SOCIOTECHNICAL INFLUENCES ON OUTCOMES IN TELEHOMECARE

by

Kimberly Denise Shea

A Dissertation Submitted to the Faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

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THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Dissertation Committee, we certify that we have read the dissertation

prepared by Kimberly Denise Shea

entitled SOCIOTECHNICAL INFLUENCES ON OUTCOMES IN TELEHOMECARE

and recommend that it be accepted as fulfilling the dissertation requirement for the

Degree of Doctor of Philosophy

_____ Date: 07/30/2007
Joyce A Verran, PhD, RN, FAAN

_____ Date: 07/30/2007
Judith A Effken, PhD, RN, FAAN, FACMI

_____ Date: 07/30/2007
Marylyn Morris McEwen, PhD, RN, APRN BC

Final approval and acceptance of this dissertation is contingent upon the candidate's
submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and
recommend that it be accepted as fulfilling the dissertation requirement.

_____ Date: 07/30/2007
Dissertation Director: Joyce A Verran, PhD, RN, FAAN

STATEMENT BY AUTHOR

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SIGNED: <u>Kimberly D. Shea</u>

ACKNOWLEDGMENTS

I wish to thank so many people in my life for this accomplishment.

Dr. Marylyn McEwen, dissertation committee member, provided expertise from a community perspective that kept me true to the emotional aspects of patient care in the home. I am grateful for her patience and willingness to be there as a sounding board.

Dr. Judith Effken, dissertation committee member, provided expertise in informatics. Dr. Effken is an unparalleled writing editor, I am grateful for her careful critique and guidance that never gave up on my challenges with writing. I will use what I learned from her tireless efforts throughout the rest of my research career.

Dr. Joyce Verran, my dissertation chair, provided expertise in analysis and systems research. I am grateful for her willingness to encourage my exploratory and experimental spirit. Thanks to her, I have a program of research that has ignited by future.

My committee has been a team of excellence that I will never lose touch with emotionally and professionally. They are each amazing women, friends and scholars.

Additionally, the support staff at the College of Nursing has been a great source of strength: the information technology group, the student affairs group and grant support group.

I have made many lifelong friends throughout this process. Without the support of new and old friends, I would have not had the fortitude to continue. The dissertation process is a trying experience and each person who gets through the many challenges has had support. My friends have been that source of support and strength. I can only hope to return the favor.

Lastly, my boys, Mack and Keenan have provided diversions from an intense process. They are full of joy, enthusiasm and hopes for their future and mine. I love them dearly.

DEDICATION

I dedicate this dissertation to my daddy, Ronald J. Shea, mommy, Ruth Sherwood Shea and nana, Eleanor M. Shea. All of these wonderful people were taken from me too soon in life. I know they are smiling and proud.

Finally, I dedicate the effort and future of this dissertation to God, my savior. Through prayer and commitment to God, I have stayed the course and prevailed. God will continue to be my guidance as I use this research to his glory.

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ABSTRACT

Telehomecare utilizes electronic communication technologies to support care when distance separates home health nurses from their patients. Telehomecare nurses, or Care Coordinators, use text-based technology to monitor chronically ill patients. Successful home health care outcomes depend on social and technical interactions within diverse patient, caregiver and nurse triad groups. No theory or analysis method for evaluating telehomecare service delivery, as a multi-level system exists. Therefore, it is not known which characteristics of interpersonal relationships influence outcomes. This research examined trust, interdependence, communication and technology integration influence on outcomes of satisfaction and self-care. The Sociotechnical Systems Theory and Social Relations Model served as guides to explore individual, relational and group effects on patient quality outcomes. The purpose of this research is to examine the relationships among patients', caregivers' and nurses' social and technical characteristics and quality outcomes in telehomecare.

Three VHA sites in the western U.S. participated in this descriptive, multi-level, correlational study. Forty-three groups comprised of patient, nurse and caregiver provided survey data on social and technical characteristics. Additionally, patients provided data on outcomes. All scales performed well, except trust. Results show statistically significant bivariate correlations demonstrate associations between characteristics and outcomes at multi-levels: interdependence with satisfaction at individual and dyad levels; communication with satisfaction at all levels of analysis and simple self care at individual levels; technology integration with satisfaction at group levels as wells as simple and complex self care at

individual levels. The principle of joint optimization states that service delivery systems function optimally only if the social and technical characteristics of the subsystem groups fit the demands of each other and the environment. A measure of joint optimization is computed for outcome predictability using multiple regressions. Joint optimization for three social and one technical characteristic was shown to have significant influences on the patient's perception of being well cared for.

Many implications of this research for nursing practice in telehomecare are discussed. Telehomecare nurses can use the results of this study to guide optimal practice methods to provide quality outcomes for their patients. This study provides a basis for further best practice research in telehomecare.

CHAPTER I: LITERATURE REVIEW

Introduction

Nurses have the opportunity to have an impact on life-long health outcomes when providing care in a patient's home. Home health nurses help patients' transition from acute episodes of poor health to self-care independence (Duke & Street, 2003). Home health nursing care has been defined as the provision of health services to individuals in their residences in order to promote, maintain or restore health, or to maximize an individual's level of independence, while minimizing the effects of disability or illness, including terminal illness (Whitten & Collins, 1998). More patients than ever require some form of home health care because there are greater numbers of: 1) outpatient surgeries; 2) elderly patients (70 million elderly projected by 2030); and 3) patients living longer with chronic health conditions. The demand for nurses exceeds the supply. Two and half million nursing positions are projected to be available by 2008. The combination of more patients requiring care and more opportunities for nurses results in fewer nurses available to provide home health.

Healthcare literature discusses many types of relationships that develop in health care between nurses and patients. All relationships that are discussed are interpersonal in nature. The establishment of a trusting nurse-patient relationship is thought to require longer visits with the expectancy of future interactions (Ward-Griffin & McKeever, 2000). Often nursing care in the home is provided only for a short period of time and a different nurse may see the patient each time. Interaction is brief between nurse, patient and family; making it difficult for the nurse to establish a trusting relationship. Relationships have been shown to be

therapeutic and provide beneficial outcomes: greater adherence to medication regimes, more accurate understanding through patient disclosure, positive lifestyle changes and earlier interventions (Raeve, 2002).   By understanding each patient as an individual, nurses can meet the each patient's unique goals. Interpersonal relationships between nurse and patient can be a means to quality care in a threatened healthcare environment.

Technology-mediated interaction in home health is thought to be a feasible solution to the three major problems associated with health care: access to care, cost containment and providing quality care (Rumberger & Dansky, 2006). Home health technology-mediated interaction, also known as telehomecare, is a type of telemedicine. Telemedicine is defined as "the use of electronic information and communication technologies to provide and support health care when distance separates the participants" (Institute of Medicine (IOM), 1996); (American Nurses Association, 1999). More specifically, telehomecare involves monitoring patients in their residences via data sent through telephone, cable or satellite transmission. Some monitoring devices that can transmit vital text information include stethoscopes, oxymeters, glucometers, and sphygnometers. Home health nurses can direct the patient or caregiver if therapeutic actions need to be taken, based on information received daily from the use of electronic monitoring equipment. Caregivers in the home are primarily female spouses, over the age of 50, who provide assistance seven days per week. Caregivers assist with: shopping, household tasks, finances, personal care, medication administration and indoor mobility (Wolff, 2006). Caregivers can be a source of support for patients and nurses because they are present in the home with patients. The presence of a caregiver in the home provides the nurse with someone who can evaluate the patient based on a face-to-face interaction. Distance monitoring by nurses may challenge the development of some

components of interactions which lead to nurse-patient relationships (Wakefield et al., 2005).

Visualization of patients and their expressions gives the nurse useful health information for

care. Although video can be used with telehomecare monitoring, studies have shown that

videophones do not reduce hospital admission rates, when compared to monitoring patients

by text with telephone follow-up (Wakefield et al., 2005; Wakefield et al., 2006).

Telehomecare technology permits one nurse to monitor 100 patients per day. Nurse

productivity is greatly increased because less time is spent on travel and nurses can maintain

a consistent patient caseload. Technology in home health care cost-effectively addresses the

increased numbers of patients needing greater access to quality nursing care (Dansky et al.,

2001). Research shows that telehomecare can fight the triple threat to healthcare: cost,

access and quality.

Nurse-patient relationships benefit patient quality outcomes. Research is needed to

discover how new technical innovations can maintain the benefits of nurse-patient

relationships while increasing the availability of valuable nursing home health care. The

general purpose of this research is to use theory to guide exploration of specific social and

technical characteristics of patient, nurse and caregiver relationships in telehomecare. This

chapter will discuss: home health nursing, aspects of nurse-patient relationships; benefits of

technology-mediated interaction in telehomecare; and the direction of research in

telehomecare.

Home Health Nursing

Home visits by professional nurses are beneficial to the entire healthcare delivery

system. The visits reduce time and cost of hospitalization while promoting healing in the

comfort of patients' homes (Jerant et al., 2001; Noel et al., 2004; Whitten et al., 2002). Since

the early twentieth century, home health nurse efforts and interventions have dramatically

improved healing with long lasting influence on patient's health outcomes (Harrison, 1902).

Home is a place where the nurse can be influential, not only as a clinician but also, as an

educator and lifestyle coach (Geister, 1926).

According to the US Department of Labor (2000) all nurses have the following job

description;

> "Registered nurses (RNs) work to promote health, prevent disease, and help patients
> cope with illness. They are advocates and health educators for patients, families, and
> communities. When providing direct patient care, they observe, assess, and record
> symptoms, responses, and progress; assist physicians during treatments and
> examinations; administer medications; and assist in convalescence and rehabilitation.
> RNs also develop and manage nursing care plans; instruct patients and their families
> in proper care; and help individuals and groups take steps to improve or maintain
> their health" (United States, 2000, p. p.26).

Professional nurses in the home balance nurse roles in a patient's home environment

where the nurse is a guest. Home health nurses must balance the roles of coach, counselor,

clinician, advocate, motivator and mediator in an environment that belongs to patients and

families. Interactions, in the home environment, can involve treacherous and sophisticated

family dynamics, as well as complicated medical regimes (Duke & Street, 2003).   Home

health nurses attempt to produce quality outcomes in an environment where patients have

unique needs and the nurse must relate to all the people involved in the patient's care.

<center>Nurse-Patient Relationships</center>

Patient's needs are based in unique social, emotional, physical and economic

characteristics that affect compliance and promote changes (Minshull et al., 1986). Whether

the establishment of an interpersonal relationship is desirable between nurses and patients has

been the basis of theoretical debates on the advantages and disadvantages of therapeutic care.

