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## Telehealth Case Management Nursing Process and Technology Enhancements: Reflecting Practice and Outcomes

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**Reflection of telenursing through clinical technology tools**

**Telehealth Case Management Nursing Process and Technology Enhancements:  
Reflecting Practice and Outcomes**

Systems Change Project  
Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Nursing Practice

St. Catherine University  
St. Paul, Minnesota

Judith/Jacome/Peters

December 2010

St. CATHERINE UNIVERSITY  
ST. PAUL, MINNESOTA

This is to certify that I have examined this  
Doctor of Nursing Practice systems change project  
written by

Judith A. Peters

and have found that it is complete and satisfactory in all respects,  
and that any and all revisions required by  
the final examining committee have been made.

Graduate Program Faculty

*Judith A. Johnson*

Name of Faculty **Project Advisor Approval**

*October 30<sup>th</sup>, 2010*

Date

DEPARTMENT OF NURSING

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First and foremost, I want to thank my husband and children for their continuous support on this project and in all that I do. Your love and humor are everything to me. Your presence in my everyday gives my life meaning; I am truly blest.

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### **Executive Summary**

Accurate reflection of care practices in telehealth care management is the fore runner to the delivery of reportable beneficiary outcomes. Success in delivering Geriatric Care Services (GCS) resides in a partnership between clinician practice and technology tools utilized in telehealth practice. Through in home technologies, telehealth can provide ongoing care needs to underserved populations, and it can support independent aging of beneficiaries who live with chronic care conditions. Tele-health care management, performed through a health plan, presents a unique opportunity to capitalize on the abundance of health data collected on a patient, and maximize the use of that information for clinical decision support.

Nursing informatics is the facilitator of telenursing. It is the specialty that integrates and applies nursing science, and respective theoretical models, in identifying, collecting, processing, and managing data. It furthers seeks to process that data to formulate knowledge based decisions and informed care plan actions. Maximizing technology and available data are primary tools a telehealth clinician uses in care management practice. It is imperative that the technology system utilized in practice supports the telehealth interaction by accurately and effectively reflecting the clinician's practice through data inputs, collection methods, and interpretation logic.

This Doctorate of Nursing Practice (DNP) systems change project examined existing telehealth care practice and available technology tools. The project explored options for practice and process improvements in identification and formulation of cases and the development of new clinical technology tools to support the practice. Further, this project implemented practice change to support the organization's strategic plan to provide efficient and effective GCS case management to our client. In summary, this project produced new clinical technology tools to reflect telehealth practice, gave a voice to telehealth case managers in the technology development cycle, and established a measurement framework for organizational reporting on case management outcomes.

## **Systems Change Project Outline**

- 1. Literature review on nursing informatics, telehealth, evidenced based telenursing, and information technology development**
  - 1.1. Site discussion with stakeholders
  - 1.2. Identification of change need, potential champions and/ or barriers
  - 1.3. Exploration and identification of guiding theory for project
  - 1.4. Reconciliation of project, resources, timeline, and organizational needs
- 2. Document overview of project for site and faculty presentation**
  - 2.1. Stakeholder presentation of system change project
  - 2.2. IRB application
  - 2.3. Site compliance and human resource study application
  - 2.4. Acceptance of IRB
  - 2.5. Approval from organization and site of system change action
- 3. Research in action for system change project**
  - 3.1. Explain project to staff
  - 3.2. Commence focus work groups
    - 3.2.1.1. Identify telehealth current practice
    - 3.2.1.2. Identify current telehealth practice tools
    - 3.2.1.3. Identify current pro/con to training and implementation process of technology releases in telehealth practice
    - 3.2.1.4. Identify gaps in technology tools, processes, training, and telehealth practice
    - 3.2.1.5. Identify recommendations for closing gaps and supporting best practice
  - 3.3. Collaborate with interdisciplinary group to support transformation of recommendations on closing the identified gaps
  - 3.4. Create (facilitate) and implement the change
  - 3.5. Measure the change outcome from the process
- 4. Disseminate the learning from the system change**

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## **Chapter 1. INTRODUCTION**

### **Background and Significance of the Project**

Telephonic nurses provide health care assessment, guidance, and support through telephone and computer contact with patients and their families. Telenurses journey with patients through the health care maze; for some individuals where health care access is marginalized, the telenurse becomes a precious resource to patients and families. Through efficient data access in telenursing, there is potential to make a difference in the lives of many who are underserved (Demiris, Parker, Oliver, Courtney, & Day, 2007; Demiris, 2007). Telephonic care management provides a unique clinical practice environment for nursing; leveraging collected data is central to delivering clinical services and to utilizing healthcare resources efficiently (Cohen & Cesta, 2005). Having access to vast amounts of information in a short period of time, at point of care, assures patient safety in the delivery of the right care at the right time to the right individual (IOM, 2001).

Volumes of health information and data are collected, either directly or indirectly through patient provider relationships, billing entities for services rendered, or health plan engagement with a beneficiary. Sources and entry points for this data are often random, not connected, and require extensive human resource time to locate key data for clinician use in practice.

Within the geriatric care practice setting of the organization utilized for this project, limitations and deficiencies existed in the usability of that health data for patient care delivery. The problem to be examined was how health data can be better utilized to support telenursing clinical decision making; and, in using technology tool enhancements as part of that process, how can a framework be established that best supports clinician adoption and usability of those tools in care management clinical practice.

This system change project evolved as a result of the challenges described above, and an independent geriatric care services (GCS) audit done late in 2008 on the GCS unit of the organization

(Mercer Report, 2008). The audit reported that case identification and case formulation were inefficient processes in telephonic care management; there was limited automation in information recovery requiring clinicians to spend extensive amounts of time in non-clinical data searches which resulted in decreased efficiency in nurse-patient contact time; and, there was no clear way to demonstrate a connection between care management practice and beneficiary outcomes. Free form text fields, the application available, did not support necessary reporting needs for nursing operations or for the client service level agreements within the contract. Further, the review presented inconsistencies and repetitiveness in documentation of health data.

In summary, volumes of data are available from a variety of entry points on a patient in care management; however, the fragmented information was inefficient and did not provide clinician insight on decision support prior to care call. Additionally, observation and interviews of nursing staff determined inconsistent and random understanding of how best to operationalize some of the technology applications in place. The report further established that the available technology tools did not reflect the practice of telenursing case management (Mercer Report, 2008; Training Survey, 2008).

### **Complex Care Needs and Geriatric Care Management**

In geriatric care management, chronic disease and complex care needs define the primary case loads for the population served. The complex chronicity of conditions requires patient care over time to be distributed among varied disciplines, multiple providers, and numerous care settings. To coordinate, collaborate, and deliver care management, the telephonic nurse requires access to real time data consolidated in a user friendly longitudinal view. Lack of organized and consolidated information limits efficiencies and the effectiveness of case identification, case formulation, and the practice of telenursing (Cohen & Cesta, 2005; Mullahy & Jensen, 2004). Further, concerns with gaps in health data at the point of care can result in safety issues, disparities or inconsistencies in care delivery, and repetitive tests or procedures; each adding to the colossal cost of healthcare, weaknesses in the nation's

care delivery system, and a burden on those who seek care (McGonigle & Mastrian, 2009). In addition to monetary costs, there are tremendous personal, social, psychological, and professional costs endured by patients, families, providers, and healthcare systems when health data is in silos and not readily accessible to the clinician for care decision support (Kohn, Corrigan & Donaldson, 1999). Clients, and the nation, have challenged the telephonic care management industry to articulate outcome results as a direct consequence from care management service delivery (Bott, Kapp, Johnson, & Magno, 2009; Kapp, 2008).

### **Business, Leadership, and Clinical Practice Recognize Opportunity**

Through internal surveys, the clinical staff expressed challenges with the formatting and clinical tools in place. The tools were insufficient to reflect and support telephonic care management practice, and staff indicated that many of the technology applications in place were not user friendly (Employee Survey, 2007, 2008). The GCS organization was attempting to acquire new business and meet the current client needs with technology tools that provided for efficient care management data use. In the absence of reportable outcomes, the challenge in selling a product, such as care management to a health plan, becomes difficult. Historically, the value of GCS relied minimally on clinical success indicators and more on anecdotal outcomes which do not readily demonstrate positive cost benefit analysis (Medical Management Operational Reports, 2006, 2007, 2008).

Identifying technology system enhancements to support reporting outcomes was center point for the future of the business. Technology tools are a huge capital expenditure for an organization and need to reflect nursing practice. The business, the clinicians, and the industry had a need for new telehealth case management tools, and urgency for a strategic plan to facilitate development, training, and user adoption of the tools (Kaplan & Litewka, 2008).

To date, the organization's technology system had been created by business and information technology (IT) units with minimal clinician voice. This project engaged nurses, social workers,

advanced practice clinicians, and physicians in a participation opportunity as core subject matter experts (SME) for content development of the clinical tool package. Business analysts, finance, strategic business development planners, programmers, and executive leadership from the corporation provided ongoing oversight to the clinical tool package development offering expertise from their discipline. Connecting with local and national experts on technology application acceptance efforts in healthcare environments established a comprehensive dialogue for this project. Through professional partnerships, this project served as a catalyst to bring internal and external disciplines together that would evolve into a clinical technology tool package to reflect telenursing care management, provide a framework to support the clinician's acceptance and use of the online tools, and measure patient outcomes.

### **Definition of Terms**

Telehealth, while available since the invention of the telephone, is a fast growing opportunity for clinicians to meet the immediate needs of an "acute" health question, utilize health information technology, and provide ongoing care to the chronically ill. Telenursing has the potential to make a difference in the lives of many Americans, who are underserved, live in rural areas, and have limited access to health care services (Demiris et al, 2007). Nursing Informatics is a catalyst for telenursing; it is the specialty that integrates and applies nursing science, and respective theoretical models, in identifying, collecting, processing, and managing data, then transforming that data to formulate knowledge based decisions and informed care plan actions (McGongile & Mastrian, 2009; Holden & Karsh, 2009). Care manager or case management is a nursing specialty which maximizes the totality of the nursing process to meet an individual's health needs through collaboration, communication, and the utilization of available resources to promote quality cost effective health outcomes (Cohen & Cesta, 2005, p. 523; Mullahy & Jensen, 2004).

GCS is the business unit within the organization where this project took place. It specifically engages in telehealth care management service delivery to a frail geriatric Medicare population. Within



this business unit, the average patient or beneficiary profile served through GCS is seventy-seven years old with 6 or more co-morbidities. They live in rural or remote areas where current or past mining communities are established, health care resources are scarce, and their income is at or below poverty (Mercer Report, 2008). Telehealth case management practitioners who are geographically remote from the beneficiary are presented with multiple professional challenges in caring for this population. The common practice tools of visual cues, touch, cultural connection, or “nursing equipment”, for example stethoscopes, are not available to the telehealth nurse. Rather deployment of health data and a keen sense of verbal and non-verbal communication and listening skills guide the practice for the case manager. Critical to efficient telehealth care delivery is patient health information. Best practice calls for this to be accomplished through the use of a technology system that efficiently reflects nursing practice and supports the clinician’s work flow (McGongile & Mastrian, 2009). This change project focused on defining and developing a technology clinical tool package for telehealth care management. The clinical tool package is defined as assessments, decision support matrices, process flows for practice, and a strategic care plan model for telehealth care management practice.

Care management is not a gadget or widget to be demonstrated in a concrete manner, and as such, is continually challenged to confirm and illustrate quality and value in practice. Hence, technology practice tools, tracking and reporting measures, and the nursing process must be in sync to best reflect outcome value from telenursing care management. Gaps in reflecting nursing practice engagement and outcomes often exist as a result of technology development that originates from IT and business units; requiring clinicians to adapt to fit the technology rather than the technology system working to support the clinical process (McGongile & Mastrian, 2009). Recognizing gaps in technologies for telephonic care management practice provided opportunity for advancing practice initiatives in telenursing care management (McGongile & Mastrian, 2009).

Throughout this paper, “user” refers to clinicians in telenursing GCS care management practice. Application denotes the computer software that allows the user to complete tasks, and MMS, or the medical management system, is the organizations health record system that houses all patient or beneficiary data. Decision support tools are computer applications that are developed to assist the user in a decision making process, and EDI, or electronic data exchange, is a set of standards for exchanging information between or among computers internally and externally with other organizations. At present, those standards for information exchange are established by the parties sharing the information. The Health Information Technology for Economic and Clinical Health Act, (American Reinvestment and Recovery Act , 2009), introduces working definitions that begin to frame not only “meaningful use” with information exchange, but a “certification process for the electronic health record (EHR)”. HITECH Act (2009) sets in place a more universal standard for how information is shared electronically and used to support patient care in acute and long term settings (HIT Policy Committee, 2009). While this law is focused on acute, long-term care, and private providers, the implication is that all members of the health care team, telehealth included, would examine how these new guidelines can best support the exchange of information to inform best practice. File feeds or data that come from outside sources like claims payers or pharmacy fills, indicative of treatments, services or medication possession ratio’s, are examples of data exchanges that were brought into this project to further inform the care manager. In consideration of this portion of the project, the researcher reviewed the HITECH Act for reflection of what was the policy expectation related to electronic exchange of information among providers. At present, the HITECH Act does not regulate health plan care management data exchange. However, informed clinician development on data exchange, specifically, data integrity, purpose, and interoperability among providers are features relevant to this change project.

### **Stakeholders and Their Impact on the Change Project**

Stakeholders in this project are the care management organization, the clinical operations staff, the client being served, and indirectly, the science of nursing informatics. While consideration is given to the uniqueness of terminology used throughout the different disciplines involved in the “business” of GCS care management, the technology language of software program development necessary for the clinical tool package had an impact on this project. McGongile and Mastrian (2009) provide a comprehensive and supportive list of computer technology terms, and the terms respective to nursing practice. Crucial to the progress of this change project was a willingness to immerse the nursing world into the information technology development world.

Stakeholders, specifically clinicians and the business leadership, had varying reasons for wanting changes with the technology tools, but there was a strong consensus to support best practice delivery in telenursing care through a common vision and enhancements in clinical case management tools. Honoring the integrity of the beneficiary’s health story, providing organized data and decision tools for clinician use, and demonstrating the ability to report outcomes from the nurse-patient engagement were common themes in each stakeholder’s vision for the project. Gaining consensus and demonstrating the individuality of the stakeholder’s impact for and from the change, helped assure “buy in” from the different stakeholders over the lifetime of the project.

