other in-home device systems that automatically send data to the client's EMR and is immediately available for viewing by healthcare personnel. Some systems can use real-time interfacing by calling the client via the communication system and solicit additional information.

Slide 23



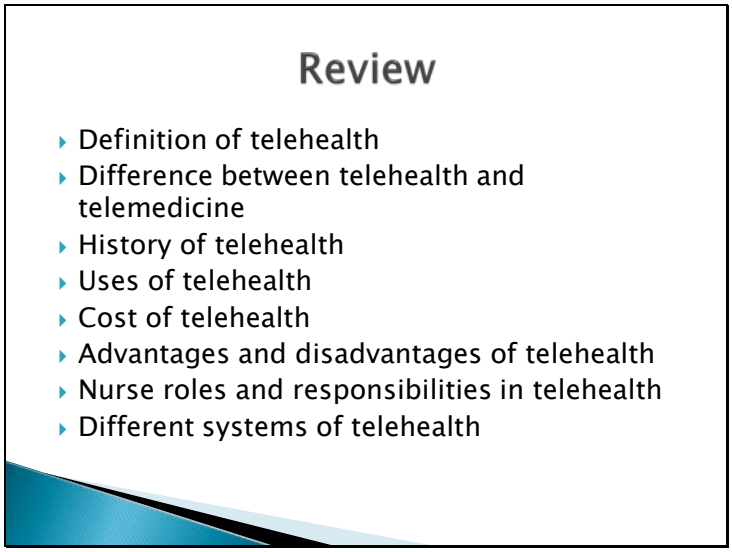
This is an example of an in-home device system. The clients on the right obtain the required information such as blood pressures, blood glucose levels, and key the data into the appliance, or if the blood pressure cuffs, blood glucose monitors and other peripheral devices can be attached to the appliance the information is retrieved automatically. From there the information is automatically transmitted via telephone or ethernet device to the data support center where it is immediately available for viewing by health care personnel using decision support tools. These tools contain the client's history, medication records, or other information that will help the provider arrive at treatment decisions if needed. The content development tool is a component that houses questions the client may be asked to further assess their condition or to provide education to the client when needed.

Slide 24



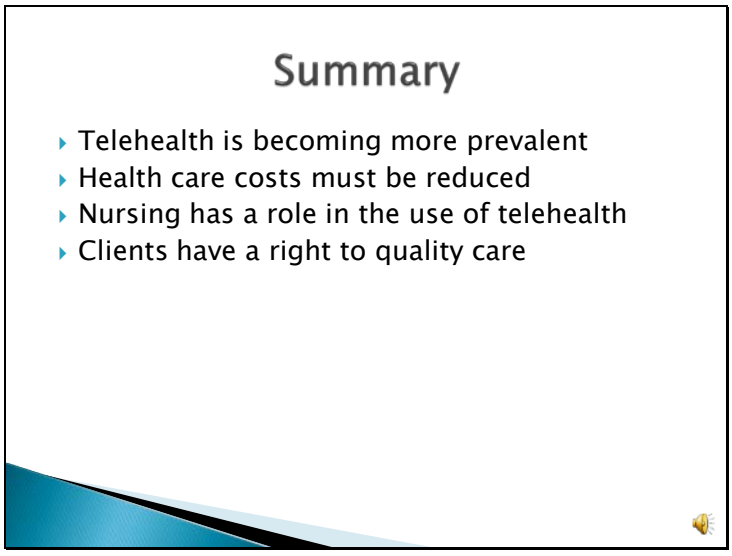
Hospital clinic based systems use specialized equipment to transmit and receive data from various locations, including data from other states or countries. Physicians or healthcare providers at remote locations can use equipment in their offices that are linked to the hospital clinic system; some of the equipment may be EKGs, scanners of radiographic images, faxes, or camera images that are being scanned on clients while they are present. The information can readily be received by a physician or the information can be stored and forwarded to the receiving clinic.

Slide 25



Recall the definition of telehealth s the use of electronic information and telecommunications technologies to support long distance clinical health care.
Telehealth is different from telehealth medicine in that telehealth is the collecting of data using electronic means whereas telemedicine is the actual use of the information to make clinical decisions.
The history of telehealth began with the use of the telephone, however in 1955 the Nebraska Psychiatric Institute began experimenting with closed-circuit television for long-distance consultation.
The use of telehealth is to transmit clinical information from a site to a physician, to monitor client's condition while the client is at home, to alert healthcare providers when set parameters have been exceeded, and to provide real-time consultation between health care providers.
The cost of telehealth is on average $1600.00 per year per person, while a hospital readmission for CHF for example is $8700.00 per episode.
Some of the advantages to telehealth is convenience, close monitoring by health care providers, low cost, and allows for early interventions when needed; the disadvantages included having equipment in the home, being responsible for the same, the rental costs, and the lack of personal visits.
The nurses' roles included Knowledge Acquisition, Knowledge Processing, Knowledge Generation, and Knowledge Dissemination. The responsibilitiesof the nurse remains no different than any other nursing discipline.
The different systems found in telehealth include hospital based systems, home based systems that use in home equipment, and those that are strictly telephone based, that have no additional equipment added into the home.

Slide 26



Because there is a national recognition that health care cost must be reduced, telehealth is being viewed by an increasing number of health care providers as a viable means of tracking and assessing client's conditions. Nursing is highly involved in all aspects of client care, whether or not that is in the hospital setting or the home setting; consequently, nurses will encounter telehealth systems in ever increasing intervals. It has become the responsibility for the nurse to be knowledgeable about these various systems, how to use them, and how to integrate them in nursing care. Clients have a right to quality care no matter where their location is, and telehealth can be a means of providing that care.

This module introduced you to the concepts of telehealth and its uses, what components make up the various telehealth systems, legal responsibilities of the nurse in the use of telehealth, the nurse's role in the use of telehealth, and the advantages and disadvantages of using telehealth.

With this information, you will be better prepared to meet the ever changing methods of caring for your clients.

Slide 27

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