Florence Nightingale advocated distance due to her promotion of nursing as an obedient vocational service (May, 1991). More personal nurse-patient relationships are characteristic of the "The New Nursing" era where nurses "care for" and "care about" patients (Williams & Kennedy, 1999). New Nursing theorists advocate that nurses communicate well, develop interpersonal relationships and know the patient well. These attributes are considered desirable in nurses. Benner and Wrubel (1989) argue that it is impossible for nurses to care about patients and help them without the establishment of an interpersonal relationship.

"In today's medical era, trust in a medical leader, such as a nurse, is encouraged by patient choice, continuity of care, and encounter time that allows opportunities for feedback; patient instruction, and patient participation in decisions" (Mechanic, 1996). Mechanic describes the "gold standard" for the development of a therapeutic interpersonal relationship. When patients trust nurses they are more likely to disclose individual needs that will help the nurse to succeed in working towards patient-centered goals. Nurse-patient relationships are considered pivotal to the therapeutic nature of nursing (Savage, 1992). Contemporary nurse-patient relationships are considered to be central to therapeutic efforts that result in improved patient health, well-being and recovery (McMahon, 1992; McMahon & Pearson, 1998). Some research has also found that therapeutic effects of health care are intrinsically related to the level of intimacy between the nurse and patient (Kadner, 1994). Cohen & Wills (1985) found that a closer relationship between the nurse and patient has been found to be integral to positive health outcomes during illness. Nurse-patient relationships enhance nurse effectiveness but are difficult to achieve in an environment with a high demand and low supply for nurses.

Nurse-patient relationships have traditionally involved touch. Nurses physically come in contact with patients when providing medical care as well as in an effort to comfort patients. Touch an integral component of nursing practice and is fundamental to care giving (Williams, 2001). However, touch must be used cautiously because patients perceive touch differently; some perceive it as comforting and some as invasive (Routasalo & Isola, 1996). Nursing literature suggests that instrumental touch is beneficial to patient outcomes.

Time demands have decreased the amount of time that home health nurses can spend with patients. Efforts to reduce health care costs have produced reimbursement structures that encourage large caseloads of patients per nurse. Large caseloads results in limited time per nursing visit, so the nurse must focus on teaching others to provide the hands-on care. Inability of the nurse to provide hands-on care shifts the responsibility for daily medical regimes and ongoing healthcare management from nurse to patient and family members. Patients unable to perform their own care must rely on the help of family members, friends and/or hired personnel. The help of caregivers with hands-on care such as wound and appliance care, medication administration, vital sign monitoring, and complication observation is helpful. However, caregivers do not have formal medical training and must rely on the nurse for interpretation. Telephone contact with nurses is usually available, in addition to the infrequent scheduled face-to-face visits, for interpretation. Today patients and their caregivers have increased responsibility in health care and more instruction in their working interpersonal relationship with the nurse.

Today home health care can be mediated by technology. Patients, nurses and family caregivers visit virtually using technical equipment for communication. Although technology can address the need for greater access to home health care, it places additional

responsibility on caregivers and patients and changes the traditional nurse-patient relationship.

Benefits of Telehomecare

Home health nurses are thought to be an ideal match for telehomecare because they are a skilled reimbursable provider that professionally administers patient treatments that benefit the entire healthcare system (Rumberger & Dansky, 2006). Although the Balanced Budget Act of 1997 created the first Medicare policy that recognized telehealth as a reimbursable option for providing remote patient care, home health care programs were soon to be challenged with effective management aspects of implementing telehomecare. In October 2000 Medicare's payment system changed traditional home health care reimbursement from cost–based, fee-for-service payment to a per episode prospective payment mechanism. Home health agencies now thrive by maximizing eligible patients and effectively managing episodes of care to improve patient's self-care and reduce their hospitalizations. However, it is difficult for home health care to meet the demands because total healthcare costs continue to rise and the number of patients receiving home health care continues to increase. More patients are living longer with chronic illness; providing home health care for them is complicated by the lack of nurses. Unless interventions foster independence, fewer patients will be able to remain at home.

Telehomecare can be used to decrease the need for medical services by promoting positive self-care behaviors when nurses help patients through education, oversight and availability. Telehomecare can increase the number of patient monitored by one nurse while keeping close surveillance on signs and symptoms of deterioration. Using technology home health nurses can visit patients more frequently to monitor their health status and use their

skills more effectively and efficiently. Telehomecare is seen as viable a solutions to

decreasing the number of nurses per patient and minimizing the cost of travel. When fully

utilized, telehomecare systems may address the triple challenge of access to care, cost

containment and quality assurance (Bashshur, 1995). Although, telehomecare is important

for economic and efficiency benefits, we don't know how it influences the nurse-patient

relationship. Do technology-mediated encounters produce the same benefits as face-to-face

encounters? The environment, patient characteristics and provider specialty are factors that

influence benefits. Telepsychology counseling originally was thought to be an inferior

substitute for face-to-face therapy but better than nothing in remote areas. Some patient-

provider relationships are enhanced when technology-mediated rather than face-to-face.

Patients can be less intimidated when the relationship is not in person (Globe, 2006;

Hampton, 2006). Relationships can be enhanced or strained by patients' individual social

needs. Research that examines the effects of technology on users sending and receiving

information asynchronously is in its infancy.

Telehomecare Research Direction

Although the broader field of telemedicine has been studied in its various forms for

many years, telehomecare is a newer innovation. Telehomecare presence in scientific

literature begins in 1990. The increasing number of elderly, patient's need for access to

healthcare outside hospitals, individualized healthcare regimes, limited healthcare resources

and homecare personnel recruitment/retention issues created a need for home health care

technology solutions. Telehomecare has become one of the fastest growing areas of research

in healthcare. A scientific review by Koch (2006) finds that between 1990 and 2003 there

were 578 telehomecare publications cited in Medline. Seventy percent of the studies were

done after 1999. Telehomecare research has progressed from demonstrating technical

feasibility and patient satisfaction with equipment and cost effectiveness to concerns about

accurate transmission of vital signs and audio/visual consultations. Patients are satisfied with

telehomecare capabilities; but satisfaction research alone does not provide information on

how to optimize outcomes (Cherry et al., 2003; Hebert et al., 2002; Hui & Woo, 2002;

Hunkeler et al., 2000; Johnston et al., 1997; Kobb et al., 2003; Levy et al., 2002; Mass et al.,

2001; Schlachta-Fairchild, 2002). Koch concluded that the impact of telehomecare on the

patient-provider relationship and the uniqueness of user groups needs to be further explored.

Requirements of provider specialties place unique demands on relationships that influence

the effectiveness of telehomecare.

Early telehomecare research demonstrated that quality connectivity, accurate

diagnostic images and a variety of data can be transmitted via electronic communication.

Early studies examined technical equipment monitoring in the home. Case studies

demonstrating the use of technology for fetal monitoring, telecardiography and blood glucose

monitoring are examples of early studies. Research on connectivity demonstrated that data

were reliable and accurate when transmitted electronically. Starting in 1995 the nursing

community became interested in the feasibility of video and teleconsultation. Once the

possibility of virtual home visits became an option, the telehomecare research focused more

on cost studies.

Much telehomecare research has focused on cost effectiveness. Several studies

suggest that telehomecare reduces the cost per visit (Brunicardi, 1998; Dansky et al., 2001;

Johnston et al., 1997; McCue et al., 2000; Noel et al., 2004). Socio-economic studies of

telehomecare have indicated enhanced quality of life and reduced utilization of services such as hospitalizations, but haven't measured cost benefit (Whitten et al., 2002). Cost analysis studies have shown repeatedly that specific characteristics of technology users are indicators of more successful outcomes (Noel et al., 2004). Characteristics are also important for determining the potential for user success with telehomecare. Cost savings can be realized by hiring telecare nurses with traits known to be consistent with patient satisfaction and low staff turnover (Courtney et al., 2005; Koch, 2006). Home health agencies must implement cost savings methods in every way possible for financial survival. Understanding the importance of nurse characteristics that support the establishment of beneficial relationships is an important component of administration. Nurses must work efficiently by establishing interpersonal relationships while being efficient with their time. Yet there are few published attempts to incorporate the social effects on nurse-patient relationship (Duke & Street, 2003). Technology-mediated home health care changes the way that nurses, patients and caregivers interact. Research has shown that electronic transmission can effectively deliver quality images with cost-savings to home health systems. Home health systems survive by cost-effective care, with quality outcomes affected by interactions.

In a study using TV monitors for interaction, Demiris et al found that virtual visits have the same assessment and education patterns as an actual visit (Demiris et al., 2001). Information technology does not change nursing processes in home health care but it does redistribute "hands-on" delivery of care (Courtney et al., 2005). When the activities of home health care with technology are redistributed, a family member, friend or hired helper often provides the "hands-on" care. The "hands-on" provider in telehomecare is generally referred

to as a caregiver and is frequently integral to successful health care outcomes. Increasingly

more attention is being devoted to the caregiver's importance (Boter, 2004; Freedman et al.,

2004; Spillman, 2004; Hokenstad et al., 2005; Kinsella, 2000). Caregivers now provide the

type of health care that previously was in the nurse's domain (Hokenstad, 2005). In

telehomecare, caregivers are physically present for the patient; observing, examining,

listening and reporting to nurses. Patients without caregivers may struggle to follow nursing

instruction despite possible fatigue or other side effects from illnesses or disabilities. To be

effective in teaching compromised patients, nurses in telehomecare must be expertly skilled

at communicating medical regimes so she can instruct from a distant location (Schlachta-

Fairchild, 2002). The quality of caregiver and patient communication with the nurse

contributes to the establishment of interpersonal relationships.

Before replacing actual face-to-face visits with virtual technology-mediated visits,

researchers must study human factor interaction. However, human factor research has most

commonly studied the actual interaction of the human and the computer or the human-

computer interface (HCI). In his book, "The Human Factor", author Vicente states, "Our

traditional ways of thinking have ignored – and virtually made invisible – the relationship

between people and technology" (Vicente, 2003). To address this dilemma, Vicente

advocates for a STS approach that focuses on the whole of the relationship between people

and technology, not a reductionist approach that examines pieces in isolation. The Human-

tech ladder is the guide to examining human or societal needs that links the human and

technology on five distinct levels; physical, psychological, team, organizational and political

(Vicente, 2003). The level that supports the Human-tech ladder is the physical level,

proceeding up to the political level that incorporates needs for all the other levels. This

research study was interested in the middle level; team needs. Teams are composed of people that have a common goal. The team must work together in an efficient manner. Vicente's framework supports the interpersonal nature of relationships and additionally advocates for the whole of the relationship. Research that examines humans on either side of the technology represents the future direction of technology-mediated healthcare research.