### **Project Development and Potential Challenge**

GCS telehealth care management seeks creative venues to deliver health care to rural communities, provide continual patient centered clinical services to manage chronic disease conditions, and leverage telecommunication technologies in clinical practice. Both the business and the clinical professional needs merged to create an environment for change. Organizationally, there was a financial commitment for IT development hours, and professionally, there was energy to reflect telephonic care management practice. The significance of the aforementioned created the foundation

for this system change project's background, and the tipping point within the organization for new directions in telephonic care management technology tool development, and "adoption" or use of those tools for practice and processes associated with GCS operations.

The primary challenge of this project was the magnitude and expectation of stakeholders. Clinician's were engaged in the process and eager to interface on all aspects of the design development. However, once that process was complete, the engagement with programmers to write system requirements for program development required new learning by the researcher. Computer terminology and systems application discovery, as well as understanding the lengthy cycle between idea and application were professional and academic challenges that had not been considered at the project onset. Ultimately, the transformation of technology requirements into the application for staff to use every day became an enormous task, and one which required nine to eighteen months for the product design- development-training-implementation-evaluation to unfold.

The assessment package, contact tracking log, the clinical clipboard, and the care plans, resulted in a two year change initiative. The scale of the project including design, development, didactic training on telenursing concepts and practice model, as well as integration and implementation of the vision and learning into the reality of technology tools in day to day practice required a three phased production release over an eighteen month time frame. Consequently, the secondary challenge was to maintain the momentum of the change from cognitive design development to the implementation in practice. A third challenge presented itself mid-way into the testing of the clinical tool package. The primary client for telephonic care management put the contract out for public bid. Because the organization had placed development dollars into a technology system particularly tailored to this client, if the contract was lost, the money spent would not be recovered. The care plan tools, the second phase of the design, had yet to go to the organization's IT programmers for development of the researcher's change

design, and a discussion ensued about the financial viability of continuing the clinical tool package project in its entirety.

The organization's strategic plan remains to support aging with independence, and the GCS business unit is central to that mission; the tools, and processes to support the usability and adoption of those tools, are fundamental to the business of telephonic care management. The business unit concluded that regardless of the outcome of the contract bid, the clinical tool package could be applied to other clients. The project continued with renewed leadership commitment.

### **Principals of Social Justice, Telehealth Clinical Tool Package, and Clinician's Acceptance of the Tools**

Professional nurses have an inherent responsibility through social awareness to be grounded in practice that is reflective of the experience that takes place as the patient adapts and reacts to the presence of that which alters his/her health story (Roy, 2007; Roy & Jones, 2007; St. Catherine University, 2009). Recognizing that the data capture of that relationship was not occurring in the telenursing practice area, nor was the collected data in care planning readily available to the clinician, the system change project evolved as a means to give voice to the practice, and provide data tools that effectively captured the integrated practice.

At varying levels of the system change project exists consideration that all twelve components of the S-O-C-I-A-L-J-U-S-T-I-C-E Model are reflected (St Catherine University, 2009). The discussion which follows focuses on the primary contributions to social justice delivered through the design, development, implementation, and evaluation of this project. Whenever there is an area within the worker's practice that could be improved for the common good and the sanctity of human dignity, workers are summoned to step up, step out, and take action (St. Catherine University, 2009). Framed within the context of the aforementioned words, nurses often find themselves in practice arenas that provide the unique privilege of receiving very intimate information from those they serve. Considering

that information to be sacred, the receiver (the clinician) honors that information not only confidentially, but in a manner that best serves the giver. Information exchange through telephonic and technology systems requires diligence on the part of the receiver to assure reliability, usability, and reporting ability of that information in a manner that is efficient, effective, and confidential. This system change project was about preserving the information that is given by the patient, as well as the individual's health plan record, such as claims, pre-certification requests, medication files, past assessments, laboratory results, immunization records, exam results etc., and allowing that information to be transformed for efficient utilization in a mode that maintains the integrity of the information, and respectfully serves the "owner" of that health story, the patient.

Technology clinical tools that are industry available, or "shelf ready products", are more reflective of ambulatory clinic or physician based office practice environments, and neither reflects the nursing process in telehealth. At present, these technology tools do not maximize the use of all available patient health data at point of care (Powell, 2000). From a care manager's lens, there is a responsibility to support and reflect nursing practice for assurance and accountability. Organizationally, corporate values of respect for people, integrity, competence, learning, and initiative within the work environment are in place both for the worker and the recipient of service. Utilizing these values as a spring board to develop clinical tools which demonstrate integrated care practices that support telenursing care delivery that is reflective of independent aging for the communities we serve, merged social justice initiatives and corporate responsibilities relevant to the organization and telenursing practice (St Catherine University, 2009; Univitahealth, 2009).

### **Project Objectives**

Utilizing technology for clinical tool enhancements, objectives for the project were established as follows: (1) to organize health data from all entry points into the care management system for clinical decision making at point of care contact, (2) to maximize data fields that accurately captured care

management practice, (3) to provide a longitudinal view of a patient's health story for efficiencies in case identification and care planning interventions, (4) to establish a telehealth framework or process to support clinicians in the usability and adoption of enhanced clinical tools in practice, and (5) to establish care plans that had identifiable and measurable patient goals, intervention strategies, and produce outcomes that were reportable.

## Chapter 2. Review and Synthesis

### Foundations of Understanding: Framing the Change Process in Telehealth Case Management

In an effort to recognize the multifaceted complexity of telehealth nursing, and to advance both the practice, and the care delivery systems, nursing leadership is called to collaborate with other disciplines extensively (McGonigle & Mastrian, 2009). In doing so, nursing brings to the conversation their clinical expertise in working with the human condition, and provides their voice, wisdom, and willingness to partner with other professionals in delivering quality health care through case management practice. Through a partnership between practice and theory, the epistemological parameters of nursing are established; when events or participants in that partnership interrupt, challenge, or call for change, this creates moments recognized as tipping points, and ultimately, growth opportunities within the system, profession, or practice (Reed, 2008; Gladwell, 2000).

Theories, such as, *Orlando's Theory of Nursing Process* (Orlando, 1987; <http://www.uri.edu/nursing/schmieding/orlando/schapters/files/SageNJS1.pdf> ), and *The Extended Technology Acceptance Model-ETAM2* (Davis, 1989; Venkatesh & Davis, 2000), provide guidance and construct to frame events which ultimately direct actions in technology use in telenursing practice. For the purpose of this project and study, acknowledgment is made to the relationships between nursing knowledge development and the interdisciplinary information exchange needed to support telephonic case management practice within GCS (McGonigle & Mastrian, 2009). Building bridges between clinicians, their practice, information system developers, business unit work flow designs, organizational goals, and client outcomes required theoretical framework input from various disciplines, specifically nursing and business information technology. Further, each theory supporting the project needed to be considered within the scope of understanding change theory (Markus & Robey, 1988; Pettigrew, 1990; Gersick, 1991).



### **Origins of Nursing Process Theory**

The nursing process theory, assessment, intervention planning and implementation, and evaluation, established by Ida Orlando in the early 1960's, is the framework for all function in nursing in the present day, and was cutting edge when presented as a unique product to define what the profession contributes to health care delivery (<http://www.uri.edu/nursing/schmieding/orlando>; Orlando, 1987). Orlando (1987) set forth the challenge for nursing professionals to articulate their practice uniqueness in response to the needs of the human condition; Orlando recognized that nurses need to find out what the patient's challenge is, use their (nurse's) perception or understanding of the challenge, and explore the patient's potential meaning of their challenge, behavior, or symptoms. As the profession has evolved, nurse's understanding and discovery sought out evidence based support for diagnosis and treatment practice plans to care for the beneficiary where they presented in their continuum of health (<http://www.uri.edu/nursing/schmieding/orlando/>; Orlando, 1987; Roy & Jones, 2007; Capezuti, Zwicher, Mezey, & Fulmer, 2008; Melnyk & Fineout-Overholt, 2005). Orlando's work set forth the foundation for patient involvement in the plan of care, with the professional nurse utilizing the entirety of the patient's health "story" for sound clinical decision making (P.A. Tyra, 2008; Cohen & Cesta, 2005).

### **Origins and Conceptualization of the Extended Technology Acceptance Model (ETAM2)**

Fred Davis' (1989) work on the Technology Acceptance Model (TAM) established a framework to study and predict IT adoption, use, and to explain a user's acceptance of information with technology tools in practice; TAM is built upon the Theory of Reasoned Action (TRA) by Ajzen and Fishbein in 1975, and the Theory of Planned Behavior (TPB) (<http://www.valuebasedmanagement.net/>). TRA and TPB represents social psychology factors which relate to variables which can affect behaviors such as image, intention to participate, and subjective norms when examining IT usage (Gibson & Seeman, 2009; Seeman & Gibson, 2008, 2009). An individual's personal and professional belief system, or that of an

associated group, will demonstrate a helpful relationship to IT system usage if the individual connects positive interactions and outcomes with the technology use in practice (Venkatesh & Davis, 2000; Seeman & Gibson, 2009). Intention (or planning) to use, as a variable indicative of an individual using the system, is part of the TAM. The relevance of this variable category has come into question in recent decades as organizations have moved from paper to systems technology in data and practice capture. Hence, due to the common practice of “using technology tools” as a requirement of a practitioner’s role in a clinical setting, the “intention to use” variable is considered a non determinant in understanding a user’s adoption of electronic systems (Seeman & Gibson, 2005, 2008; Chismar & Wiley-Patton, 2003; Eley, Fallon, Soar, Buikstra, & Hegney, 2008).

ETAM2 (Venkatesh & Davis, 2000) evolved from TAM and conceives that technology design characteristics, such as quality of a system and training, are additional variables that users form responses to, and are significant variables that affect a clinician’s adoption of electronic technology tools (Davis, 1989; Venkatesh & Davis, 2000; Seeman & Gibson, 2009). Through research, several authors concluded that “mandatory compliance based approaches” to technology tool implementation in practice without consideration of customized implementation strategies, leads to minimal use of costly tools or technology systems by clinicians (Venkatesh & Davis, 2000; Seeman & Gibson, 2009; Ammenwerth, Mansmann, Iller, & Eichstadter, 2003). Of primary importance in ETAM2 are the responses and activities associated with “perceived usefulness” and “perceived ease of use” of a technology system; each has key relevance to this change project that will be explained further.

### **Overview of ETAM2 Variables and Definitions used in the System Change Project**

The “technology system” is a comprehensive clinical tool package for telenursing, a portion of which was designed and developed through this project. The “tools” within the clinical tool package included assessments, a contact log, a clinical clipboard, and the design of enhanced electronic care plans. Within the context of ETAM2 (Venkatesh & Davis, 2000), the terms used and measured are

perceived usefulness (PU) of the tools, perceived ease of use (PEOU) of the tools, job relevance (JR) of the tools, social norms (SN) of the tools, image (I) in using the tools, output quality (OQ) from using the tool, and results demonstrated (RD) as outcomes in using the tools. ETAM2 has been used to examine these variables within a healthcare and business setting. However, limited work has been done examining this model and its relevance to technology systems in a healthcare setting (Chismar & Willey-Patton, 2003).

PU is defined as the clinician's sense that using the clinical tool package will increase her/his job performance within the practice (Venkatesh & Davis, 2000; Chismar & Willey-Patton, 2003). Davis (1989) and others (Seeman & Gibson, 2005, 2008, 2009; Houser & Johnson, 2008) suggested that the more a user believed an electronic technology system would help them to perform their job "better" and provide for an enhanced job performance experience, the more likely the user was to interact and adopt the technology tool. Hence, high scores on PU will have a positive user-performance-adoption relationship (Davis, 1989; Venkatesh & Davis, 2000). Further, even if the user scores the electronic tools high in regards to difficulty to use, the user would still adopt the electronic tool system, if the benefits of using the tools are perceived to outweigh the difficulty or effort needed to use the system since the improved job performance is viewed as a positive contribution (Davis, 1989; Venkatesh & Davis, 2000).

PEOU refers to the extent to which the clinician expects the clinical tool package to be free of effort (Venkatesh & Davis, 2000; Chismar & Willey-Patton, 2003). Put simply, Davis' (1989) work demonstrates user acceptance of an electronic technology system is perceived to be easier to use in practice than what is currently being done. From an organizational perspective, with increased use of a more efficient technology tool, a user has the potential over time to increase performance as a result of a streamlined or more automated workflow. There is a potential for increased productivity or case load volume as a result of the efficiency (McGongile & Mastrian, 2009; Ammenwerth, et al., 2003; Venkatesh, Speier, & Morris, 2002). Further, research indicates that PEOU is positively correlated to development

and training initiatives as well as the adoption of the tools by the users (Peck, 2005; Venkatesh et al., 2002; McGongile & Mastrian, 2009).

In addition to the PU and PEOU, subjective determinants of technology adoption, ETAM2 has a cognitive and social construct to evaluate the use of technology tools in practice. Social norms and image are variables that create context depth, or the absence of depth, for the user to engage in using the new system tools (Venkatesh & Davis, 2000; Chismar & Willey-Patton, 2003). Cognitive factors that influence the PU are job relevance, such as, how does this electronic tool pertain to my job, output quality, which is the individual's perception of how well a system performs tasks necessary for his/her practice, and results defined as the operational outcome resulting from using the technology (Venkatesh & Davis, 2000; Chismar & Willey-Patton, 2003). These components give additional credence to the adoption confidence by the clinician using the electronic clinical tools. Additionally, when planning training initiatives or implementation strategies for new electronic clinical tools, all the aforementioned variables contribute to the success or adoption of the tools in practice (Peck, 2005; McGongile & Mastrian, 2009).

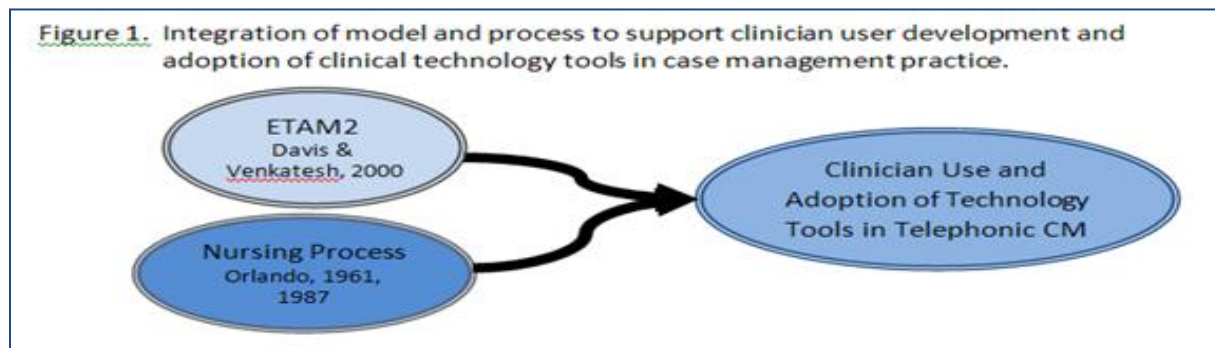
The model is used to evaluate user confidence levels, before and after implementation of the new case management clinical tool package. It also explores the extent to which the clinician is using the new tools, and identifies the effects of the strategies used in the delivery of clinical technology tools (Ammenwerth et al., 2003; Seeman & Gibson, 2009; Eley et al., 2008; Houser & Johnson, 2008; McGongile & Mastrian, 2009, Peck, 2005; Venkatesh et al., 2002). The goal is to integrate nursing clinical practice with the telenursing clinical IT tools (Venkatesh et al., 2002; Peck, 2005).

### **Nursing Process and ETAM2 Theory for the Telehealth Technology Project Theoretical Framework**

Through a systems change project, development of clinical technology tools in telenursing practice is not in itself sufficient for advancing the practice and the delivery of care management

services. Rather, the “acceptance and adoption” of that technology decides the use of the application, and ultimately the success of the technology implementation within the organization, and eventually, the use in clinical practice delivery. This then affirms practice advancement and theory support (Ammenwerth et al., 2003; Chismar & Patton, 2003; Houser & Johnson, 2008; Davis & Venkatesh, 2000; McGongile & Mastrian, 2009).

The nursing process guided the design and development processes of the technology tools, the interface with staff work groups for geriatric health assessments, telephonic practice work flows, data point consolidation, decision making triggers and the beneficiary centric care plans. The ETAM2 framed the strategy and factors by providing variable direction measurement, training, and implementation strategies for the clinical tool package. Together, as illustrated in Figure 1, the nursing process and ETAM2 framed (1) identification of what data points from which sources would most inform telenursing practice engagement, (2) definition development of patient identified problems, and how to optimize information technology to guide the data collection and provide for decision making tools to support those actions, (3) the selection of patient goals that would systematically produce triggered intervention(s), (4) execution and documentation of all the aforementioned in both clinical and system technology language for clinician and product development use, (5) evaluation and redefinition of care delivery to meet the objectives set forth in the change project, and (6) construction of process flows for new technology applications and clinician practice engagement (Ammenwerth et al., 2003; <http://www.uri.edu/nursing/schmieding/orlando/schapters/files/SageNJS1.pdf> , 1987).

**Figure 1 Technology Tool Adoption through Telehealth Model Design**

The scope of the change project required utilization of a combined model to support execution of the development of the clinical technology tool package, and the demonstration of clinician's adoption of the tools in telenursing care management practice. To support the success of user adoption of technology tools in practice, research by Venkatesh et al., (2002) demonstrates the positive correlation between attending to a user's interests and concerns before, throughout, and post, development, training, and implementation of new technology systems.

### **Literature Review and Synthesis: A General Introduction**

As discussed, the scope of this project was interdisciplinary, and as such required the researcher to be sensitive to terminology, practice, and implications of change across disciplines. The review of literature required for this project needed to accommodate both the practice of telenursing care management, and the use of electronic technology tools to support practice. Doing so further expanded the review to the examination of costs, benefits, implementation, and satisfaction in using electronic tools, and the adoption of electronic tools in daily practice. Electronic health information, electronic clinical practice tools, and the exchange of information between beneficiary and nurse is essential to assure quality (Anderson, Kimmel, Newbold, O'Steen, & Sauls, 2008; Cohen & Cesta, 2001).

Case management is "a collaborative approach that focuses on the coordination, integration, and at times the direct delivery of beneficiary services placing internal controls on the resources used for care; such management emphasizes early and thorough assessment and intervention,

comprehensive care planning, inclusive of service referrals” (Cohen & Cesta, 2001, p.7). A collaborative case management model encompasses a joint process among interdependent parties or data sources to support the beneficiary along the continuum of health (Cohen & Cesta, 2001; Kappas-Larson, 2008). Over time, this type of model has the potential not only to be user friendly to the consumer, but has the prospect to reduce utilization cost and improve quality outcomes (Cohen & Cesta, 2001).

Every organization works best with some model of care established at the onset of practice (Cohen & Cesta, 2001; Mullahy & Jensen, 2004; Reed & Shearer, 2009). According to Bailey’s (1998) writing on care coordination, geriatric care management has existed since 1971; she highlights several programs that work to keep frail elderly in their homes by using a variety of professional and paraprofessional support teams. Kaiser Permanente Health Foundation has had multiple initiatives over the past two decades that have pioneered case management specifically for geriatrics, veterans, and individuals with chronic conditions like diabetes, heart failure, and chronic obstructive pulmonary disease (Bailey, 1998; Thompson, 2008; Coye, Haselkorn, & DeMello, 2009).

### **Understanding Telenursing Care Management, Technology, and Outcomes through the Literature**

With health care reform and clinician demand and supply challenges prevailing, telenursing care management is positioned to address the challenges looming over our health care system with regards to resource access and the health management needs of an aging population (Swann, 2007; Sevean, Dampier, Spandoni, Strickland, & Pilatzke, 2008; Car & Sheikh, 2003). What remains paramount in care management delivery, specifically telephonic, is a presence of what assures quality practice for the recipient, the client, the profession, the system, and the industry (Mullahy & Jensen, 2004).

In populations where health literacy, communications barriers, limited access to care, and chronic illness and aging are present, contributions of telenursing to address these healthcare gaps are well documented (IOM, 2001; Peck, 2005; Mullahy & Jensen, 2004; Bowler & Blake, 2007; “Program

identifies patients”, 2008; Car & Sheik, 2003). Telenursing has the ability to assess a health challenge, monitor symptoms and behaviors, teach on a health topic, collect data remotely, intervene remotely if symptoms or behaviors necessitate, and provide caregiver support. Engaging a multidisciplinary team, telenursing delivers holistic and comprehensive care to a patient in the home through the use of computer technology and the telephone. Working to mitigate barriers and disparities in the healthcare system through patient advocacy, the telenurse travels the continuum of health, self management, and risk prevention with patients and families (Powell, 2000; Mullahy & Jensen 2004; Bailey, 1998).

Peck (2005) suggests that telenursing has the potential of standardizing nursing practice; however, many in care management are not prepared to use information technology. New technologies are being introduced that address patient care and safety while reflecting nursing workflows and processes. Principal to this evolution in technology is an interdisciplinary collaborative team of healthcare and business professionals positioning to meet the needs of our nation’s healthcare goals for the 21<sup>st</sup> century (McGongile & Mastrian, 2009; Anderson et al., 2008).

The intent of a care coordination or disease management telephonic program is to support beneficiary goals for self management with often chronic and complex health conditions (Cohen & Cesta, 2001; Powell, 2000). The broad categories usually looked to as indicators of results achieved through care management are: (1) clinical outcomes, (2) financial/economic outcomes, (3) humanistic outcomes, (4) quality outcomes, and (5) organizational, administrative and systems outcomes (Powell, 2000). Best practice considers components of each indicator and research is continually needed to refine, as well as define the components necessary for specific customization for organizations (Cohen & Cesta, 2001; Powell, 2000). Herein lies challenges in capturing measurable and reportable outcomes of care management practice; well known in that arena are the demonstration projects on care and disease management initiatives that have been underway through the Centers for Medicare and Medicaid Services (CMS) (Bott et al., 2009). The initial findings from the CMS’s projects included more



than three hundred thousand beneficiaries participating in varied payer programs over twenty one months and indicated a reduction in utilization and fee cost did not achieve the intended expectations (Bott et al., 2009). The questions that remain from these projects beckon further examination of strategies for engagement, identification of targeted groups, and definition or refinement of interventions associated with the care and disease management for reporting program outcomes (Bott et al., 2009; Kapp, 2008).

### **Clinical Decision Support to Outcomes from Case Management Practice**

Most clinicians provide a clear narrative picture of a patient's health state. The challenge unfolds in transforming that narrative into a quality assurance document support payment, program integrity, and measurement of what has occurred during the engagement between the patient and the clinician. According to McGongile & Mastrain (2009, p. 195), "The ability to measure outcomes can be enhanced or impeded by the way an information system is designed and used." Standardization of nursing terminology and compatibility between data sources is paramount in assuring the right information is present at the point of contact for the patient and the clinician (Lunney, 2006; Saba, 2001; Liu, Wyatt, & Altman, 2006; <http://www.omahasystem.org/>).

### **Summary Overview of Technology and Implications for Nursing Practice**

Slow to technology development has been that which defines nursing care: patient identification of problems, goals, interventions, and outcomes (Swan, Lang, & McGinley, 2004). These authors extensively capture the importance of using evidenced based nursing, clinical expertise, patient preferences, and that which brings to reportable data fields the often invisible "do" of what nursing engages (Capezuti et al., 2008; Cohen & Cesta, 2005; Saba, 2007). Clinical transformation projects that give voice to the practice of telenursing care management are leadership initiatives for change (Anderson et al., 2008).

Literature supports the transformational change in technology systems as being most successful when initiated and implemented by a collaborative team with strong clinician leadership committed to evidenced based practice as a major goal for the nursing process and outcome measurement (Anderson et al., 2008; Swan et al., 2004; McGongile & Mastrian, 2009; Lu et al., 2006). Key to this project was an examination of standardized nursing terminology, available technology systems to support telenursing care management, and the integration of these two developments into a clinical tool package for practice in the GCS business unit.

### **Chapter 3. Methods**

#### **Aim**

The aim of this study was to evaluate the change in telenursing care management practice for GCS by designing clinical technology tools and engaging staff in the use of those tools. Further, the clinician's perception of using the new technology tools in practice would be identified. Through staff engagement in the project, it was hypothesized there would be greater practice satisfaction using the new technology tools than those currently utilized.

#### **System Change Project Design**

The clinical tool package product development resulted from a qualitative descriptive approach using data obtained from telenursing focus groups, centering on the utilization of the nursing process in case identification and care planning practices in telehealth GCS (Orlando, 1987; Melnyk & Fineout-Overholt, 2005; <http://www.uri.edu/nursing/schmieding/orlando/schapters/files/SageNJS1.pdf>). Each focus group lasted forty-five to sixty minutes in duration and met five times over eight weeks. In addition, this group of participants exchanged written and email information on telenursing care management, case identification, and case formulation process improvement options. An open, flexible, and repetitive data gathering strategy on the telenursing process was implemented over an eight week period of time to design and develop the clinical tool package (Melnyk & Fineout-Overholt, 2005, p. 287). Appendix A contains the question guide for focus group data gathering on the clinical tool package product development.

A quantitative-pre/post survey design employing the ETAM2 adapted survey questions (Venkatesh & Davis, 2000; Appendix B) was used to measure acceptance, process, training, socialization, and implementation of the new clinical tool package. The independent, or changed variable, was the clinical technology tools available post product development and implementation. The dependent variable, or that which had or received the effect, was the clinician's use or acceptance of the new

clinical technology tool package (Melnyk & Fineout-Overholt, 2005). Adapted ETAM2 questionnaires were given in July 2009 and February 2010, two separate measurement intervals reflective of training, socialization of new processes, and post implementation release usage.

Focus group discussion included training and learning needs for telenursing care management technology tools (Appendix A). The components of ETAM2, and theories of adult learning, were used to construct training modules for instruction on the operational and functional learning necessary for the new clinical technology tool implementation (<http://www.blog.klpnow.com/2008/01/andragogy.html>; Venkatesh & Davis, 2000).

Before the new clinical tool package was released to operations, all staff participated in training, socialization, and implementation of the new practice model enhancements and functionality. Staff participation in training and implementation was mandatory. Utilization of available clinical technology tools for telenursing practice was a requirement of employment. All staff attended training on the new clinical technology tools. Over the course of implementing the new technology in practice, a total of thirty two hours of training support was provided to staff. At varying levels of the clinical tool release to production, each staff was offered the adapted ETAM2 self assessment questionnaire with assurance of response anonymity. Questionnaire completion was voluntary and estimated to take five to fifteen minutes per participant per questionnaire.

## **Participants**

Participants in the focus groups, and the self assessments, were registered nurses who practice in telephonic care management for a geriatric Medicare population. Out of the twenty-four original nurse participants, five have advanced certification as case managers. Cumulatively in GCS within the organization, there exists more than four hundred years of varied and comprehensive nursing experience. Prior to engaging in focus group sessions for clinical tool package development, telenursing clinicians were invited to participate in a self assessment of their current usage of technology tools in

daily case management practice (Appendix B). All clinicians were provided project purpose and study information overview, work group facilitation direction, and assurance of data feedback anonymity (Appendix C).

Telehealth nurse participants are on the GCS staff, and were most familiar with the current technology system in use. All were directly impacted by the implementation of new clinical technology tools for case management. The nurse's feedback, observations, and vision provided insight to the informatics project development initiative. The telenurse provided firsthand operational usage of the current and new technology system, its functionality, and subsequently, insight to the degree in which the tools reflect their telehealth case management practice. Recognizing that telehealth case management is not isolated to the discipline of nursing, clinical technology tool development feedback was invited and received from social work, medicine, and business operations staff.

### **Risk and Benefits of Participation**

Recruitment of subjects was an invitation to all 30 telenurse care managers employed within the GCS organization for a private health plan within the Twin Cities from April 1st, 2009 – April 30<sup>th</sup>, 2010. A staff email and hard copy notification with description of the project were sent to each care manager with an explanation of the project (Appendix D). IRB from St. Catherine University granted approval for the study as did the organizational business unit (Appendix E & Appendix F).