Maximizing the potential for nurses, patients and families to use a newly implemented technology is vital to successful adoption but nurses must not be perceived as technicians (Gerrard et al., 1999). Although many HCI studies have been concerned with how nurses use computers and nurses' attitudes toward computers in point-of-care care technology. Factor analyses of a 20-item, Nurses Attitudes Toward Computers (NATC) questionnaire, have consistently found that concerns over patient care explain higher levels of variance than concerns about computer anxiety (Schwirian et al., 1989; Stockton & Verhey, 1995; Stricklin et al., 2003). Nurses are concerned about patients' care and social needs more than anticipating problems with technology. This finding supports the need for research that understands human characteristics that contribute to relationships in combination with technology. This research did not look at the interface between human and computer; rather it examined the humans affected by technology and their relationships when technology mediated nurse and patient interactions.

Research on health care delivery has determined that there are valuable benefits from interpersonal interactions with a health care provider, such as a nurse (Duke & Street, 2003; Hokenstad et al., 2005; Inglis et al., 2004; Kane et al., 1997a; Miller & Lazar, 1995; O'Brien-Pallas et al.; Potter & Peden-McAlpine, 2002; Quinn, 1998). Interpersonal relationships in a

human interaction allow the participants to better understand and effectively deal with the unique social needs of individuals. Technology that becomes the mediator for interaction must be examined for effects on the interpersonal nature of human interactions. Questions about technology in healthcare on a continuum from transparency to prominence need to be answered, if healthcare is to implement technology mediated interactions.

A large study in Kansas and Michigan was an example of the importance of studying how technology affects human interpersonal relationships. The study examined the use of technology in a telehospice project but the urban site in Kansas withdrew in only nine months (Cook et al., 2001). The researchers concluded that issues relating to patients and family caregivers are important in telehomecare applications and lack of attention to human factors in the study may have contributed to the Kansas site withdrawing. Characteristics of interpersonal relationships are of utmost importance in a hospice homecare environment. Caregivers are pivotal in hospice care. They are stressed by emotional and physical factors that are involved with being physically present with the patient. Agencies must consider whether caregivers are willing to take on additional responsibilities of using and safe-guarding technical equipment in the home when planning and evaluating a telemedicine project (Dansky et al., 1999). Hospice caregivers and nurses interact integrally for quality patient outcomes.

Patients, nurses and caregivers in home health care each have unique roles that are interdependent in their group effort to achieve the same goals. Interdependence is one of the defining properties of groups (Sampson & Marthas, 1977). There is increased research interest in groups and group level analysis. Group research ranges from small to large aggregates of people. Family and hospital units are two example of healthcare research that

examines different size groups of people. McGrath's (1984) extensive research on groups defines a working group as "a relatively small set of persons within an organization who are the role incumbents with whom a given individual interacts and who are highly interdependent in terms of those organized roles." Research is needed that considers the patient, nurse and caregiver as a working group with members working together towards self-care and improved health. This research accounts for patient, nurse and caregiver contributions as individuals and interacting group members to fully explore relationship issues in telehomecare.

Working with technology as a group has been studied for over 50 years in organizational research. The human component that examines the intersection of social and technical factors has been valuable in comprehensive systems analysis. In the 1950's, the Travistock Institute produced several research theories that realized the value of social factors within service delivery systems. One prominent theory was the Sociotechnical Systems (STS) theory that described the importance of joint optimization of social and technical systems to produce optimal outcomes (Cherns, 1976; Pasmore et al., 1982; Trist & Bamforth, 1951). STS theory's interprets the group aspect of interacting with technology and its applicability to this research will be discussed later in Chapter II.

Research Study Questions

The purpose of this research was to examine the relationships among patients, caregivers and nurses, their social and technical characteristics and quality outcomes in telehomecare.

The research questions posed in this study were:

1. What are the relationships among social characteristics (trust, interdependence, and communication), technical characteristics (technology integration) and quality patient outcomes (perception of being well-cared for, self-care, and hospitalizations) in individuals involved in telehomecare groups (patient, nurse and caregivers)?

    a) What are the relationships among social characteristics and patient outcomes when data are analyzed at the individual level for each member of a unique patient-care group?

    b) What are the relationships among technical characteristics and patient outcomes when data are analyzed at the individual level for each member of a unique patient-care group?

2. What are the relationships among social characteristics (trust, interdependence, and communication), technical characteristics (technology integration) and quality patient outcomes (perception of being well-cared for, self-care, and hospitalizations) in dyads involved in telehomecare groups (patient, nurse and caregivers)?

    a) What are the relationships among social characteristics and patient outcomes when data are analyzed at the dyadic level in a unique patient-care group?

b) What are the relationships among <u>technical characteristics</u> and <u>patient</u> <u>outcomes</u> when data are analyzed at the dyadic level in a unique patient-care group?

3. What are the relationships among <u>social characteristics</u> (trust, interdependence, and communication), <u>technical characteristics</u> (technology integration) and <u>quality patient</u> <u>outcomes</u> (perception of being well-cared for, self-care, and hospitalizations) in telehomecare groups (patient, nurse and caregivers)?

   a) What are the relationships among <u>social characteristics</u> and <u>patient outcomes</u> when data are analyzed at the group level providing unique patient care as a group?

   b) What are the relationships among <u>technical characteristics</u> and <u>patient</u> <u>outcomes</u> when data are analyzed at the group level providing unique patient care as a group?

4. Can group joint optimization between each social characteristics and technical characteristics be evaluated?

   a) Is there a relationship between joint optimization (each social and technical characteristic) and outcomes?

   b) What is the influence of joint optimization on outcomes?

Significance

Research in telehomecare is a relatively new area so there are many gaps in the research. This research study will address the following gaps in telehomecare research:

Interpersonal Relationships

This research explored important interpersonal relationship questions in telehomecare research that have not been studied to date. Telehomecare is relatively new and descriptive studies are vital. Initially research was needed to address important questions about technical capabilities and the cost-effectiveness of telehomecare to determine its feasibility. Now that the question of accurate diagnostic images and system cost-savings has been given preliminary answers, research is needed to determine how to best care for patients when delivery is not face to face.

Optimizing Telehomecare Delivery

Insight into questions about effective use of interpersonal relationships will add to a growing body of telehealth knowledge that will serve to improve and not just replace existing healthcare delivery systems. Research has demonstrated the value of interpersonal nurse-patient relationships in healthcare. By understanding the influence of relationships on outcomes in telehomecare, nurses will be able to practice at a distance more effectively. Not only can the knowledge gained from this research be used for practice but also the knowledge gained can be used in other areas of healthcare. Educators will better understand how nurses can best use their efforts in technology-mediated encounters to train health professionals. Administrators will have better insight into human qualities that are most advantageous to optimal outcomes. Most importantly, patients will receive optimal care. There will be improvements that will ultimately benefit all systems in healthcare. Scientists who look forward to the future understand that for a new innovation to succeed, it has to be much better than what is being replaced or benefit in a whole new way (Norman, 2002).

Patient, Nurse and Caregiver Groups

Groups or teams have often been the subject of healthcare research. The most common method of studying groups has been to administer the same questionnaire to each person in the group and then aggregate the scores of all the members of the group. In healthcare, systems researchers have challenged methods of aggregation for studying hospital units (Aiken, 2000; Blegan, 1998; Effken & Stetler, 1997; Verran et al, 2003; Verran, Gerber & Milton, 1994). In research on healthcare systems, members of the study group have not been related to each other and the patient is not part of the group.

Patients, nurses and caregivers should work together toward a common goal of quality outcomes for the patient. Healthcare literature supports the value of patients taking part in healthcare and decision making (Ende et al., 1989). If the healthcare model of care gives patients and caregivers responsibilities to work with the nurse toward successful outcomes, then the analysis should be consistent with the model of care. The interdependence of group interaction in telehomecare (patient, nurse and caregiver) is complex. Data about relationships among group members are difficult to analyze in a way that captures the complexity of the interaction. Statistical representation of the interaction can accurately depict the influence of social characteristics on outcomes. Telehomecare groups could be considered even more challenging than professional teams because of their heterogeneous nature. Too often statistical models fail to capture the complexity of the effect of heterogeneous individual contributions as well as relationships between dyads within the group (Snijders & Kenny, 1999). Studying heterogeneous groups, such as patient, nurse and caregiver, are challenging but necessary if research is to reliably depict what is occurring in telehomecare.

Multi-level Analysis

The Social Relations Model provides analysis formulas that compare multi-levels effects; individual target and perceiver, relational and group (Cook & Kenny, 2004). Family literature is well versed in the challenges of group measurement and analysis. Family studies have acknowledged that the family as a unit is different than the sum of its parts. Social Relations Model (SRM) has been used in family studies to examine heterogeneous groups, but not in healthcare. Application of the SRM to a group that combines a professional healthcare member with a patient and a caregiver has not been done before. The SRM model was useful in this telehomecare research because it does not make any apriori assumptions about which level of analysis is most influential. Each member of the telehomecare group has the potential to make decisions and lead. Interactions between any two members of the group may be beneficial to patient outcomes. Comparing the influence of social characteristics (trust, interdependence and communication) and a technical characteristic (technology integration) from individual members, dyads and as a triad group will provide information that will explore all level effects on telehomecare. Group level analysis investigates a hypothesis about patient, nurse and caregiver functioning optimally as a team. The needs of healthcare lead to changes in roles of the caregiver and nurse. When roles are altered, other adjustments occur as a result.

This research used a family analysis model to analyze the influence of individual, dyad and group social process scores on outcomes in healthcare. Researchers will be able to apply the influence of level to analysis on understanding the interactions that occur in telehomecare.

Provide Foundation for a Theoretical Map in Telehomecare.

Telehealth research has increased so rapidly that there has been a scarcity of studies that are guided by theory. Without theory as a sustaining guide research studies describe findings in parallel, often identifying impacts of interventions on outcomes in isolation from other similar efforts. This type of problem driven research does not identify interventions that are sustainable over time. Changes in technology are happening so rapidly, research is most valuable when it can intersect the future projection. Theory based research helps to build science for future research and creates research that is applicable as problems in healthcare change (Verran, 1997). In healthcare there is often a lack of theory in system's research to solve problems. While problem-solving research may find an immediate answer, it does not provide a basis for consistent guidance in future problems (Lynn & Layman, 1996).