For the investigatory product development portion of the change project, the researcher planned for, at minimum, a representative from each of the five care management subunits to assure representation across the GCS organization. All task group written responses were shared as an aggregate response with no identifiers back to the participant. Participation and feedback through focus group discussion and survey completion was intended to inform the organization, telenursing, and the industry on potential design of case management practice tools. There were no foreseen risks to focus group project participation.

All staff written responses on the adapted ETAM2 was shared as aggregate response data with no identifiers back to the participant. Participation and feedback through ETAM2 questionnaire completion was intended to inform the organization, telenursing, and the industry on telenursing technology tool usage and adoption of tools in practice. There were no foreseen risks to project survey participation.

Benefits of participation, in the focus group for tool development and the ETAM2 survey completion to measure clinician usage of new tools, were immeasurable for telenursing and nursing informatics (Swann, 2007). Through participation, subject matter experts (SME's) were invited to share their experience, knowledge, vision, and practice needs for telephonic care management with a lens to reflect best practice and measure outcomes for case management. Establishing care practice models and electronic care systems that accurately reflect telehealth nursing care has extensive implications not only for our organization's current and future work, but for nursing informatics knowledge and the health care industry (Kaplan & Litewka, 2008; Swann, 2007).

### **Research Questions**

For the development, training, and usage of the new clinical technology tool package associated with this project, the null hypothesis was there will be no change in the usefulness, ease of use, or job relevance associated with the new clinical technology tools among the telenursing clinicians within the organization. This project presented an opportunity to explore additional questions on the use of technology tools in case management. First, would clinicians agree that current clinical tools (assessments and care plan functionality) do not reflect telenursing care management practice effectively, and would there be a significant change in reflecting their practice with the new clinical tools? Second, what would the impact on telenursing practice be in using the Clinical Clipboard (CCB) and the telenursing care practice model, for case formulation and case identification in telehealth care management? Third, what factors influence telenursing technology acceptance in the use of the clinical

tool package? And finally, would new training initiatives and user technology adoption processes for the clinical technology tool products (assessment, CCB, contact log) better support and reflect the telenursing practice than legacy tools and training that were in place prior to the new clinical technology tool package release?

The business required extreme sensitivity to the employee's feedback participation on product development and usage. They did not agree to blind identifiers on the survey's which limited analysis ability from a multiple regression perspective. Hence, correlations pre and post product release were based on the employer group, not on the individual user. Also, clinical technology care plans developed as a component of the clinical tool package development process was not a measured component in this project due to agreed upon time frames for project completion.

### **Tools Used**

Discussion questions both open ended and those with established responses based on a likert scale were developed and used for the product development focus groups (Appendix A). For measurement of clinical technology tool acceptance in telenursing practice, a questionnaire was developed using items from published sources (Venkatesh & Davis, 2000). Items within the published questionnaire were adapted with permission (Appendix G).

TAM scales have been validated through previous research with Cronbach alpha values of greater than or equal to 0.80 and less than or equal to 0.98 across studies and time periods (Davis, 1989; Venkatesh & Davis, 2000). Through earlier studies, adapting "terms" within the questionnaire to reflect the verb tense changes and/or nomenclature indicative of an organization's practice was shown not to affect the reliability of the questionnaire (Chismar & Wiley-Patton, 2003). Further, questionnaires for this project used a five point likert scale as demonstrated in the published ETAM2 questionnaire by Chismar and Wiley-Patton in 2003 and considered a more user friendly data collection tool. Using ETAM2 with a five point likert scale as done by Chismar and Wiley-Patton (2003) in a pilot test

confirmed face and content validity. The authors examined the reliability of the questionnaire, with wording and likert changes, for their study on pediatrician's usage of online technology. On all six constructs or model factors, the Cronbach's alpha values were above 0.70, the acceptable range by the literature, and most were above the 0.80 which is considered very good (Chismar & Wiley-Patton, 2003, p.160c). ETAM2 questionnaires (Appendix B & H) were given to staff in paper pencil format and responses were consolidated into aggregate information tables.

### **Data Collection**

Prior to clinical technology tool product development in focus groups, case management clinicians' usage of current technology tools, and their framework for practice was established using a modified ETAM2 questionnaire (Appendix B). Utilizing Appendix A to guide focus task groups during product development, data were collected from April 2009-June 2009.

Guided by Appendix A, the researcher consolidated the meeting minutes, feedback documentation received from participants, and returned the aforementioned to focus group participants for further refinement and clarification. Subsequent to each meeting and/or receipt of an email from a focus group participant, this process, information receipt, consolidation of themes, and return of that information to participants for further insight, was repeated throughout the eight week focus group engagement. In July 2009, utilizing the adapted ETAM2 questionnaire, data was collected prior to training, socialization, and implementation of new clinical tool products, and again, in February 2010, three months post implementation of new clinical tool products excluding the care plans.

### **Evidenced-based Project Implementation Plan**

This system change project, clinical technology tool design, training, and the implementation of those tools in GCS within the organization, was framed by planning, doing, studying, and acting (PDSA) in a cyclical pattern April 2009 through May 2010 (<http://www.ihi.org/ihi>; Deming, 2000). Several



authors would agree that research in practice requires discovery, summary, integration, and evaluation in an ongoing repeated cycle to support system change when engaging in research in practice settings (<http://www.ihl.org/ihl>; Deming, 2000; King, 2008; Capezuti et al., 2008).

### Timeline, Resources, Budget, and Technology

As reflected in Table 1, extensive interdisciplinary resources were used throughout the time frame of this project. This project provided for opportunity to bring clinical and technology teams together, thereby creating a synergy, for product development of technology tools that were reflective of telenursing case management practice.

**Table 1** GCS resource use in telehealth case management technology tool development and adoption of tools in practice.

Timeline Discipline	April/May 2009	June/July 2009	August/Sept/Oct 2009	Nov/Dec 2009	Feb 2010	Mar-July 2010
Researcher – Facilitator, Writer, Design	1	1	1	1	1	1
GCS Leadership Budget & Model Approval	10	10		10		10
GCS Case Management Staff	25 D	30 CT/S	0 S	50 CT/S/I	50 S/I	50 CT/S/I
Training	N/A	1	1	1	1	N/A
Clinical Tool Package Testing	N/A	N/A	10	10	N/A	5
Business Analyst	1	1	2	2	2	1
Programmers	0	8	8	6	0	1
Reporting/Analytics Staff	1	1	0	0	0	2

Numbers above reference the total people involved in each category    **D**= Design participants;  
**CT/S**= Class Training/Socialization on Clinical Tool Package;    **I** = Implementation of Clinical Tool Package

### Return on Investment (ROI)

Technology upgrades in an organization such as telehealth are capital intensive expenditures. The onetime expense, programming development costs, required to create the new technology tools for

telehealth case management consisted of assessments, contact log, and the clinical clipboard totaling 8,605 programming hours. Additional assessments and corrections to the formatting equaled 1,989 programming hours, and the care plan programming hours added an additional 10,498 hours, for cumulative development hours of 21,092 and dollar cost of \$590,576.00 (Univitahealth Project Plan, 2009, 2010). Time spent on design and user acceptance is instrumental in assuring that technology enhancements and technology applications for clinician use is user friendly and reflective of practice. Technology systems that “do not reflect the work of the clinician”, “interrupt the process flow of the clinician’s work” or are not “accepted” by clinician users, become an employee relations and financial issue for the organization. A technology system that strains human resources leads to turnover in workforce, and a technology system that does not capture the work being done for reporting and validation purposes negatively affects contract commitments and business relationships for an organization (Houser & Johnson, 2008; Seeman & Gibson, 2008; Peck, 2005; Venkatesh & Davis, 2000).

Return on investment (ROI) is recognizing that without upgrades to technology tools, business opportunities for case management are lost. Securing a case management client contract for a five-year period brings eight to thirteen million dollars in revenue to the organization and provides customer references for new business opportunities. Losing contracts can be costly to the organization’s financial bottom line. Likewise, gaining a business contract can be a lifeline for a company’s financial growth. This project provided technology enhancements to the current computer system for case management which was a vital component in securing the five-year contract for GCS customer account.

Beyond the scope of this project, but a valuable exercise for ROI, is recognizing GCS turnover in the year previous to the release of the new clinical tools. Clinician turnover in GCS prior to the release was approximately four percent, compared to no turn over in clinical staff in the past eight months since the tools have been released to production. ROI for future study consideration is to examine efficiency

time and quality in clinical decision support for case management before and after the implementation of new technology tools.

Referrals to telehealth case management within GCS have increased in the past year, consequently, increasing care manager case loads. During that time, there has been no increase in clinical staff positions. Service level agreements with the client have been maintained, and new business development opportunities have been presented (Univita Health, 2010). An additional future ROI research area to examine is the financial impact of the efficiencies in place with the new clinical technology tools as it relates to increased case loads and case management outcomes for client accounts and practice.

### **Support from the GCS Organization and Employment Site**

Organizational leadership was an early partner in this project and became critical to the sustainability of the change. Site and development dollars for the technology changes necessary to execute the scope of this project were received from the organization (Appendix F). An independent audit in 2008 on the case management technology tools expressed that staff was eager for technology tools that were user friendly and reflective of their telehealth practice (Mercer Report, 2008; Univita Health, 2008). Participation response in the focus group by more than eighty percent of case management telehealth staff in the development of the clinical technology tools demonstrated staff support of this project.

### **Ethical Considerations**

As discussed earlier, professional nurses have an inherent ethical responsibility to be grounded in practice that is reflective of the experience that takes place as the patient adapts and reacts to the presence of that which alters his/her health story (Roy, 2007; Roy & Jones, 2007; St. Catherine University, 2009). Recognizing the data capture of that relationship was not occurring in the telenursing

practice area, nor was the collected data in care planning readily available to the clinician, this system change project evolved as a means to give voice to case management and provide data tools that captured practice.

Seeking to deliver best practice, clinicians and organizations using technology tools for practice and data capture have the responsibility to participate in the development of those tools to assure accountability to the profession. Data integrity and maximizing access to that data for clinical decision support at point of care contact is paramount to quality case management telenursing practice.

Conducting research in a business healthcare practice setting demonstrates interdisciplinary collaboration, but can produce some ethical challenges for the researcher. For example, the scope of a project that gives interdisciplinary voice, while optimal for collaborative practice and reflective of the organizational structure, produces research challenges from a gold standard perspective (Melnyk & Fineout-Overholt, 2005; Capezuti et al., 2008). Remaining focused on project design, methodology, and an implementation plan, while considering the immediate action needs of the business setting as a project is underway, requires continual dialogue, negotiation, compromise, and at times, concessions between business and research expectations (<http://www.ihi.org/ihi>; Deming, 2000; King, 2008).

There are many levels of established research that offer validity to learning and practice (Capezuti et al., 2008). Nurses practicing outside the scope of the traditional care environments have opportunity for interdisciplinary research in action as subject matter experts (SMEs). This project, while not a randomized control gold-standard type design, addressed gaps in technology case management tools to reflect practice requiring change theory, research in action, and collaborative discipline research from the SMEs participant perspective (Pettigrew, 1990; Melnyk & Fineout-Overholt, 2005; Capezuti et al., 2008; Deming, 2000; Faulkner & Thomas, 2002; Rose, 2003). Research on the development of technology practice tools and the clinician's use of those tools in practice, is an ethical responsibility of

the advanced practice nurse in leading decision making at point of care contact in telehealth (McGongile & Mastrian, 2009).

## **Chapter 4. Data Analysis**

### **Participation and Questionnaire Response Rate**

The project examined the design and clinician acceptance of new clinical technology tools for case management telehealth practice in GCS. Of thirty telehealth case management staff available to participate in focus work groups for clinical tool design, twenty-six (86%) actively participated in providing verbal and written feedback to the process over an eight week time period.

In examining the impact and acceptance of the new technology tools in case management practice, thirty adapted ETAM2 questionnaires were distributed to telehealth clinical staff within GCS and twenty (67%) were returned and deemed usable. According to the University of Texas Instructional Awareness Research on Survey Tools, classroom paper pencil survey response return greater than 50% is good (<http://www.utexas.edu/academic/diia/assessment/iar/teaching/gather/method/survey-Response.php?task=research>). Aggregate clinical staff data pre and post design, development, and implementation of the new clinical technology tools in telehealth practice were statistically analyzed.

### **Data Format Capture Related to Organizational Vision**

Due to the sensitivity of employee privacy rights and GCS leadership, the organization's request was for the researcher to not access and match individual question responses pre and post. This provided an organizational view of the product and its usefulness and accountability to the team versus individual user preference for the technology. The organization and leadership measurement interest was on a product with sustainability that was internally and collaboratively generated by an interdisciplinary team and one which demonstrated outcome and performance accountability for the telenursing case management business unit (Porter-O'Grady & Malloch, 2007). To accommodate the request, data units were correlated as an aggregate response on each question as opposed to the individual's response to the questions.

### **Focus Group Design Input on Clinical Technology Tools for Case Management**

The focus group began with the directive to improve identification and formulation of cases for telehealth care management practice. Extensive documentation of feedback was compiled on focus group technology tool discussions. Summation of that information is found in Table 2.

Illustrated in Table 2 are seven themes which emerged to support the development of new technology tools for case management. The discussion common themes displayed in Table 2 acknowledge the key direction from staff on rationale to support the identified themes for the development of technology tools. Development actions taken for the technology tools incorporated the clinician themes and purpose described by staff as validation for the technology enhancements. Nursing process and care management practice protocols common to the industry, were essential to best practice delivery identified by staff (Bodenheimer, Lorig, Holman & Grumbach, 2002; Whitelaw, 2006, 2009; Capezuti et al, 2008). Maximizing the availability of data on the beneficiary for use in clinical decision support was recognized as essential in designing new tools. Minimizing redundancy and complicated technology efforts necessary to perform job tasks was vital for case identification and case formulation.

Lengthy discussions evolved related to “reporting outcomes of case management”. Clinician consensus varied on a uniform point of outcome measurement. Agreement centered on a comprehensive overview of actual or potential outcome measures based on the actions or touches that occurred when the patient was in case management. Table 3 captures the essence of varying touch points in the lifetime of a case, and identified by staff as potential benchmarks, for outcomes measurement for case management. Staff agreed that the nursing process and the five clinician practice intervention areas common to telenursing case management provided a starting point for reporting intervention outcomes. Further, concurrence revealed the more automated the technology

was to capture these themes and elements described in Tables 2 and 3, the more successful the reporting ability for the organization.



**Table 2** Themes, Purpose, and Actions for Development of Telehealth Clinical Technology Tools April 2009-July 2009.

<p><b>Emerging Themes:</b> Clinician direction for Telehealth Care Management Practice and Proposed Clinical Technology Tool Development</p> <p>April - August 2009</p>	<p>Tools to assess physical, social, psychological, functional, and cognitive health, as well as efficient access to health history including claims, pre-certification information, pharmacy history, and socio-demographic insight</p> <p>Case Management Industry Standards (CCM)</p>	<p>Use of the Nursing Process important to reflect practice</p> <p>Technology to reflect practice is an easy way that demonstrates outcomes of GCS case management</p>	<p>Care Plan Technology tool that accounted for the nursing process in its entirety with fluidity and outcomes that reflected case management care delivery, minimize text field entry, and inform practice efficiency</p>	<p>Regardless of "Identified problem or challenge" that entered the beneficiary into case management, there were three areas that clinician's took a "deeper dive" into exploring to further inform on next steps in care delivery</p>	<p>Regardless of "Identified problem or challenge" that entered the beneficiary into case management, there were six repetitive parameters that surfaced in case management practice</p>	<p>Goals are established based on the urgent physical or safety needs of the beneficiary first, followed that which the beneficiary identifies as workable</p>	<p>Interventions arise from holistic assessment of the beneficiary + the identified problem + the level of need around that problem + further identified area to be addressed related to that problem</p>
<p><b>Purpose:</b> GCS Practice Tools for Case Identification and Case Formulation in Telehealth Case Management in the organization</p>	<p>Enhancements in system to provide for case identification and case formulation in a consistent practice delivery model for care managers.</p> <p>Technology supports practice and provides for accountability. Quick consolidation and easy access to all data</p>	<p>Useful to the clinician, easy to use, related to case management, and reported/ reflected practice and beneficiary outcomes</p>	<p>System logic recognized actions taken in practice and logged subsequent actions based on protocol and established policy/ practice definition.</p>	<p>Assessment of Knowledge, Behaviors, and Symptoms associated with the identified problem or challenge informs practice and measures change over time</p>	<p>These parameters were captured and defined as Area(s) of Concern (AOC).</p> <p>AOC's further identified needed intervention action within the core problem identified for case management</p>	<p>Goals result from identified problem + AOC. Status of the goal needs expansion to account for that which is defined "achievable or unable to achieve"</p>	<p>Interventions arise as actions to support goal attainment.</p> <p>Further system logic addresses case management practice area protocol.</p>
<p><b>Actions:</b> New Clinical Technology Tool Development</p>	<p><b>Added Assessment Tools:</b> General Health (initial, follow-up, &amp; discharge) Medication Nutritional Health CAGE COPD Diabetes Heart Failure</p> <p><b>System Efficiency Tools</b> Contact Log Clinical Clipboard</p> <p>Best Practice Literature Scope of Practice Interdisciplinary</p>	<p>Technology development maximized clinician (SME) input and literature support for the nursing process, and elements that maximizing user (clinician) acceptance of technology in practice.</p> <p>All new clinical tools defined to SME's understanding</p>	<p><b>Workbook Area</b> Captures - <b>Collaborative interdisciplinary practice</b>- -<b>Progress</b> on interventions and -<b>Reason for progress</b> at point of care -<b>Dashboard</b> lists all opened/ worked problems, goals, and interventions -Problem list to CCB -<b>Calendar</b> update status of problems</p>	<p>1-5 likert <b>Health Rating scale</b> problem identification/ assessment</p> <p>System calculates cumulative and individual scores of functioning level of the beneficiary within knowledge, behaviors, and symptoms based on the clinician's input. Can be used multiple times through care planning process</p>	<p><b>Areas of Concern (AOC)</b></p> <p>Activity Coping Medication Nutrition Prevention SelfManagement</p>	<p>1300 unique goals developed, and system logic refines selection for user based on identified problem and AOC.</p> <p>Status of the goal: Initiated In Process Not an Issue Achieved Unable to related to: Beneficiary Choice Chronicity of Condition Death Hospice Hospitalization Other Skilled Nursing Facility Rehabilitation</p>	<p>5300 interventions developed, system logic refines user selection based on goal ID</p> <p><b>System identifies 5 clinician practice areas of telehealth case management</b> for reporting</p> <ol style="list-style-type: none"> <li>1) Further Assessment</li> <li>2) Coordination/ Collaboration of Services</li> <li>3) Symptom Monitoring</li> <li>4) Coaching, Teaching Guiding</li> <li>5) Additional service delivery not included in the above, i.e. benefits management</li> </ol>

**Table 3** Recommendation on Data Elements for Reporting Telehealth Case Management Outcomes

Option	System Data	Enhanced Assessments	Problem Rating	Areas of Concern	Goal Status	Interventions
Outcome Measurement (Benchmark)	Claims and Utilization data pre post case management participant	Assessment change pre post case management	Rating Changes over time	Specific areas of care related to the problem identified for measurement change	Further insight to outcome is greater than Achieved or Unable to Achieve ...deeper definition provides clarity to outcome	1) Further Assessment 2) Coordination/ Collaboration of Services 3) Symptom Monitoring 4) Coaching, Teaching Guiding 5) Additional service delivery not included in the above, i.e. benefits management

Data elements gathered from April 2009 through July 2009 in staff focus work groups in GCS telehealth case management.

Final discussion topic of the focus group was related to staff input on the implementation process of technology tools. Table 4 displays the staff identified benchmarks for a technology release, clinician comfort with technology tools, and their view of what makes successful outcomes for case management.

**Table 4** Recommendation on Training and Socialization of Technology Tools in Case Management

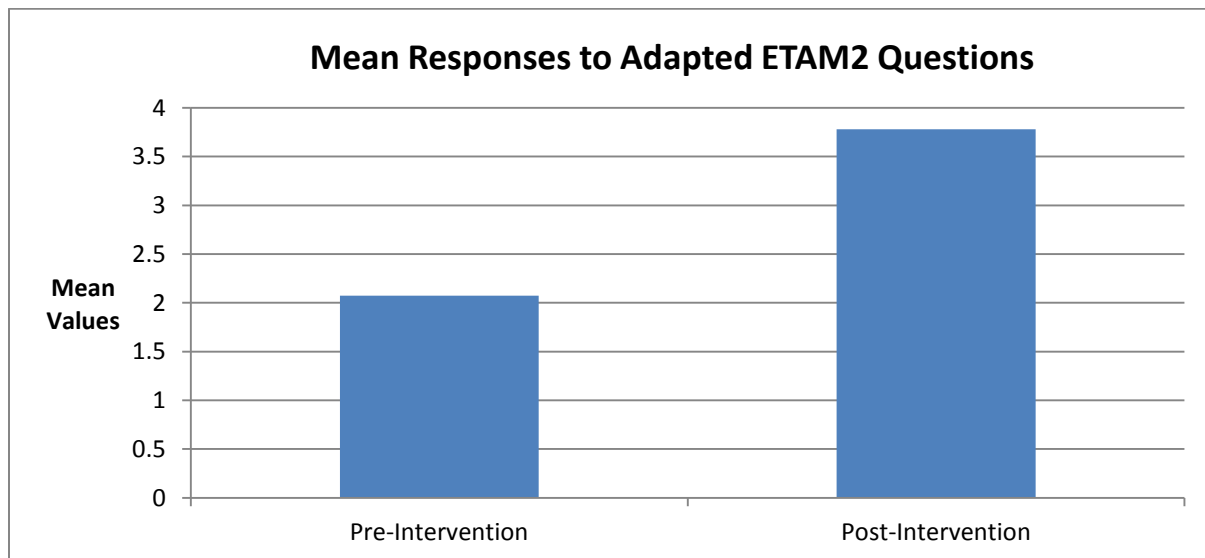
Recommendation	Rationale Captured from Discussion Themes
Staff input to technology	Subject Matter Experts (SME) while not technology experts know their process. With SME input to design the technology tools would reflect practice and meet SME needs.
Easy to use tools	Cumbersome technology steps (i.e. 5 clicks to get where I need to be to see or enter information) inhibit clinician's efficiency.
Make the tools work for us in what we do in case management	If technology does not follow process, "workarounds" affect reporting as information is not captured. Technology should work for the process, not the process adapted to fit the technology.
Give us time to learn about the tools	Historically, introduction of new technology to practice and the actual implementation or release has occurred within a week to ten days; as clinicians, technology is not our primary comfort learning zone, and a longer timeframe would be helpful to understand the why and the how of the technology.
Give us time to practice with the tools	Historically, introduction of new technology to practice and the actual implementation or release has occurred within a week to ten days. Such a small window of time has not provided for practice time to obtain any type of comfort level with the tools before the expectation of use in practice.
Limit the testers for the tools	Historically, all clinicians are expected to "test" the product prior to release of the technology. This expectation has increased anxiety use as the testing historically has involved many negative testing features. "Negative testing" means things the technology is "not" suppose to be able to do, however with the short window of introduction of the technology going right into testing, the clinician does not at this point even know what the technology is "suppose" to do. This type of involvement "user acceptance testing" has always been a challenge for the organization due to available clinician skill set with technology applications, and limited business technology analyst (BTA) understanding of case management.
Have support for the release from a clinicians view point	Historically, the technology support has been marginal and learning around that support more punitive in nature. Example provided, clinician will report the "system is not working for XYZ that they are doing", BTA will respond, "it's a user issue" or "the system is responding correctly". Frustration unfolds for the clinician, and they BTA is still not informed of the scope of the issue, and ultimately the problem remains. Acronyms are used in every practice arena; this becomes a barrier between clinical case management practice and technology developers or BTA's.

Data elements gathered from April 2009 through July 2009 in staff focus work groups in GCS telehealth case management.

## Mean Differences Pre and Post Intervention of New Clinical Technology Tools Implemented in GCS

Mean differences, between pre and post technology tool development and implementation in GCS telenursing practice were measured. There was significant change among the telenursing staff surveyed in the usefulness, ease of using the tools, and the relevance of the technology tools to the practice of GCS case management. Post implementation of the new clinical technology tools, a higher overall mean score of 3.78 resulted on the acceptance of the tools by telenursing clinicians in GCS within the organization. Figure 2 illustrates that each time the thirty questions from the adapted ETAM2 scale were given the aggregate mean responses were higher post implementation of the new clinical technology tools.

**Figure 2 Mean Responses to Comparable Questions Pre and Post- Intervention/ Implementation of New Clinical Technology Tools in GCS.**



Pre-Intervention refers to baseline questionnaire responses from Telehealth Case Managers on current use of technology tools available for practice use in GCS within the organization April 2009. Post-Intervention refers to questionnaire responses from Telehealth Case Managers on new clinical technology tool package available post development and released to daily use December 2009. Post-Intervention questionnaires were obtained three months post usage of new clinical technology tools in practice.

The post mean score is two times greater than the pre-intervention mean score, and the post mean score is statically significant as illustrated in Table 5. Appendix H contains individual questions posed post implementation of the new technology tools in telehealth case management practice. These results indicate that clinicians had a higher acceptance of the new tools related to the usefulness, job relevance, quality output, and ease of using the tools as compared to the technology tools that were in place prior to the new technology tool package release.

**Table 5 T Test of whether the Pre-Intervention and Post-Intervention Mean Difference is Statistically Significant (The null hypothesis is that the difference=0).**

	n	Mean	Standard Error	Standard Deviation	Test Statistic
Pre-Intervention	30	2.07	0.099	0.57	-----
Post-Intervention	30	3.78	0.11	0.61	-----
Difference	30	1.707	0.18	0.96	t, (df=29)=9.72**

\*\*p<0.01

Pre-Intervention refers to baseline questionnaire responses from Telehealth Case Managers on current use of technology tools available for practice use in GCS within the organization April 2009. Post-Intervention refers to questionnaire responses from Telehealth Case Managers on new clinical technology tool package available post development and release to daily use December 2009. Post-Intervention questionnaires were obtained three months post usage of new clinical technology tools in practice.

The mean difference across the adapted ETAM2 thirty questions (Appendix H) is statistically significant from zero. The t value associated with the mean with 32 degrees of freedom is 9.72. The t-value has an associated p value of less than 0.000. This p-value indicates that the development and the implementation (training, socialization, and release) had a positive effect on the clinician's usage of the product in telenursing practice. Further, the p-value supports that doing this intervention with another sample of nineteen or twenty nurses, or one thousand nurses, there exists confidence that the intervention (development, training, socialization, and implementation process) would have a similar effect on clinicians' use of clinical technology tools for telehealth case management practice.

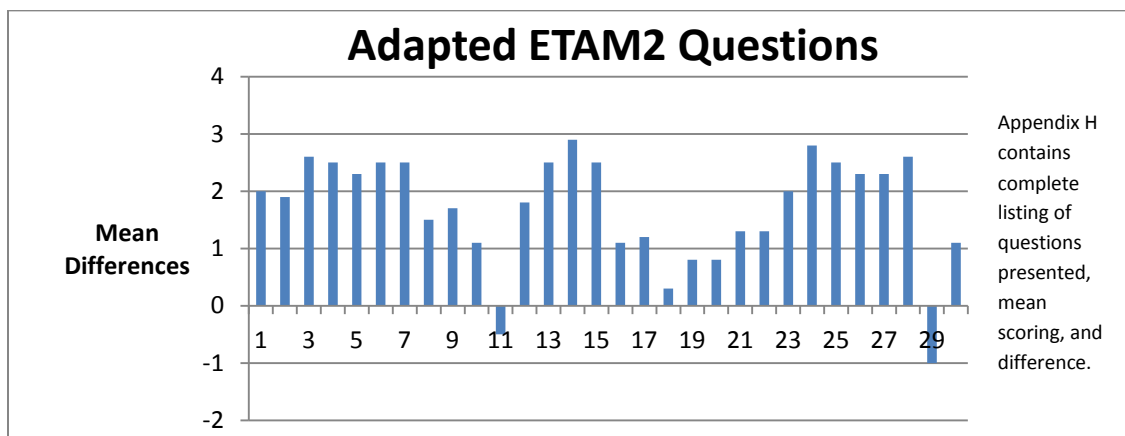
### Differences in Post-Intervention Favorability of Responses by Question and ETAM2 Group

A five point likert scale was used where a “1” indicated the clinician “strongly disagreed” with the question through “5” indicating they “strongly agreed” or accepted the presented question.