Summary

Home health nurses' abilities to relate to patients have provided beneficial health outcomes for over a century (Harrison, 2001). Home health nursing care has depended on the relationships that develop to provide care that lead patients to successful health outcomes. Increasing demands on healthcare access and costs in home health nursing has created a need for technology-mediation that will allow nurses to be more available for interactions with patients. Technology-mediated telehomecare has proven to be technically feasible and is considered to be cost-saving; however human components are vital to success. Telehomecare research has demonstrated that patient care can be satisfactorily administered with the help of technology but there are changes in the roles of the participants. Remote nurses in telehomecare depend on patients and caregivers to perform technical skills. Nurses advise and instruct patients on medication administration, lifestyle changes and hands-on care based

on information that is transmitted electronically. Telehomecare visits depend on a group

effort by nurse, patient and caregiver. Relationships among the telehomecare group members

are acquired differently than face-to-face. The STS theory guides research to examine the

whole of the relationship between people and technology. For telehomecare to provide

optimal care, it is important to examine how relationships are affected and how social

characteristics influence outcomes. It is vital that as telehomecare becomes accepted to

assure that technology use improves the quality of home health care and not just merely

replace face-to-face visits with technology-mediated virtual visits. Research is needed to

understand the influence of technology-mediation on relationships among patients, nurses

and caregivers in home health. The ways in which telehomecare group members trust,

depend on one another and communicate is unknown. Understanding the effect of group

relationships on outcomes in telehomecare provided valuable knowledge to improve care.

This descriptive study examined several aspects of relationships, based on a theory-guided

approach, to fill gaps in telehomecare research.

CHAPTER II: CONCEPTUAL FRAMEWORK

Introduction

The framework for this research examines social and technical characteristics in telehomecare from a systems perspective. Sociotechnical systems theory (STS) is grounded in the philosophy of social constructionism, which views the construction of meaning or purpose of the system as being generated by group members of the system. Constructs and concepts from STS theory will provide the conceptual framework for this study. Figure 1 displays the basic conceptual framework as applied to group interaction mediated by technology in an organizational environment, as originally theorized.
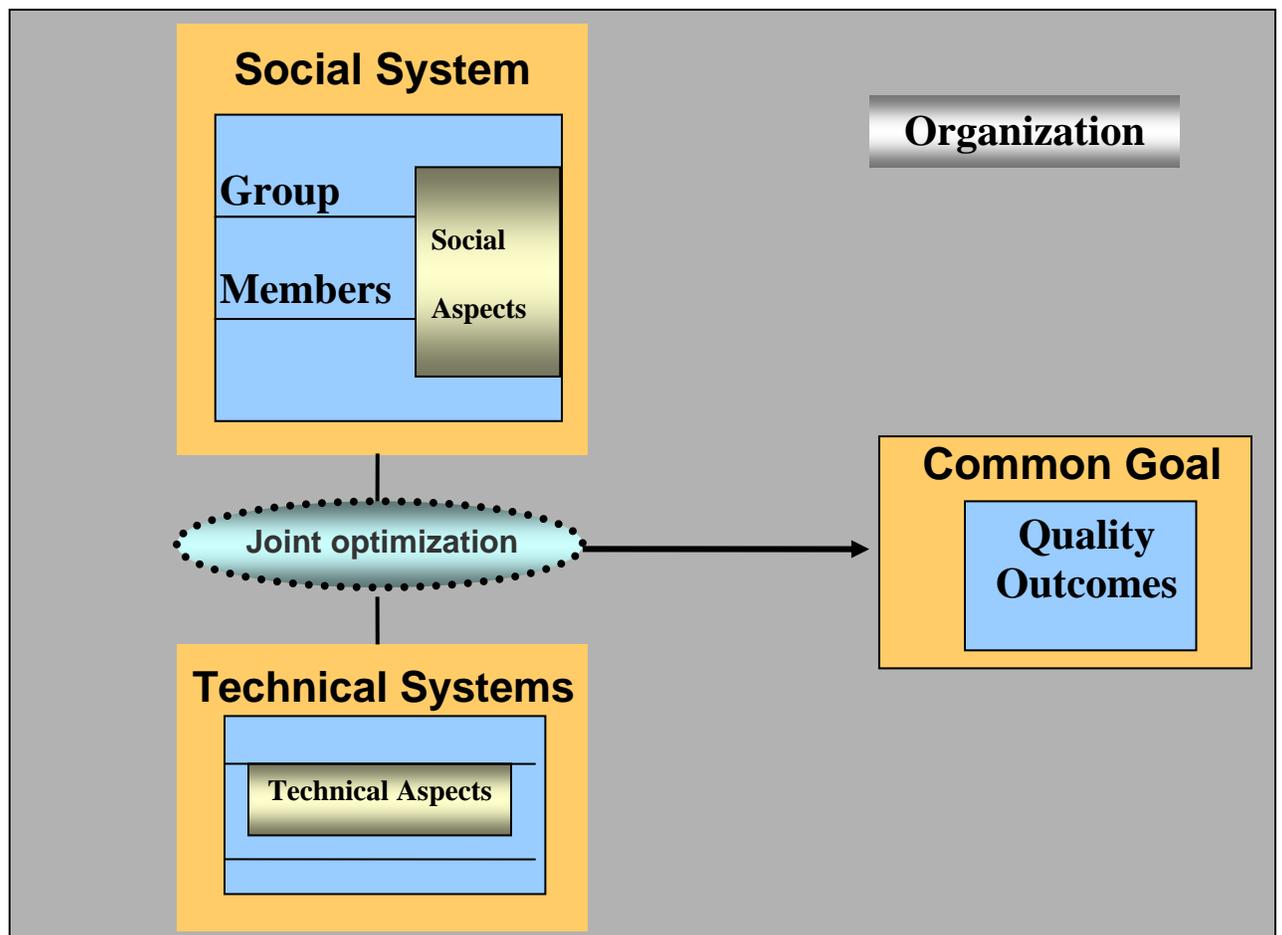
FIGURE 1. Sociotechnical Systems Theory (Trist & Bamforth, 1951)

Sociotechnical Systems Theory

Sociotechnical systems theory emerged in 1951 at the Travistock Institute to describe the importance of the interrelatedness of the social and technical subsystems of an organization (Trist & Bamforth, 1951). This systems theory is concerned with those organizational settings in which human beings are required to perform tasks in order to produce the desired results (Pasmore & Sherwood, 1978). STS posits that service delivery systems are made up of groups of people that produce outcomes using some technology and that each social group affects the operation and appropriateness of the technology. Each group member comes to the group with social characteristics that influence the reciprocal relationship between the social system and technology. The technology constrains the behavior of the people in the social system yet the technology should be designed to meet their characteristic needs. Sociotechnical systems theory examines how social and technical characteristics combine to achieve greater quality outcomes. Social characteristics are comprised of 1) motives, 2) attitudes, 3) expectations 4) relationship patterns and 5) experiences (Pasmore et al., 1982). Technology consists of the tools, techniques, procedures, skills, knowledge, and/or devices used by the members of the social system to accomplish goals of the organization (Pasmore et al., 1982). Quality outcomes are achieved by behavior, productivity and service of the group members.

According to the principle of joint optimization, service delivery systems function optimally only if the social and technological characteristics of the subsystem groups fit

the demands of each other and the environment (Emery, 1959). Seven processes of joint optimization are commonly noted in STS literature (Pasmore et al., 1982).

Application of the seven processes of joint optimization to telehomecare groups operationalizes STS in a small system with three-person subgroups. By exploring the three main questions that this research poses, the seven processes of joint optimization can be used in telehomecare, resulting in a potential for improved outcomes. The following describes each of the seven processes of joint optimization together with an example of how each can be operationalized in telehomecare.

1) Open environmental systems (adaptation) – The influence of external community surrounds the internal social and technical systems. Internal group environment is the focal unit of joint optimization and must adapt to the changing external environment. In telehomecare, the patient, nurse and caregiver adapt to new home health care delivery by technology that results from more patients with chronic illness in the community and decrease in nurse availability.

2) Organizational choice (equifinity) – Leadership within the group has the flexibility to change and adapt to the changes in the environment as needed. There are many different ways to meet goals. Often a different goal may necessitate that a new group leader emerge from within the group. A telehomecare example is; caregivers may start making decisions and becoming involved with the telecare equipment because the patient is unable due to deteriorating health.

3) Control of Variance (autonomy) – Variance within the system is defined as any deviation from the normal. Groups perform their work utilizing education and knowledge

to respond to variances as soon as they arise. In telehomecare, the home care group determines that the patient needs to have telephone contact with the nurse more frequently, despite telehomecare readings within normal range.

4) Boundaries (communication) – Groups should be supported in their ability to share knowledge and information across the boundaries of the groups. This freedom of communication permits the leaders to learn from other areas of joint optimization. For example, in telehomecare the nurse learns and shares across groups because a she is member of many patient care groups.

5) Support congruence (shared mission) - All people within the system should understand the values of sociotechnical theory. It is important for telehomecare group members to understand the relevance of joint optimization of social and technical characteristics with respect to desirable outcomes. When the importance of either social or technical characteristics dominates the system of delivery then the system risks optimal outcomes for all patients. Nurses within telehomecare delivery should remain vigilant to not focus too much on the technology equipment.

6) Support subgroups (self-regulation) – Quality of work life can be improved by utilizing sociotechnical systems theory as a guide to offer social support, provide feedback, recognize accomplishments and permit self-direction to individuals within the group. Telehomecare group members are interdependent in their care of patient. There should be an interaction that will foster feedback and support among the members of the care group united in a common concern for the patient's condition.

7) Continued learning and education – The system within the organization should offer constant educational support and provisions for continued efforts toward joint optimization for all group members. For example, telehomecare nurses should continually update their skills and knowledge of patient care specific to the needs of individual patients. Additionally, the patient and caregiver should be provided with appropriate patient education materials, Internet sources, organizational resources and/or library information.

These theoretical processes of joint optimization, when applied, have consistently demonstrated an ability to guide groups in the production of quality outcomes (Pasmore et al., 1982). Understanding telehomecare relationships that are inherent in the STS theory will provide the basis for applying the principle of joint optimization.