Adapted ETAM2 questions 1 through 6, fifteen, and twenty-three through twenty six speak to the extent the clinician accepted the new clinical tools and recognized their application to telenursing case management. Table 5 presents the statistically significant mean differences for each question presented post implementation of the new clinical technology tools.

Important differences between the pre and post responses on presented questions are noted in Figure 3. The questions, cited above (1-6, 15, 23-26) and illustrated in Figure 3, reveal the clinician viewed the new technology tools as enabling telehealth care management practice to be completed with more reflection of current practice than did the legacy technology tools in GCS within this organization.

**Figure 3 Mean Difference Pre and Post-Intervention by Question**

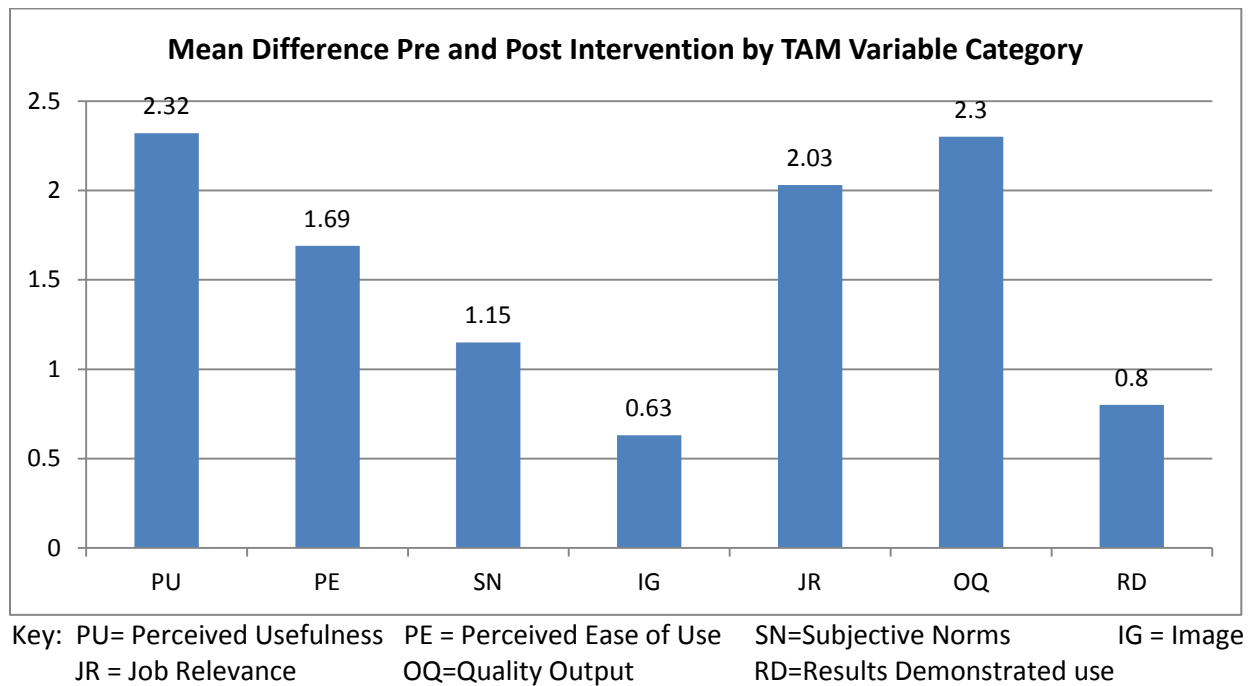


Questions related to training initiatives (7, 8, 13, 14, and 15) had very high agreement scores by the majority of the clinicians responding on the post intervention questionnaire (Appendix H) as shown in Figure 3. Training initiatives were specifically designed using the principals of adult learning and focused on making the technology tools work and speak to the needs of the telehealth care manager from a nursing process and technology acceptance model perspective, Figure 1.

Specifically question fourteen, which references “practice time with tools before release” had the second highest acceptance score among all questions asked. This is of particular importance as practice time training modules were central to the training initiative introduced with this system change project. Questions 1-8, fourteen, fifteen, and twenty-three through twenty-six show high acceptances related to perceived usefulness of the product, perceived ease of use of the product, and job relevance of the product to case management. Questions eleven and twenty-nine, low level of agreement was expected as new technology is challenging to explain to others and does require learning and practice time (Peck, 2005; Houser & Johnson, 2008; Eley et al., 2008).

Through the groupings of questions presented reflective of the ETAM2 categories, perceived usefulness of the clinical technology tools to practice had the highest agreement indicator. Questions related to job relevance of the technology tools, the output quality or how well do these new tools help the clinician perform tasks associated with his/her job, as well as the ease of using the tools in practice accounted for the next grouping of acceptance indicators for use of technology in practice.

Figure 4 shows there was relative similarity across all groups except image (IG), social norms (SN), and results demonstrated (RD). Work by Chismar & Wiley-Patton (2003) demonstrated that SN and image IG, as variables in determining clinical technology tool package acceptance, did not have a high agreement rate similar to what was demonstrated in this project and displayed in Figure 4.

**Figure 4 Mean Difference Pre and Post-Intervention by TAM Variable Category**

The results demonstrated (RD) variable or that which is identifiable from the operational use of a product is not readily visited by staff but rather a management level inquiry. RD analysis of outcome data within the time frame of this project would not be evident due to the care plan technology features of the tool package not being implemented until October 2010. Linkage analysis, for example, the correlation between the technology enhancement and the results demonstrated through either reporting of outcomes or staff efficiency studies, can be complex and unreliable to capture in an evaluation done at three months post implementation (Goodman & Rousseau; 2004; Chismar & Wiley-Patton, 2003). Hence, the questions that relate to RD would be more fully realized for acceptance early 2011.

Figure 4 expresses the relative similarity by group confirmed by ANOVA. ANOVA analysis found there was no statistical significant difference by adapted ETAM2 groupings. Presented in Figure 4 are differences by groupings for questions, for example between perceived usefulness and image, but there was no statistically significant difference in the mean values for those groupings with a resulting p value

of 0.11. For this particular analysis of data at this level, we cannot have great confidence in these differences by question groupings. More than likely this is a result of the small sample size of questions within each grouping (PU, PEOU, SN, IG, RD, OQ) and a small overall N (20) for data grouping of questions by category. Having had access to individual data for each grouping, (individual question pre to same individual question post), could have helped when answering the question of statistical significance of the questions related to those question groupings. Further it would have provided an opportunity for the use of multi-regression analysis to determine effect among and between the question groupings by individual.

### **Additional Information Gleaned from this Project**

Individual questions associated with the ETAM2 groupings demonstrated that this project had significant organizational impact with training, socialization, and implementation initiatives linked to the development and release of new clinical technology tools in telehealth case management practice. Individual survey questions illustrated in Figure 3, specifically connected with perceived usefulness and ease of using new clinical technology tools in telehealth practice, demonstrated with confidence that the new technology, the training and socialization of the product, and the implementation had a high acceptance score by telehealth clinicians in case management. These scores with mean differences that were statistically significant showed acceptance and relevance to the clinician's telenursing case management practice.

Anecdotal data shared in written form in the margins of the returned questionnaires revealed acceptance of the new clinical technology tools as evidenced by written "thank you for" (1) making nursing come alive in technology training, (2) designing tools that speak to what we do, (3) getting our voice heard, and (4) providing a system that captures what I do every day. These subjective clinician statements are not evidenced based nor reconciled with validated methodology, warrant meaningful



feedback to the organization whose directive at onset was to develop clinical technology tools that staff would use and the organization could employ to demonstrate outcomes from the technology use.

## Chapter 5. Conclusion and Discussion

### Overview of System Change Project Learning

Technology tool usage by clinical case managers is essential for professional accountability and financial stewardship of an organization. The literature and this project demonstrated the importance of recognizing and activating the “user” voice in the development, training, and implementation of technology tools for telehealth case management practice (Seeman & Gibson, 2009; Venkatesh et al., 2002). This project established early “buy in” from the staff on the technology tool design, facilitated small groups of clinician testers, and implemented early and continual training on the tools and process. The high volume of focus group participants, and the large response rate to questionnaires in this project, further suggests the topic, nursing process and technology tools to reflect case management practice, was of high interest to clinicians in telehealth practice (Peck, 2005; Eley et al., 2008; Heinzelmann, Kvedar, & Kibbe, 2008).

Based on the results displayed earlier in this paper, interventions employed to design the clinical tools and support the clinician’s acceptance of those tools in practice, are reproducible on a comparable or larger sample size of telehealth case managers. Staff feedback indicated that through the new technology tools, their practice and processes were better reflected. At point of care contact, health information was more organized, allowed them to accomplish tasks more efficiently, and provided improved insight into the potential care needs of the beneficiary. Innovative training initiatives presented throughout the pre and post implementation of the technology release were found to positively affect the clinician’s use of the new technology tools in case management practice (Training Survey, 2009, 2010). Finally, usefulness of the tools and the relevance of the tools to the clinician’s practice (or “job”), factors the literature suggests impacts the clinician’s use of technology, were found to be positively supported through this project. The technology tools produced through this project were the largest and most complex since the initial application was released in 2005 (E-Univitahealth,

2009). This supports early work that suggests a clinician will still use a “difficult” technology tool if they can relate the usefulness of using the tool and the relevance of using the tool to their “job” or practice needs (Davis, 1989; Venkatesh & Davis, 2000).

Outcomes of this project were aligned with literature on nursing process and technology tool acceptance or “adoption” (Chismar & Wiley-Patton, 2003; Venkatesh et al, 2002; Houser & Johnson, 2008; Peck, 2005; Seeman & Gibson, 2009). The added value of this project to nursing science is the environment in which the research took place. To date, minimal study on technology acceptance has taken place in a healthcare environment or telehealth practice (Chismar & Wiley-Patton, 2003; Peck, 2005).

Establishing partnerships between clinicians, information technology specialists, and organizational leadership provided the framework to build technology tools and support implementation of those tools in telehealth case management. ETAM2 and the nursing process created theoretical contribution to this project, and helped to explain the usability of the technology tools in telehealth (Venkatesh & Davis, 2000; Orlando, 1987). This theoretical base provided the foundation to merge the end product, technology tools for telehealth case management, with the forerunner, clinician practice, vision, and voice from the lived experience.

### **Limitations**

The absence of data connection on an individual user level versus a question level, small sample size, self reported colleague feedback, and scope expansion were limitations to this project. Individual pre and post question answers would have potentially provided further insight into the connection of question groupings, and their subsequent affect on technology adoption by clinicians. Through the organizations employee rights agreements, a one to one identifier on such a project could only be done by an independent resource. Timeline and budget did not account for such an arrangement, and the organization was specifically interested in team aggregate learning not individual experience.

Mixing staff and management in a research in action project has the potential for incomplete disclosure on a topic due to trepidation by staff that the employer would connect feedback responses to an individual. While there was no verbal or written indication of any apprehension in providing feedback, the researcher acknowledges the potential bias.

The scope of the project grew to accommodate business expectations and did not remain constant to the original intent. Originally, the project set out to define the conceptual model for telehealth practice, but in doing so required development of the technology tools to support the practice. Consequently for organizational change to unfold there was “scope creep” to this project. This format for study may challenge the gold standard perspective of design and methodology for research; however, it illustrates a two year research “in process design” at a worksite that delivered organizational change to case management technology tools and telehealth processes.

## **Discussion**

Twenty percent of Americans live in rural areas and only nine percent of the nation’s physicians practice there (AHRQ Report, 2005, p.1). Through improved data access in telehealth, opportunity exists for clinicians to make a difference in the lives of many who are underserved as a result of limited health care resources (Cohen & Cesta, 2005; Demiris et al., 2007). Tele-health nurses are in a unique practice environment employing telephone and computer as care tools.

At the onset of this project, the organization was seeking enhancements to telehealth processes for case identification and case formulation, and the technology tools to capture and reflect this action in GCS. The outcome of this project, the comprehensive clinical tool package, integrated the nursing process and technology programming to deliver efficiencies in case identification and case formulation. Through this project, case managers have improved access to use available health data for clinical decision making and definitive data fields that capture their workflow and engagement with the patient enrolled in case management.

## Conclusions

The clinical clipboard (CCB) makes available an electronic longitudinal patient record, which includes medical and pharmacology claims and previously logged care events. Established filters provide alerts for the care manager based on high risk medication usage and high impact diagnoses. Trigger stratifications indicative of potential care needs launch to the clipboard from enhanced assessments and guide care planning. Consolidating data from various entry points mitigates collection redundancy while maximizing existing data for clinical decision support. Data fields, developed for comprehensive care planning, are unique to the organization's GCS team and are positioned for delivering outcome reports reflective of the patient's enrollment in case management. Further, through an automated function in the care plan, a problem list develops from care plan decision making with date and action tracking measures to the CCB.

What does all this mean for telehealth case management practice? This project developed the above tools and processes to maximize available data and transform that data into organized fields for clinician access at point of care contact. Through that process it informs, guides, and reflects telenursing practice engagement for GCS clinical staff. Online assessment and care planning tools that provide insight, capture actions, and track follow up procedures, through data fields with minimal text notation, minimizes clinician documentation time and maximizes clinician case management or phone time with the patient. The aforementioned technology enhancements and processes launched efficiency tools for care managers, and for executive leadership to report and evaluate outcomes of this care engagement.

From an organizational perspective, these technology tools, and the clinician's acceptance of the tools in case management telehealth practice, give credence to the importance the system change presented. New technology applications are a huge financial expenditure. Through this project, the organization benefited from staff acceptance of tools which resulted in employee work satisfaction and

client satisfaction with deliverables of planned outcome reports that were not available prior to the new clinical tool package (Training Survey, 2010; Univitahealth CVR Reporting Plan, 2010).

Training initiatives, on the nursing process and technology tool acceptance theory, were provided early on in the design and development of the technology tools. Repetitive teaching on these topics and extended opportunity for “hands on practice” with the new technology was central to this system change. Through the staff questionnaire results, these efforts were instrumental in supporting and socializing the new technology tools in telehealth case management practice, and ultimately the “acceptance” or “use” of the tools in telehealth GCS within the organization (Training Survey, 2009, 2010).

The interventions employed in this project, focus work group design, training, socialization, and implementation recommendations for the technology enhancements, were paramount in delivering the organizational change for telehealth GCS. This effort, providing clinical voice to the design throughout the process was new to the organization. Conceptual and functionality training over a two month time period, critical to the clinician’s acceptance of the telehealth tools in practice, was also new to the organization (Venkatesh et al., 2002; Peck, 2005; Ammenwerth et al., 2003). To have positive employee usage of the technology and minimal required “fixes” on the application reflect technology acceptance and usability of the product (Venkatesh et al., 2002). This project demonstrated financial, employee, and customer feedback value to the organization.

### **Implications for Practice, Research, and GCS**

The literature documents the clinician’s frustration with technology experiences that are not user friendly or applicable to practice (Bolton, Gassert, & Cipriano, 2008). This project positively demonstrated the result of activating the clinician’s voice in technology development in a telehealth setting. Opportunities to partner and manage care for individuals who have limited access to health care resources resides in innovative outreach through available and yet to be developed technologies.

As such, advanced practice nurses need to lead conversations and partner with team members on the design of technology tools that will optimize available data and minimize “workarounds”. With DNP leadership, the same clinician voice that expresses “frustration” with technology can be utilized to build technology tools that are innovative and applicable to telehealth practice. The transferability of this project, while yet to be explored in other healthcare settings, invites action by nurse leaders.

Fragmented care, limited access to health care resources, and staffing shortages are real issues facing consumers (IOM, 2001; <http://www.chcs.org>; Bolton et al., 2008). Adding to these disparities in healthcare are inefficiencies in managing data and technology that is cumbersome. Circumstances which do not serve to inform practice, to demonstrate value of services provided, or give voice to the outcomes of engagement are indicators of needed change. The aforementioned were primary motivators for this systems change project, but they are not unique to telehealth practice. As nurse leaders, we recognize that technology is here to stay, and our responsibility is to be an active collaborator in structuring technology systems that work for the uniqueness of the clinical practice setting. This project calls for all practitioners, regardless of practice setting, to commit to solutions that provide best care practice delivery inclusive of technology tool design. The American Nursing Informatics Association (ANIA) commits to the advancement of nursing through technology, communication, education, research and professional activities ([www.ania-caring.org/](http://www.ania-caring.org/)). Disseminating this project information, as done in April 2010 at the ANIA conference in Boston, was essential for networking on the topic, and promoting future research replication opportunity.

As advance practice clinicians working in telehealth, where technology and data are primary practitioner tools, a unique voice and circumstance exists to inform the telehealth industry on outreach potential, efficiency improvements, practice reflection, and outcome identification through technology enhancements. Telehealth case management has the potential to be a focal point to address disparities in healthcare through practice and research. Through the HITECH ACT (American Reinvestment &

Recovery Act, 2009), the exchange of health information in a “meaningful way” or that which maximizes the most benefit to the consumer receiving care, is a call for advanced practice clinicians to develop technology tools that reflect practice engagement and highlight outcomes. HITECH Act and health care reform will require entrepreneurial strategies to deliver on financial, political, institutional, and consumer expectations. Nurses need to take responsibility for their professional commitment to changes in practice delivery on the horizon, such as enhanced telehealth interface and interoperability of health records across all practice settings (HIT Policy Committee, 2009). This project exhibits that by activating nursing voice and knowledge, the clinician bends technology to their practice purpose. Familiarity of technology programming is not needed, but rather a complete presence, by the advanced practice clinician, to the process of clinical technology design and implementation is vital to assuring tool usefulness to practice.

Patient engagement time to improve outcomes is a clinician practice goal. Enhanced technology tools that are user friendly to the practitioner have potential to support that vision. Only through clinician commitment to the technology development process will a true reflection of the care vision occur. Within this organization, a follow up to this system change project is a measurement for “actual time” spent on care management delivery post implementation of the comprehensive clinical tool package. This will provide both organizational and practitioner insight into the value added potential of clinical technology tools developed by clinicians. With the new clinical tool package, staff has hypothesized they have more patient to nurse time compared with patient to nurse time prior to system enhancements.

Healthcare consumers trust and respect nurses which provide both opportunity and responsibility for the advanced practice nurse. Being a community, professional, and political voice on electronic care tools that are easy to use and potentially make healthcare access more readily available, assures consumers and professionals are better served. Nurse leaders need to be open to the take



action in the healthcare technology arena. In doing so, DNP's will guide the direction for clinical technology tool innovation and nursing leadership.

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## Appendix A

### Focus Work Group Question Guide

Participation in focus work groups is completely voluntary and all feedback shared will be considered in the design and development of new clinical tools for telehealth care management practice. Your clinical practice expertise is essential to this development process to establish technology support for your telehealth practice. Specific discussion will center on each case manager's insight regarding:

1. telehealth care practice area- process and current technology use (Session 1)
2. recommendations on technology enhancements to reflect care delivery (Session 1)
3. industry standards related to telehealth practice and current GCS practice(Session 2)
4. practice direction (model or framework) for telehealth nursing within GCS (Session 2)
5. current clinical identification and formulation of cases and use of the technology systems (Session 3)
6. barriers to practice efficiency in telehealth case management (Session 3)
7. what and how could be better within telehealth care management to support your practice (Session 4)
8. training and technology (Session 4)
9. measuring outcomes from beneficiary participation in telehealth case management (Session 5)
10. Summation (Session 5)

Table below was the bases of the data collection tool for the focus group

Session	Themes	Purpose/Rationale	Recommended Action
1	Verbal and written information shared	Verbal and written information shared	Verbal and written information shared
email	Written information exchanged	Written information exchanged	Written information exchanged
2	Verbal and written information shared	Verbal and written information shared	Verbal and written information shared
email	Written information exchanged	Written information exchanged	Written information exchanged
3	Verbal and written information shared	Verbal and written information shared	Verbal and written information shared
email	Written information exchanged	Written information exchanged	Written information exchanged
4	Verbal and written information shared	Verbal and written information shared	Verbal and written information shared
email	Written information exchanged	Written information exchanged	Written information exchanged
5	Verbal and written information shared	Verbal and written information shared	Verbal and written information shared

## Appendix B

### Pre and Post Adapted ETAM2 Questions\*for Clinician Users of Clinical Tools in MMS

Completion and return of this questionnaire provides my consent to use the feedback information for the purpose of process development, implementation, study evaluation, and reporting. Any reporting on this feedback will be done in an aggregate form for the purpose of informing case management practice and technology support in telehealth. Once this questionnaire feedback is tallied in aggregate form, this questionnaire will be shredded. **ALL FEEDBACK** is greatly appreciated, and as a reminder there is no direct connection between you and the feedback received for study.

Please circle or "X" the number below each question that corresponds to your evaluation response. All questionnaire (completed or not) can be deposited in the drop box in the conference room. **THANK YOU**

	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
A	Using the clinical tools in MMS enables me to accomplish tasks more efficiently				
	1	2	3	4	5
B	Using clinical tools in MMS improves the quality of the care I deliver				
	1	2	3	4	5
C	Using the clinical tools in MMS enhances my effectiveness case management and provides me holistic insight to my beneficiary				
	1	2	3	4	5
D	Using the clinical tools in MMS is useful in reflecting the care process- assessment and case formulation				
	1	2	3	4	5
E	Using the clinical tools in MMS reflects the nursing process in the delivery of telenursing care management practice for the beneficiary population [clinician/beneficiary interaction]				
	1	2	3	4	5
F	I am informed on the beneficiary's physical, psycho-social, functional, and health care history by MMS when I first receive a new case for entry into the program				
	1	2	3	4	5
G	My interaction with the clinical tools in MMS is clear and understandable				
	1	2	3	4	5
H	Learning to operate the clinical tools in MMS is easy for me				
	1	2	3	4	5
I	I find the clinical tools in MMS to be flexible to interact with				
	1	2	3	4	5
J	It was easy for me to become skillful at using clinical tools in MMS				
	1	2	3	4	5
K	Interacting with clinical tools in MMS did not require a lot of additional learning				
	1	2	3	4	5
L	It is easy to get the clinical tools in MMS to do what I want it to do				
	1	2	3	4	5
M	Training initiatives on clinical tools in MMS affect my use				
	1	2	3	4	5
N	Allowing for practice time with clinical tools in MMS before release affects my use of the clinical tools in MMS				
	1	2	3	4	5

Appendix B continued					
O	I find the clinical tools and the health information in MMS useful for my beneficiary case formulation (care planning) and care management practice.				
	1	2	3	4	5
P	Colleagues who influence my behavior think using clinical tools in MMS is good practice				
	1	2	3	4	5
Q	Colleagues important to me think using clinical tools in MMS is a good practice				
	1	2	3	4	5
R	Using electronic clinical tools is a symbol of practice soundness				
	1	2	3	4	5
S	Care Management Teams who use electronic clinical tools have more strength				
	1	2	3	4	5
T	Care Management Teams who use electronic clinical tools are held in high regard				
	1	2	3	4	5
U	Usage of the clinical tools in MMS is relevant to the delivery of telehealth care management practice for the beneficiary population				
	1	2	3	4	5
V	Usage of the clinical tools in MMS is important to the delivery of telehealth care management practice for the beneficiary population				
	1	2	3	4	5
W	Usage of the clinical tools in MMS reflects the delivery of telehealth care management practice for the beneficiary population				
	1	2	3	4	5
X	The beneficiary health information I have before I make my first call to a beneficiary is organized and accessible				
	1	2	3	4	5
Y	The beneficiary health information I have before I make the first call provides insight to the beneficiary's care needs				
	1	2	3	4	5
Z	The quality of the clinical tools in MMS to express tasks necessary for my job is high				
	1	2	3	4	5
AA	The quality of the clinical tools in MMS to provide data fields to identify problem classifications for potential care initiatives is high				
	1	2	3	4	5
BB	I could communicate to others the use of the clinical tools in MMS and the use of the clinical tools in telehealth care management practice				
	1	2	3	4	5
CC	I would have difficulty explaining the usefulness of the clinical tools in MMS and its use in telehealth care management practice				
	1	2	3	4	5
DD	Using a conceptual model for practice supports case management practice and my use of clinical technology tools in MMS-[post questionnaire contained schematic of technology tool enhancements and practice model]				
	1	2	3	4	5

\* Venkatesh, V., & Davis, F. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, 46(2), 186-204.

## Appendix C

### Letter to Staff with Purpose, Project Information, and Consent Request

Letter, Information, and Consent Documents provided to staff post manager providing the clinician with information overview of the project, and the researcher receiving an email list of clinicians interested in learning more information on the project and/or participating.

#### Letter to GCS Staff

Dear Colleagues,

As you may know, I am pursuing a doctorate in nursing practice at The College of St. Catherine in St. Paul, MN. Here at work, we are about to embark on some practice and technology system changes in the GCS/MMS operations area of LTCG, Inc. Specifically, how can identification and formulation of cases take place with efficiency, assuring that we are using the most up to date information for our clinical decision making and reporting processes. The prospect of providing input to those changes and studying the impact of this effort will give insight into best practice for telehealth case management.

I understand that your manager has passed along some information about some upcoming enhancements to our electronic tools that we use in GCS case management and this study opportunity. Thank you for your expressed interest. This is your invitation to join me in providing your subject matter expertise towards developing a model for telehealth practice and the electronic tools to support that model.

As part of my project and study with St. Catherine's program, I am particularly seeking your insight on how you currently use beneficiary health intake information, how you transform that information into a care plan, and how the technology tools in place support that process. Further, from your view point, how and what do you see as critical to enhancing the process you currently use in your practice. The focus group participation is about sharing your wisdom, experience, and insight on technology system enhancements that could help accurately reflect your practice and deliver outcomes of engagement in case management.

Attached you will find a study consent form which highlights the project and outlines the intended process for the focus group as well as the questionnaire completion once the new technology tools are released to daily practice. I will be attending your next staff meeting and providing additional overview information of the project, and welcome any questions in advance or at that time.

As always, much appreciation for all the wonderful work you do in case management and I look forward to all the new learning and development that will arise from our work together....

*Judy*

## Appendix C Continued

## Informatics Clinical Care Process and Technology Tool Development for Telephonic Case Management Program

## INFORMATION AND CONSENT FORM

**Introduction:**

You are invited to participate in a research study investigating the development of clinical technology tools, and the efficacy of an informatics care practice model, utilized by Telehealth nurses in a care management program. This study is being conducted by a doctoral student, Judy Peters, RN, MSN, at the College of St. Catherine. You were selected as a possible participant in this research because you are a registered nurse working as a care coordinator/care manager in MMS. Please read this form and ask questions before you agree to be in the study.

**Background Information:**

The purpose of this study is to determine if standardized case formulation and an enhanced electronic clinical technology tools for Telenursing care will be more efficient and effective in problem identification, goal setting, intervention selection, and outcome measurement for case management care delivery. Approximately 50 people are expected to participate in this research.

**Procedures:**

There are two opportunities to participate as a member of a **focus group** and/or a **user providing questionnaire feedback** on the use in practice of the developed tools post implementation of the final product. **Members of the focus group** will be asked to be subject matter contributors on telehealth case management specifically related to the attached question guide (Appendix A). You will be asked to join other staff in focus group sessions that will last no more than an hour, occur five times over the course of eight weeks, and be scheduled on various days to allow for maximum attendance. If you choose, you may also share additional written feedback to questions and discussion post sessions through email. Anytime commitment requested either for the focus group or written feedback regarding the process can be done during your work day per organizational leadership. **As a user of the technology product once released to practice**, if you decide to participate, you will be asked to complete a two to four comprehensive survey/questionnaire forms reflecting your current practice and patient outcomes with new clinical tool package. These questionnaires will be given at baseline, before new tools are designed, again before training and socialization on the new tools, three and six months post implementation of the new tools to care management practice. Each survey completion should be less than 15 minutes of your time, for an estimated total of one hour of time cumulative over the course of the year. There will be system and practice model training events that you will attend as part of the system improvement process as a staff employee; those, while part of the study report will require your attendance as a work commitment, not as a study participant commitment. The questionnaires mentioned are not a work requirement, but are what the researcher seeks your participation in and request consent from you. The remaining reporting for this study will not require any additional time from you as it will be an element that is occurring as you are doing your daily work, for example, using the newly developed clinical technology tools in daily practice.