Research Framework

STS theory has been used less frequently in health care than in manufacturing organizations. Some uses have been to evaluate nurses and technology in patient care delivery settings such as nursing administration (Rudy & Daly, 1990), ICU (Happ, 1993; Song et al., 1997)and medical practices (Harteloh, 2002). Berg (1999) encouraged researchers to use STS as a guide stating, "Optimal utilization of technology is dependent on the meticulous interrelation of the system's functioning with the skilled and pragmatically oriented work of health care professionals" (p. 245). In an effort to address urgent problems of access to care, cost containment and quality assurance, technology research in healthcare has developed rapidly and few studies have a theoretical basis. Rapid problem-based telehomecare research has created an atheoretical foundation that

limits the ability for future research to systematically understand, build and develop best practice methods. In the cited research studies, STS serves to guide systems in effective improvement of healthcare.

STS theory has not been applied to point-of-care technology in the home. The relevant group in home health that produces the service or outcomes is comprised of the patient, nurse and caregiver; all have social and technical characteristics. This research examined three social characteristics and one technical characteristic. STS requires equal emphasis on social and technical characteristics to operationalize the process of equifinity that encourages joint optimization. Equifinity acknowledges that there is more than one way to reach a goal and all must be considered. Since this study examined more social than technical characteristics, there may be a violation of the process of equifinity. However, the theory of STS dependencies addresses the tradeoffs that often must be made when deciding which components of STS to examine when there are political, economic, individual and social constraints (Majchrzak, 1997). Only having one technical characteristics was a tradeoff that resulted from the researcher's limitations within the VHA study environment.

STS dependency theory acknowledges the need to examine selected components of the theory to alleviate gaps in an effort to explore sources of optimal outcomes. Although human components in telehomecare have been acknowledged recently, more research is needed. Studying characteristics of individual involvement and contributions to group interaction will provide information on optimal social conditions for telehomecare implementation.

This study was an initial step in examining characteristics that are influential in face-to-face groups and determining if telehomecare technology users function as a group to influence outcomes. Research in telehomecare will be advanced by application of the STS principle of joint optimization. Figure 2 shows the research model, when applying the STS theory to telehomecare. The following section examines each construct in the applied framework.
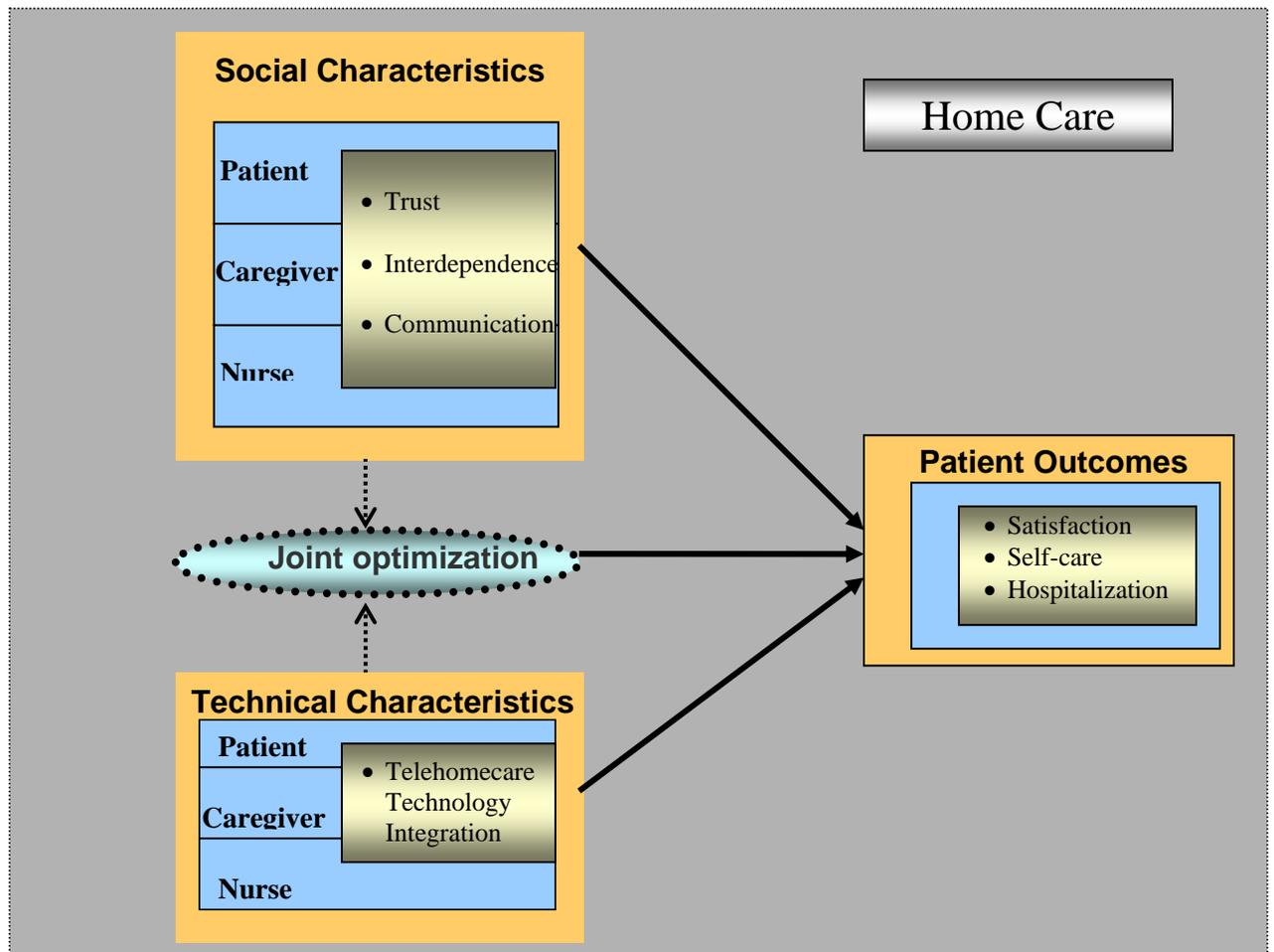
FIGURE 2. Research Model

Social Groups

STS posits that systems are made of groups composed of individuals with a common goal that come together to produce a service (Pasmore et al., 1982). Social units have many forms but, by definitions, all groups must have interaction, interdependence, mutual awareness, knowledge of past and a future goal (McGrath, 1984). Telehomecare patient, nurse and caregiver groups are a social unit that comes together for the purpose of achieving successful targeted outcomes. In this study group members were examined as individuals, dyads and as a group to determine what social and technical characteristics they bring to the group.

Social Characteristics for Technology-Mediation

Social characteristics in face-to-face teamwork performing and producing effective outcomes have been called the "big five" (Salas et al., 2005). Based on an extensive analysis of working team effectiveness literature, Salas et al, determined that five core components of effective groups are leadership, mutual performance monitoring, back-up behavior, adaptability and group orientation. Core components were examined to determine how three supporting behaviors; trust, interdependence, and communication, influence outcomes. Group trust, interdependence, and communication are consistently valued in achieving quality outcomes (Arrow et al., 2000; Aubert & Kelsey, 2003; Hoyt & Blascovich, 2003; Kawachi et al., 1999; McGrath, 1984, 1998; Mechanic, 1996; Salas et al., 2005). In research on organizations, many studies have examined technology as an enabler of interorganizational collaboration (Bakos & Brynjyoolfsson, 1993; Carr & Smeltzer, 2002; Chae et al., 2005; Grover et al., 2002). There is evidence that mediating

technology removes a human element in buyer-supplier organizational relationships (Carr

Smeltzer, 2002). Chae et al, (2005) proposed a conceptual model for the studying the

effects of technology on organizational relationships. Trust, interdependence, long term

commitment and information sharing were examined as primary dimensions of

relationship building (Chae et al., 2005). Case studies determined that existing

interorganizational relationships were enhanced by technology mediation but that trust,

interdependence and communication between partners needed to be established prior to

technology linkage. Redistributing responsibilities for care to patients and caregivers

requires trust, interdependence and communication between telehomecare group

members. If trust, interdependence and communication are important supporting social

behaviors effecting group outcomes in organizational and work teams, then telehomecare

group research should also explore their influence.

Trust is a factor in all relationships but its importance increases when risks are

higher. If patients have a bad experience with misplaced trust in a health professional

then patients believe there is a great risk. Trust has been defined as an attitude of positive

expectation that one's vulnerabilities will not be exploited (Riegelsberger et al., 2003).

The guidance of a trusted professional care provider to help alleviate symptoms and

promote healing relieves patient stress. Studies have established that patient trust predicts

instrumental variables such as use of preventive services, adherence, and continued

enrollment at least as well as satisfaction does, and is more salient for measuring the

quality of ongoing relationships (Thom et al., 2004). A nurse-led telehealth service that

facilitates trust between clients, providers and the technology, could be the mechanism by

which to encourage people to accept and use home-based systems (Levy et al., 2002). It is important to explore the construct of trust in telehomecare before negative outcomes create the perception of a high risk. Social dilemma games are a popular method for human computer interaction researchers aiming to assess trust between people interacting via technology-mediated communication. However researchers warn that the specificity of game situations cannot model the complexity of how trust is formed in the real world, since they neglect other social factors (Riegelsberger et al., 2005). Aubert and Kelsey examined the effect of technology on virtual group dynamics in students that interacted by virtual technology (Aubert & Kelsey, 2003). In the Aubert study, there were 11 teams, typically composed of three students who lived locally in the same city and three students who lived remotely in another city. This research defined teams similarly as the groups in this study; "a small number of people committed to a common purpose, set of performance goals and approach for which they hold themselves mutually accountable". Trust is of importance to Aubert and Kelsey's study because the researchers begin from the hypothesis that relationships must develop across space and time with communication technology to enable the student teams to perform effectively. Researchers found that group members placed more trust in virtual team members that lived locally than those who were remote, even though local members did not meet face-to-face. Students scored group members who lived locally higher on traits that are antecedents to trust; ability, integrity, and benevolence. Finally, overall level of trust did not affect the student's ability to perform the required task but did affect the quality of their performance. Also more effort and time was required to go through the stages of forming, storming, norming

and performing with remote team members (Tuckman, 1965). However, when the effort was made differences between trust levels in local and remote groups significantly influenced the quality of performance. In telehomecare, patients and caregivers are experiencing health issues, so exerting additional effort may be too stressful to be possible. If telehomecare nurses have to increase efforts beyond current home health care efforts, then benefits may be limited. Most researchers agree that trust is a determining factor in effectiveness of group collaboration (Granovetter, 1985; Mcallister, 1995). Group members that trust each collaborate freely with information that potentially will enhance outcomes (Salas et al., 2005). As a characteristic of social groups, trust is always present in all groups and interdependence is a characteristic that all groups must possess.

Interdependence is a key determinate for defining a group (McGrath, 1984). Interdependence is defined as linking group members together in such a way that each individual's actions benefit the group and the group's actions benefit individuals (Meloth & Deering, 1994). Most sociologists would agree that interdependence among individuals characterizes a group relationship. Interdependence implies trust that group members will contribute toward a common goal. Telehomecare group members are diverse, each member having different skills and contributions toward outcome goals. Individuals in a complex environment can not separately supply all that is demanded for quality healthcare outcomes. Together patients, nurses and caregivers make decisions on how to proceed with home care tasks and choices. Interdependent decision-making in groups is referred to as cognitive census (Mohammed & Ringseis, 2001). Mohammed and Ringseis (2001) found that achieving cooperative interdependence is positively associated with

outcome satisfaction yet cooperation among group members did not significantly influence group ability to reach consensus. Understanding expected roles for each member of the group is vital for decision-making. Diverse groups' preconceived assumptions about individual roles and tasks interfere with interdependence if the expected contributions for each member are not known. Additionally, Mohammed and Ringseis study found that groups with greater interdependence responded to each new situation in a different manner. There are several hundreds of studies comparing the effects of three types of interdependence on groups cooperative, competitive and individualistic (Johnson & Norem-Hebeisen, 1979). Johnson & Norem-Hebeisen have done research on over 6000 students from kindergarten through college sequenced over a period of years. The purpose of their research was to develop a scale for social scientists interested in social interdependence (Johnson Norem-Hebeisen, 1979). Three types of social interdependence were defined: cooperative, competitive and individualistic. Based on original theory, these three types of interdependence were felt to exist in opposition to each other. The research found that they actually might exist on a continuum depending on cognitive and developmental age. The scales were found to be more cohesive for older than younger study subjects. There was a greater negative relationship between cooperative and individualistic scores while competitive scores showed less of a relationship. Cooperative interdependence involves a positive correlation among goal attainment scores for involved group members. Competitive interdependence involves a negative correlation among goal attainment scores for involved group members. When goal attainment scores are independent among group members then individualistic

interdependence exists. Conditions from each type of group condition are related to performance in achievement situations such as self-esteem, outcome achievement, attitudes and locus of control. Researchers conclude that findings about the value of cooperative interdependence influence on outcomes have been varied because competitive, cooperative and individualistic interdependence exist on a continuum. Interdependence changes as group members develop socially and cognitively. Older subjects have been found to have an inverse relationship between cooperative and individualistic interdependence while younger subjects have a greater relationship between competitive and individualistic interdependence (Ahlgren & Johnson, 1979). Cooperative group outcomes are enhanced by communication.

Communication is a process of sending and receiving information. Traditional face-to-face visits send information by verbal and non-verbal communication. Family dynamics and financial status can be learned by actual nurse observation in the home environment. Telehomecare virtual visits limit nonverbal information communicated. Advocates do not believe that limiting nonverbal communication is a problem. E-commerce research has found that the quality of verbal communication appeared to be a more important factor in influencing patient than set-up time or quality of image (Chae et al., 2001). Telehealth in home health care settings is thought to provide a means of interacting in a client-centered manner, promoting client autonomy through education and more frequent communications (Warner, 1997). In a Community Care Coordination Service (CCCS) program using home telehealth technology, the Care Coordinators bridged the gap between office visits by providing a daily connection between the

coordinators and the patients. Inpatient admissions were reduced by 46% at Ft. Myers, 68% at Lake City, and 13% at Miami. Daily communication made it possible for problems to be identified early and interventions implemented before problems escalated (Cherry et al., 2003).

Research on the influence of computer mediated-communication (CMC) for relational dynamics in groups has proposed that initially CMC group members will communicate in a less friendly manner than face-to-face group members (Barker et al., 2000) CMC fosters a more serious and business-like climate that is focused on task goals, whereas face-to-face communication is more friendly, emotional and personal (Fowler & Wackerbarth, 1980). The Impact of Nursing Characteristics study, at the University of Arizona, examined group communication as part of a larger composite that measured culture(Verran et al., 2003). Communication among teams of patient care professionals in hospitals was studied for frequency, timeliness and understandability. Verran's (2003) study found that communication is a vital social need in healthcare and, in particular, in group functioning.

Technical Characteristics for Social Groups

Technical characteristics, as described in the STS, can constrain the behavior of the individuals in the group. This study did not examine technology functioning; rather it examined integration of technology by each group member. Different degrees of telehomecare technology integration into users' daily lives represent the technology aspect of the study. Incorporation of technology into home health care should be as smooth as possible. Patients, nurses and caregivers should not focus on the technology. If

the technology is not integrated into usual health care practices, it will be an inconvenient burden, not an advantage.

Technology integration was the technical need that will be examined for its relationship to outcomes. Integration was defined as the assimilation of technology in performing care practices. The degree of technology integration was an indicator of the amount of incorporation into regular activities. Integration of technology into the regular activity of healthcare provider practice has been most frequently been examined as a component of adoption. May et al studied why normalization of telemedicine fails to stabilize (May & Ellis, 2001; May et al., 2003a; May et al., 2003b). Adoption of telemedicine systems in service depends on successful integration and stabilization, in practice, adoption depends on integration at the level of professional knowledge and practice (May et al., 2003a). Since patients and caregiver are an integral part of telehomecare groups, they must integrate technology into their care practices also. Research suggests that the problem with integrating telehomecare technology lies in its use in everyday settings (Finch et al., 2003). Telehomecare group members should be able to accommodate technology through the development of routine activities that are incorporated into daily care practices.

Joint Optimization of Social and Technical Characteristics

STS posits that when there is joint optimization between social and technical characteristics there will be optimal outcomes. As we anticipate greater integration of technology in home health care, it is essential that we understand the relationship between trust, interdependence, communication and integration of technology in care

practices. Lehoux utilized Giddens Structuration Theory to conceptualize the integration

of teleconsultation in specialty physician practice.(Lehoux et al., 2002). This social

constructionist theory recognizes that human agents are enabled and constrained by social

practice structures, yet these structures are the result of previous actions. Observing

practice structures can create a preferred manner of practice. However, established ways

of doing things can be changed when they are replaced or reproduced differently

(Giddens, 1984). Based on his analysis of specialty physician practice, Lehoux concluded

that the six specialties of physicians studied could not utilize teleconsultation to the same

degree. This research supported the view that users find telehomecare acceptable.

Additionally this research examined the influence of the patient and caregiver

interpersonal characteristics on the degree of utilization. Best practice for the nurses in

telehomecare can result from varying degrees of integration by members of the group.

Research regarding the process of integration into practice with respect to user

characteristics will help in the development of best practice methods. Best practice

research can lead to guidelines that are statements of policy or procedures that determine

a course of action with "recommended" flexible processes. If telehomecare is to meet

expectations related to improving access, quality and costs of care, it needs to be studied

within the full scope of the nurse-patient interaction and the integration of technology.

Examining group social characteristics can help to determine what composition of

characteristics supports home care technology integration. This study examined the

association between three social characteristics (trust, interdependence and

communication) and one technical need (technology integration) to explore joint

optimization's impact on outcomes.

<p style="text-align:center">*Outcomes*</p>

Quality outcomes in this study were the patient's perception of being well cared

for, self-care and hospitalizations. Telehomecare is being touted as a solution to the triple

challenge of access to care, cost containment and quality assurance. Some type of

intervention is necessary to address the needs of 150 million people who have a need for

home management of at least one chronic disease. It is estimated that these chronic

disease conditions may account for two-thirds of the annual $1 trillion in healthcare costs

(Meyer et al., 2002). Reducing hospitalizations and improving self-care will result in

fewer system costs. Additionally, if patients are satisfied with telehomecare they may be

able to make better decisions regarding positive health-promoting self-care behaviors

(Acton & Malathum, 2000). The Veterans Health Study in the Sunshine Network found

that telehomecare corresponds favorably with patient satisfaction, improved self-care and

fewer hospitalizations (Kobb et al., 2003; Meyer et al., 2002). Chronic diseases such as

congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD) and

diabetes are three extremely prevalent diseases in home health care. Theses three chronic

diseases are the primary focus of telehomecare programs. Jerant et al, found that CHF

related readmission charges were 80% lower in the telenursing groups compared to usual

care, and these groups also had significantly fewer CHF-related emergency visits.

Telenursing can reduce CHF hospitalizations and allow increased frequency of

communication with patients (Jerant et al., 2003). Patients have been overwhelmingly

satisfied when questionnaires ask about technical aspects of telehomecare services (Britton, 2003; Chae et al., 2001; Dansky et al., 1999; Doolittle et al., 1998; Hui & Woo, 2002; Kobb et al., 2003; Mair & Whitten, 2000; Whitten et al., 1997).

Patient satisfaction has been studied frequently in technology-mediated care. Mair and Whitten (2000) report that 32 studies involving interactive video consultations between patients and providers reported high levels of satisfaction. Most of these studies sought to determine if patients would use telehealth again or were satisfied with the service. The authors concluded that although patients were satisfied, few studies defined what satisfaction meant. Satisfaction is a difficult concept to measure and most of the studies represented only initial impressions and did not assess what happened over time. When determining their satisfaction with care, patients are more likely to focus on their present state of health then to consider the process of improvement they have experienced. (Kane et al.,1997b).

Patient satisfaction, defined in this study as the patient's perception of being well cared for, is regarded by many as the method of choice for obtaining patients' opinions about their care for several reasons (Avis, 1995). First, patient satisfaction is thought to be a desirable health care outcome in its own right (Donabedian, 1988; Kane & Degenholtz, 1997). Second, because patients are assumed to be an essential source of data about how well health care systems function, including patient views when evaluating health care systems makes sense (cf., (Donabedian, 1980). Third, if asked about their expectations and perceptions, patients can describe quality nursing care (McMillen, 1999). Finally, today reliable and valid instruments exist that can be used to

ask patients about aspects of care that healthcare providers and patients agree measure quality (Cleary, 1999).

Self care was defined as the degree to which the patient or significant other participated in the development and implementation of illness-linked protocols to restore health. Only a few studies have examined the association between variations in organizational, patient, and unit characteristics and self-care outcomes; and the relations among them remain equivocal (Henry, 1997). One reason for this is a failure of these studies to look at patient characteristics or other environmental factors as moderators of the relationship between the delivery system and outcomes.