**Risks and Benefits of being in the study:**

The study has no risk.

The benefits to participation are receiving educational and support materials for informatics telephonic care management practice throughout the year. Additional nurse benefit of participating in the study is an opportunity to advance nursing informatics practice models and clinical technology tool design in a telephonic care setting, and to have an impact on practice knowledge gained from this initiative. For the client or beneficiary, there is an assumption that the process will demonstrate an efficient and risk appropriate entry into care management

## Appendix C Continued

support programs for the client population. In other words, the right beneficiary, entering the right program at the right time, and receiving the right formatting of support service.

**Confidentiality:**

Participation in the focus group and providing verbal feedback will be held in confidence. Your manager or the organization will not be given an individual feedback obtained during the focus group sessions nor from any email that you send providing insight to the questions from the focus group work. Any information obtained in connection with this research study will have no identifiers with your name. Questionnaires from users of the new technology tools will be anonymous. In any written reports or publications, no one will be identified or identifiable and only group data will be presented. Any health plan or care model data used will be anonymous and have no personal or demographic identifiable indicators. Health plan data will not leave the company site. I will keep the research results in a locked file cabinet in my home office and only Judith A. Peters, RN, MSN, and my advisor will have access to the study records while I work on this project. I will finish analyzing the data by May 2010. I will then destroy all original reports and any data collection records when the analysis and study is completed.

**Voluntary nature of the study:**

Participation in this research study is voluntary. Your decision whether or not to participate will not affect your future relations with your employer or the College of St. Catherine in any way. If you decide to participate, you are free to stop at any time without affecting these relationships. No individual identifiers will be connected with any questionnaires completed for this project nor will individual questionnaires be given to your employer or the College of St. Catherine; all information will be presented in aggregate form.

**New Information:**

If during course of this research study I learn about new findings that might influence your willingness to continue participating in the study, I will inform you of these findings.

**Contacts and questions:**

If you have any questions, please feel free to contact me, Judy Peters, 952-457-8454. You may ask questions now, or if you have any additional questions later, the faculty advisor, Dr. Judy Johnson, 612-654-6125, will also be happy to answer them. If you have other questions or concerns regarding the study and would like to talk to someone other than the researcher, you may also contact Dr. John Schmitt, Chair of the College of St. Catherine Institutional Review Board, at (651) 690-7739.

I will provide you with a copy of this form for your records.

**Statement of Consent:**

You are making a decision whether or not to participate. Your presence at focus groups indicates that you have read this information and your questions have been answered, and you are willing to give feedback to the project. Please know that you may withdraw from participation in the study at any time. Return written completed questionnaires with no identifiers is your willingness to participate in that portion of this project.

## Appendix D

### Staff Email to GCS Management Team

April 2009

Dear GCS Manager,

As recently mentioned at a staff meeting, I am a DNP student at The College of St. Catherine. I will be starting a systems change project within our telehealth case management practice unit. My project will focus on a process improvement for identification and formulation of cases for our GCS telehealth care management programs as well as the development of supporting technology tools for that process to be identified.

I am creating a task group that will meet five times for one hour over the next two months. I envision these meetings to occur once every two to three weeks. If they choose, the participants will be invited to continue their feedback to the design process through an email information exchange.

Participants are asked to share their expertise and experience with telenursing in their respective care program area. Specifically, I will be seeking their insight on how they currently use intake information and how they transform that into their care plans. I would like to have at minimum one nurse to represent interests' particular to the telehealth care practice from your program care area. Considering we are co-workers, feedback from staff that participates in the focus group will not be anonymous; however, I will assure confidentiality of their input. Management will be given group or aggregate feedback not individual feedback.

I would be more than happy to come and speak at your staff meeting about the task group and answer any additional questions you may have. Please forward me the names of interested individuals. As always, if you have any questions, feel free to contact me at 952-516-6361.

Sincerely,

Judy Peters, RN., MSN  
Manager, Clinical Program Development  
Doctoral Nursing Student, The College of St. Catherine

## Appendix E



### IRB-Approval

April 15, 2009

Judy Peters, RN, MS  
16724 Thatcher Road  
Eden Prairie, MN 55347

#### **09-F-03 A Comprehensive System Evaluation of the Telehealth Care Management Nursing Process**

Dear Ms. Peters:

Thank you for your prompt reply to the College of St. Catherine Institutional Review Board (IRB) letter of 4-08-09 outlining the stipulations required for approval of the research project listed above. You have thoroughly addressed all concerns and clarifications as requested. As a result, your project is approved and you may proceed with your research.

Please note that all research projects are subject to continuing review and approval. You must notify the IRB of any research changes that will affect your subjects. You should not initiate these changes until you receive written IRB approval. Also, you should report any adverse events to the IRB. Please use the reference number listed above in any contact with the IRB.

This approval is effective for one year from this date. If the research will continue beyond one year, you must submit a request for IRB renewal.

If you have questions or concerns about these stipulations, please feel free to contact me by phone (X 7739), email ([jsschmitt@stkate.edu](mailto:jsschmitt@stkate.edu)), or campus mail (mail stop MPLS).

We appreciate your work ensuring appropriate treatment of your research subjects. Good luck with your research.

Sincerely,

John Schmitt, PT, PhD Chair,  
Institutional Review Board  
Cc: Judith Johnson



## Appendix F

### LTCG, Inc. Authorization and Acknowledgement of Change Project Actions



April 13, 2009

John Schmitt, PT, PhD  
Associate Professor and Chair, Institutional Review Board  
Doctor of Physical Therapy Program  
The College of St. Catherine  
601 25th Avenue South  
Minneapolis, MN 55454

Re: DNP Student-Judy Peters

Dear Dr. Schmitt,

I have the privilege of working with Judy Peters as her DNP project advisor at Long Term Care Group, Inc. As the manager of our clinical programs within the Geriatric Care Services division, Judy has added tremendous value to the ongoing development of our telephonic case and disease management programs through her clinical experience and expertise but also the significant learning opportunities provided through her program at St. Kate's.

Judy has been very diligent in working with me on the development of her project, and keeping me apprised of any requests or modifications to the scope and planned execution of her data collection and study.

Please feel free to contact me with any questions at any time throughout the project. I look forward to seeing this project through its successful conclusion.

Sincerely,

Pamela Hursh  
Vice President, Health Services  
Long Term Care Group, Inc.

## Appendix G

### Email Approval from Dr. Fred Davis

**From:** Fred Davis [mailto:FDavis@walton.uark.edu]  
**Sent:** Thursday, March 05, 2009 5:03 PM  
**To:** Judy Peters  
**Subject:** RE: Extended Technology Acceptance Model

Dear Judy

You have my permission to use and adapt the extended TAM model and measures in your study provided that you cite the papers from which they were adapted in any resulting reports.

Best wishes,

Fred D Davis  
 Distinguished Professor and David D Glass Chair  
 Information Systems Department  
 Sam M. Walton College of Business  
 University of Arkansas

US mail  
 Attn: Fred Davis  
 BADM 204  
 1 University of Arkansas  
 Fayetteville, AR 72701-1201  
 phone 479-575-5980  
 fax 479-575-4168  
 email [fdavis@walton.uark.edu](mailto:fdavis@walton.uark.edu)

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**From:** Judy Peters [mailto:japeters47@comcast.net]  
**Sent:** Saturday, February 28, 2009 9:46 AM  
**To:** vvenkate@mbs.umd.edu; Fred Davis  
**Subject:** Extended Technology Acceptance Model

Dear Dr. Venkatesh and Dr. Davis,

I am a doctoral nursing student at the College of St. Catherine in St. Paul, MN. The nursing staff where I work provide care management services for a Medicare beneficiary population telephonically, hence "technology", the phone and computer applications, are their primary tools of care. To date, the literature is sparse on the use of electronic health care planning in the world of telehealth practice; later this year we will be implementing several enhancements to our electronic care planning system within our geriatric care division with the following assumption

- the enhanced care plan will more accurately reflect the nursing process, practice, nurse/patient relationship, and have accurate reporting outcome capabilities

In reviewing the literature, I have come across several studies that have used both the Technology Acceptance Model and the Extended Technology Acceptance Model. Chismar and Wiley-Patton (2003) presented a paper, "Does the Extended Technology Acceptance Model Apply to Physicians" which used the model within Pediatrician practice environments. I would like to use the Extended Technology Acceptance Model within the geriatric care services telephonic case management division both before implementation of the enhanced electronic assessment and care planning applications, at one month post implementation, and at 3 month post implementation to help us understand nurse usage of such systems overtime within telehealth practice and the effects of that usage on the reportability of intervention and patient outcomes.

I would like permission to use the Extended Technology Acceptance Model with the following variations; voluntariness will be dropped due to the applications being necessary for various aspects of the nurse's telephonic care management role, and I would like to change some of the phrasing within the sentences to reflect applicability to the practice environment. I have attached a copy of the wording format I would use.

In advance, thank you for your time, attention, and consideration to my request.

Judy Peters, RN. MSN 952-457-8454  
 Clinical Projects Coordinator Geriatric Care Services  
 (Doctoral student College of St. Catherine)  
 16724 Thatcher Rd  
 Eden Prairie, MN. 55347

<b>Appendix H</b>			Pre Mean Total Response/ N	n	Post Mean Total Response/ N	n	Difference
Analysis of: Pre and Post Adapted ETAM2 Questions* for Clinician Users of Clinical Tools in MMS							
Mean total response per available N <u>pre intervention</u> which equals before focus group discovery [Pink=pre-measurement]							
ETAM2 Group	Mean total response per available N <u>post intervention</u> which equals after new clinical technology tools were released to practice [Purple=post-measurement]						
PU	1	Using the clinical tools in MMS enables me to accomplish tasks more efficiently	1.5	20	3.5	19	2
PU	2	Using clinical tools in MMS improves the quality of the care I deliver	1.8	20	3.7	19	1.9
PU	3	Using the clinical tools in MMS enhances my effectiveness case management and provides me holistic insight to my beneficiary	1.5	20	4.1	19	2.6
PU	4	Using the clinical tools in MMS is useful in reflecting the care process- assessment and case formulation	1.2	20	3.7	18	2.5
PU	5	Using the clinical tools in MMS reflects the nursing process in the delivery of telenursing care management practice for the beneficiary population [clinician/beneficiary interaction]	1.6	18	3.9	19	2.3
PU	6	I am informed on the beneficiary's physical, psychosocial, functional, and health care history by MMS when I first receive a new case for entry into the program	1.5	20	4	19	2.5
PEOU	7	My interaction with the clinical tools in MMS is clear and understandable	1.8	19	4.3	19	2.5
PEOU	8	Learning to operate the clinical tools in MMS is easy for me	2.5	20	4	19	1.5
PEOU	9	I find the clinical tools in MMS to be flexible to interact with	1.6	19	3.3	18	1.7
PEOU	10	It was easy for me to become skillful at using clinical tools in MMS	2.6	17	3.7	17	1.1
PEOU	11	Interacting with clinical tools in MMS did not require a lot of additional learning	2.9	19	2.4	19	-0.5
PEOU	12	It is easy to get the clinical tools in MMS to do what I want it to do	1.3	20	3.1	19	1.8
PEOU	13	Training initiatives on clinical tools in MMS affect my use	2.1	19	4.6	19	2.5
PEOU	14	Allowing for practice time with clinical tools in MMS before release affects my use of the clinical tools in MMS	1.7	18	4.6	19	2.9
PU	15	I find the clinical tools and the health information in MMS useful for my beneficiary case formulation (care planning) and care management practice.	2	20	4.5	20	2.5
SN	16	Colleagues who influence my behavior think using clinical tools in MMS is good practice	1.9	20	3	18	1.1
SN	17	Colleagues important to me think using clinical tools in MMS is a good practice	2	20	3.2	19	1.2
IG	18	Using electronic clinical tools is a symbol of practice soundness	2.9	20	3.2	18	0.3

Appendix H continued							
IG	19	Care Management Teams who use electronic clinical tools have more strength	2.8	20	3.6	17	0.8
IG	20	Care Management Teams who use electronic clinical tools are held in high regard	2.8	20	3.6	18	0.8
JR	21	Usage of the clinical tools in MMS is relevant to the delivery of telehealth care management practice for the beneficiary population	2.5	19	3.8	19	1.3
JR	22	Usage of the clinical tools in MMS is important to the delivery of telehealth care management practice for the beneficiary population	2.4	20	3.7	19	1.3
JR	23	Usage of the clinical tools in MMS reflects the delivery of telehealth care management practice for the beneficiary population	1.8	20	3.8	19	2
JR	24	The beneficiary health information I have before I make my first call to a beneficiary is organized and accessible	1.8	20	4.6	19	2.8
JR	25	The beneficiary health information I have before I make the first call provides insight to the beneficiary's care needs	1.7	20	4.2	19	2.5
JR	26	The quality of the clinical tools in MMS to express tasks necessary for my job is high	1.8	20	4.1	19	2.3
OQ	27	The quality of the clinical tools in MMS to provide data fields to identify problem classifications for potential care initiatives is high	1.6	20	3.9	18	2.3
RD	28	I could communicate to others the use of the clinical tools in MMS and the use of the clinical tools in telehealth care management practice	2.3	19	4.9	18	2.6
RD	29	I would have difficulty explaining the usefulness of the clinical tools in MMS and its use in telehealth care management practice	3.3	19	2.3	19	-1
RD	30	Using a conceptual model for practice supports case management practice and my use of clinical technology tools in MMS-[post questionnaire contained schematic of technology tool enhancements and practice model]	3	20	4.1	19	1.1

\* Venkatesh, V., & Davis, F. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, 46(2), 186-204.