This study examined three important outcomes in a home health care process (patient's perception of being well cared for as a measure of satisfaction, degree of self-care patients can perform and how many hospitalizations the patient has had since enrollment in the telehomecare program. This research took a correlational approach to examining the influence of group relationships, social and technical characteristics, on perception of being well-cared for (satisfaction) self-care and hospitalizations.

<div align="center">Summary</div>

Theory guidance is vital to the sustainability of research. Sociotechnical systems theory guided this research. STS theory emphasized group member's social and technical characteristics using the principle of joint optimization to achieve optimal outcomes. Telehomecare is a system of home health care delivery with patients, nurses and caregivers relying on each other in a group effort to provide patient care. Social characteristics for members of a telehomecare group are considered to be trust,

interdependence and communication. Technical characteristics for each member are represented by the integration of technology into home health care. Social and technical characteristics of members influence the common goals of patient self-care, satisfaction with being well cared for and reduced hospitalization. STS theory guided this study that examined the patient nurse and caregivers affect on outcomes from an individual, relational and group perspective. This research's approach to studying social and technical characteristics in telehomecare additionally examined multi-levels of relationships among the group members.

CHAPTER III: METHODOLOGY

Introduction

This chapter includes a description of the research design, the population sample, and setting. In addition research activities such as; consent and participation, instrumentation, data collection, and analysis are reviewed.

Research Design

This study used a descriptive, multi-level, correlational design. The study participants were nurses, patients, and their caregivers. The Veteran's Health Administration Systems (VHA) home and community based care department refers to the use of technology in home health as care coordinated homecare technology (CCHT). Patients refer to the CCHT nurses as care coordinators. To reduce confusion during study data collection and analysis, nurses are referred to as care coordinators (CC) and caregivers are referred to as home-helpers (HH). Each patient, CC and HH are measured individually but analyzed using the three levels described in the Social Relations Model design of multi-level analysis (Cook & Kenny, 2004). The results describe various aspects of the relationships of social and technical characteristics with outcomes from individual, dyadic and group perspectives.

Population Sample and Setting

There are 23 Veterans Integrated Service Networks (VISN) in the United States and within each VISN are many VHA sites. All VHAs have Home and Community-Based Care but only a select few have started to use CCHT. Two VISNs in the western US; VISNs 18 and 20 were represented in the study. Two VHA CCHT sites from VISN

18 participated; Southern Arizona Veterans Administration Health Care System (SAVAHCS) in Tucson and Carl T. Hayden Veterans Affairs and Medical Center (CTHVAMC) in Phoenix and one VHA CCHT site from VISN 20 participated; VA Puget Sound Health Care System (VAPSHCA).

All telehomecare patients were interacting with their care coordinators using a telecare messaging machine that was used routinely to send patient-specific health readings to the monitoring CC. Usual diagnoses for patients in telehomecare are chronic obstructive pulmonary disease, congestive heart failure and diabetes; however other diagnoses are starting to be equally prevalent. This research was not diagnosis specific.

Group analysis puts a greater demand on sample size for adequate power to maximize the potential for significant results. Patient data were collected for 2 months at each site, with a goal of 60 patient, HH and CC triad groups would achieve the conventional standard power of .80 (Cohen,1977). A CCHT patient participant was the link to the other two group members (CC and HH). All participants were asked to complete a one-time Home Telecare Questionnaire specific to their involvement with the other members of the triad. A brief demographic questionnaire collected additional information from all participants on gender, age and experience with computers.

<div align="center">Consent and Participation Activities</div>

All requirements were met for human subjects review boards at: University of Arizona, SAVAHCS, Carl T. Hayden VAMC, University of Washington and VAPSHCA. The study was first explained in a face-to-face meeting with the CCs. Information was distributed about the goal of the study, source of funding, time expected

from each participant and data collection purpose. CCs were offered a consent form to sign at this time. Recruitment letters were sent by the VHA to CCHT patients of consenting CCs. Recruitment letters invited patients and HHs to indicate that they might like to participate by calling the researcher. Each participant was informed of specific inclusion criteria. Inclusion criteria for CC are: patient and HHs agree to participate, licensed as a RN and employed by VHA in CCHT for minimum of 2 weeks and primary interaction with patient is telecare. Inclusion criteria for patients: CC and HH agree to participate, over 50 years of age, routinely uses telecare monitor two or more times per week and has a home-helper (family, friend, hired acquaintance) that is not a hired professional. Inclusion criteria for HH: patient agrees to participate, devotes time weekly to helping patient and is not a hired professional. If the patient or HH did not meet inclusion criteria they were thanked for their time and interest but not given the questionnaire.

Only the CC completed a written copy of the Home Telecare Questionnaire (see Appendix C). The researcher administered the study questionnaire over the telephone to the patient and HH (see Parts I, II, III, IV: Appendices A and B). Up to one month after the patient and HH completed the Home Telecare Questionnaires, the patient received a follow-up telephone questionnaire about patient quality outcomes: patient satisfaction, hospitalizations and self-care (see Parts V and IV: Appendix A:).

Instrumentation

All instruments used for measurement are summarized in Table 1 in addition to noting their location in the appendices. Detailed descriptions of these instruments are provided in the next section.

TABLE 1. Instruments

Measure	Subjects	Instrument	Administration	Appendix Location
Social Characteristics				
Trust	Patient Home-Helper CC	Trust Scale (adapted)Aubert & Kelsey, 2003	Questionnaire (Pt/HH telephone, CC written)	Part I - Appendices A, B, C
Interdependence	Patient Home-Helper CC	Social Interdependence Scale (adapted) Johnson and Norem-Habeison, 1979	Questionnaire (Pt/HH telephone, CC written)	Part II - Appendices A, B, C
Communication	Patient Home-Helper CC	Communication Scale (adapted) Gittell, 2000	Questionnaire (Pt/HH telephone, CC written)	Part III- Appendices A, B, C,
Technical Characteristics				
Technology Integration	Patient Home-Helper CC	Rating of perceived integration (developed for study)	Questionnaire (Pt/HH telephone, CC written)	Part IV- Appendices A, B, C
Quality Outcomes				
Patient Satisfaction	Patient	Patient Perception of Being Well Cared For (adapted) Verran et al, 2003	Telephone questionnaire	Part V -Appendix C
Hospitalization	Patient	Patient/caregiver self-report	1 question	Part V– Appendix C Question #17
Self care	Patient	Self-Care: Condition Management (adapted) Shea. 2003	Telephone Questionnaire	Part VI - Appendix C

The three instruments on social and technical characteristics (trust, interdependence, communication and technology integration were combined to create a single 29-item Home Telecare Questionnaire which was administered to each patient, HH, and CC. Patient and HH were administered the questionnaire by the researcher, via telephone. Patients only completed the satisfaction, self care and hospitalization questionnaires up to one month after the characteristics' instruments were complete. The referents in the scale items were unique to each role. Each participant rated items on separate questionnaires about trust, interdependence, communication, and technology integration specific to each other member of the telehomecare triad. For example; telehomecare patients completed three separate scales rating their HH and CC. The participant role being rated is referred to as the target. By using this process each member of the telehomecare group rated their perception of social and technology characteristics as influenced by their interaction with each other member.

Social Characteristics

Scales evaluating trust, interdependence and communication measured social characteristics. Telehomecare study participants rated their perceptions of other triad member's trust, interdependence and communication.

The Trust scale that was used in this research was adapted from Aubert and Kelsey's research on virtual student teams (Aubert & Kelsey, 2003). Data was collected twice from each participant initially when the team formed and at the end when the project was completed. Four antecedents to trust were measured: ability, benevolence, integrity and propensity to trust and a single scale of trust as a concept. The hypotheses

that the level of trust would increase over time or that outcomes would positively relate to trust were not supported with student study participants. However, the scale was found to be valid and reliable. The four antecedents for trust explained a high percentage of the trust score for all members regardless of whether participant was local or remote. Together all the antecedents explained greater than 55% of variance in scales administered initially and greater than 45% of variance in final scales. Reliability scores for the trust scale were determined by Cronbach's alpha: local team members initially (α =.69), finally (α = .82) and remote team members initially (α =.82) and finally (α =.74).

Aubert and Kelsey's scale for trust (not the antecedent scales) was subjected to a content expert review (Shea, 2006). Ten content experts in telehealth or instrumentation were included in a content analysis. The scale was determined to be relative to telehomecare by the majority of the telehealth experts. One expert suggested that the scale needed major revisions before it could be applied to telehomecare use. The primary reasons for major revisions were the inability to use scores as a measure of trust because there are too many other possible reasons to disagree/agree with the statement. The Trust Scale used for this telehomecare study was adapted based on the recommendations of the experts. The eight items are measured by a 6-Point Likert multiple-choice interval scale ranging from strongly agree to strongly disagree or not applicable. Participants were asked to choose a level of agreement with each statement. The eight-item scale is divided into two equal subscales: with five matching statements to be rated by the participant

about each other member of the triad. Part I : Appendices A, B and C, show the Trust Scales administered to patient, CC and HH, respectively.

The Social Interdependence Scale was adapted from Johnson and Norem-Habeison's original research. Reliability scores for Social Interdependence scale were determined by Cronbach's alpha. The scales that were pertinent to the age of the participants in this research study were shown to be reliable: cooperative (α = .84) and individualistic (α= .88). Since this research telehomecare study enrolled subjects 50 years or older, only cooperative and individualistic scales from the original Social Interdependence scale were used to compare interdependence effects. Five general items were used for descriptive purposes. Ten items were measured by a 6-Point Likert multiple-choice interval scale ranging from strongly agree to strongly disagree or not applicable. Participants were asked to choose a level of agreement with each statement. The ten-item scale was divided into two equal subscales: five matching statements to be rated by the participant about each other member of the triad. Part II: Appendices A, B and C, show the Social Interdependence Scales administered to patient, HH and, CC respectively.

Communication is integral to the effective coordination of work, and in the health care system, quality outcomes depend critically on effective coordination of services. The scale was adapted from the original work of Gittell's study for the Impact of Nursing Characteristics Study (Verran et al, 2003). Communication among healthcare workers, in both Gittell's (2000) and Verran et al's (2003) study, was examined as part of a larger composite but in both studies, the communication scale performed well. Components of

the communication scale are frequency, timeliness and accuracy. In Verran's (2003) study, reliability scores for two different types of communication were determined by Cronbach's alpha: nursing communication ($\alpha = .86$) and team communication ($\alpha = .95$). Gittell's (2000) study reports the range of Cronbach's alphas for communication, as an individual dimensions of relational coordination, to exceed minimum levels of index reliability (α range = .72 - .84).

Participants in the telehomecare study were asked to answer questions about three components of communication: frequency, timeliness and understandability. A 6-Point Likert scale ranging from always to never or not applicable was measured by six items. The six-item scale was divided into two equal subscales: three matching questions about each other member of the triad. Part III: Appendices A, B and C show the communication questionnaires administered to the patient, HH and CC, respectively.

Technology Characteristics

Technology integration represented the technical characteristics of telehomecare users in this study. Part IV: Appendices A, B and C show the three different rating questions for each scale administered to patient, HH and CC respectively. Participants ratings of "rate the amount of telecare information used on a daily basis for health efforts on a scale of 0 to 100", was used to measure how much the participants perceive that the others integrate telehomecare technology. Participants rated their own integration of information from telehomecare technology into healthcare efforts, as well as their perception of each other members' integration of information from telehomecare technology.

Joint Optimization

The telehomecare environment requires that the small, three person groups interact with each other and telehomecare technology. STS in telehomecare functions on the premise that the members perform as a group toward the goal of quality outcomes for the patient. Joint optimization was operationalized for this study as maximal group functioning. Group scores for trust, interdependence and communication were combined with the technical integration group score to produce three joint optimization scores. These three joint optimization scores were examined as predictors of quality patient outcomes.

Patient Quality Outcomes

Outcomes in this study were measured by patient questionnaires on satisfaction, self-care and number of hospitalizations.

Satisfaction is the patient's perception of contentment with care. Satisfaction was measured by the Patient Perception of Being Well Cared For scale which is a 20 item scale adapted from the Perception of Being Well Cared For scale (Verran et al, 2003). The scale contains eight questions about general health care, and 12 questions specifically addressing nursing care. Items are summed with higher scores reflecting greater patient satisfaction. The Perception of Being Well Cared For Scale was found to have reliability in previous studies with validity in three subscales of patient satisfaction: 1) general, 2) individualization of care and 3) caring aspects in the Impact of Nursing Characteristics Study (Shea, 2003). Four of the original scale items were dropped due to low factor loadings or not applicable ratings by the majority of patients. Validity was

confirmed by exploratory factor loadings greater than .71 for all satisfaction subscales.

Reliability scores for all subscales of satisfaction were determined by Cronbach's alpha:

general (α = .90), individualized (α = .90), and caring (α= .76). Part IV: Appendix A

shows the adapted Perception of Being Well Cared For questionnaire that was

administered to telehomecare patients.

   Self Care was measured by a third generation adaptation of the Health Restoration

Self-Care scale (Lorig et al, 1996). The scale used in this study was adapted from the

scale used in the Impact of Nursing Characteristics study (Shea, 2003) composed of 12

items designed to measure patient confidence in performing activities that required the

patient to participate in health decision-making. The purpose of using the scale, in

Verran's study was to capture patient self-care when discharged to home. Factor analysis

determined that the scale was valid as two separate subscales both loading at greater than

.65 (Shea, 2003). Simple self-care measures activities that are reviewed in typical

discharge instructions and complex self-care measures activities that require complex

decision-making skills. Reliability scores for both subscales of self-care were determined

by Cronbach's alpha: simple (α = .82) and complex (α = .76). The adapted Self-Care

Questionnaire that was administered to patients is included in Part II: Appendix A.

   Hospitalizations were measured by patient self-report. Clinic or outpatient visits

will not be included. The patient will be asked a single item question. "How many times

have you been hospitalized since you began using the telehomecare equipment?", (Part

V, #17: Appendix A). The researcher obtained the date of admission to the telehomecare

program to standardize the number given by the patient.

Analysis

The social relations model (SRM) has been used previously to examine the family system and individual family functioning (Cook & Dreyer, 1984; Cook & Kenny, 2004). The SRM's multi-level approach was used as the method of analysis. Patient's, CC's and HH's relationship to each other group member were analyzed using a round-robin design shown in Figure 3.

SRM examines specific components of telehomecare group relationships by using survey ratings of each member's perception of each other group member. The group may have successful outcomes because of the effect of one or more individuals, a relationship between a dyad within the group or the triad group as a whole. The SRM approach does not make any apriori assumptions about the strength of any one members influenced on the group. This quality of SRM makes it valuable for telehomecare group analysis. Any individual member may have a strong influence on the group. The impact of an interaction between two of the members may influence group outcomes. This research explored the assumption that the stronger the relationship between the members performing as a group, the better the outcomes. Social and technical characteristic scores for three different effects were analyzed for correlations with outcomes; 1) individual, 2) dyads (relationships between two individuals within the group) and 3) group (total triad). All scores reflect different levels of relationships within the group and can be negative or positive. When each different calculation was correlated with outcomes, the result reflected the influence of the different levels of effects on outcomes. The formulas for the perceiver, target and relationship were originally presented by Warner, Kenny and Soto

(Warner et al., 1979) and later applied to family relationship data by Cook and Dreyer

(Cook Dreyer, 1984).

<div align="center">Target</div>

Perceiver	Patient	CC	HH	
Patient		X_{PC}	X_{PH}	Row Mean P
CC	X_{CP}		X_{CH}	Row Mean C
HH	X_{HP}	X_{HC}		Row Mean H
	Column Mean P	Column Mean	Column Mean H	Grand Mean

X represents the observed score and the subscript represents the relationship, for example,
X_{CP} = the measure of CC rating the patient's social characteristic

FIGURE 3. 3x3 Round Robin Design

The SRM was adapted for use in this research because of a relationship difference

between the family group and the telehomecare group. Unlike the family group, in most

cases, the telehomecare group was composed of a CC that was a professional and a HH

that was frequently a family member.

In the SRM model, the first effect scores to be calculated are at the individual

level. The individual scores capture members from two perspectives: the perceiver and

the target. The perceiver effect score is established based on individual pre-existing

factors from life events over a long period of time. The perceiver effect score is

calculated as part of the round-robin design. However, that score was not used in the

analysis of individual scores in this study. The perceiver scores was not used because of

the relatively short acquaintance between the CC and the other telecare triad members.

The target effect is the perception that others have of the participant. This

individual effect is established more quickly and was used as the measure of individual

effect. Each individual had a single target effect score resulting from each member's

observation of the individual. The target effect was also calculated using the round-robin

design. Social or technology scores from each member's perception of the other members

created a row mean to represent an average of other members rating the individual. The

mean score was then weighted in a manner that adjusted for the missing member who is

being rated by others. For example; patient trust was rated by other group members and

received a target mean for the row. The formula was then applied to calculate a weighted

target effect score for the patient. There was a total of three *target effect* scores; one for

each patient, CC and HH. The following formula demonstrates statistical weighting that

utilizes the observed social need ratings relative to the total average of all social need

ratings to calculate a *target effect* score for each group member.

$$\textit{Target effect}_{p} = \text{column mean}_P\ (n\text{-}1)^2/[(n(n\text{-}2)] + \\ \text{row mean}_P\ (n\text{-}1)[n(n\text{-}2)] - \text{group mean}(n\text{-}1)/(n\text{-}2)$$

The next type of effect scores calculated was at the dyad level. Interaction

between two members of the group may influence the outcomes more than the interaction

between other members of the group. SRM approach provides information on which of these components is responsible for successful outcomes. The *relational effect* score reflects the influence of the relationship between two members of the group. In a usual dyad score, two member's ratings are averaged. Consequently, patient and CC dyads could have the same mean even though they rated their perception of each other very differently. The following SRM formula creates a *relational effect* score by subtracting the other effects from an observed rating. For example; patient rates the CC for trust, then the CC's perceiver effect, the patient's target effect and the group effect scores are subtracted. Only a score for the relationship between the dyad remains.

$$\textit{Relationship effect}_{CP} = \mathrm{X}_{CP} - \textit{Perceiver effect}_C - \textit{Target effect}_P - \text{group mean}$$

The third type of effect score calculated was at the group level. The *group effect* score was calculated as a mean of all six ratings (3X2) in the round-robin matrix. Group level effect scores were based solely on averaging survey ratings and are conceptually equivalent to ratings of the whole group functioning. It is likely that group functioning were affected by individual and dyad relationships. For example; the group effect score for trust was the average of six (6) group member's rating of trust: the patient's rating of nurse and caregiver (2), the nurse's rating of patient and caregiver (2) as well as the caregiver's rating of the patient and nurse (2). The following formula for the *group effect* score was based on the survey ratings in the round-robin design (Figure 3).

$$\textit{Group effect} = \mathrm{X}_{PH} + \mathrm{X}_{PC} + \mathrm{X}_{CP} + \mathrm{X}_{CH} + \mathrm{X}_{HP} + \mathrm{X}_{HC} / 6$$

Psychometric tests for reliability and validity were performed to examine the instrument used in this population. Cronbach's Alpha and ANOVA tests were used to examine reliability and confirmatory factor analysis was used to test validity for each scale. Once the scales were determined to be reliable and valid, then the SRM effect scores were computed.

SRM effect scores provided the basis for comparing the influence of differences within the telehomecare groups. More specifically individual, dyad and group level effects were computed for each group. Since the STS is based on optimal outcomes from groups within a system, joint optimization scores for each group was computed from group social and technical outcome effect scores. There was a total of 31 scores for each group; individual (12), relational (12), group (4) and joint optimization (3). Pearson's product moment correlation coefficients were examined to determine the extent to which each of the 31 group scores correlated with outcome scores. Prediction for the influence of joint optimization on outcomes was computed with multiple regression statistics. More detailed discussion of analyses is presented in Chapter IV.

<div align="center">Summary</div>

Data were collected for this research from participants in Care Coordinated Home Telehealth programs in VISNs 18 and 20 in the Veterans Health Administration System. All group members communicate with the nurse using a telehomecare messaging system. Previously established instruments were used to collect data on social characteristics (trust, interdependence and communication) and technical characteristics (integration of technology). Each participant completed a questionnaire with summative scales that rated

their perception of social and technical characteristics of other members in their group. A

family Social Relations Model (SRM) was used to examine the unique differences

between the ratings of group members. The SRM used survey ratings rating scores in a

round robin design to statistically compute individual, dyadic and group effect scores.

Effect scores for each social and technical characteristic was correlated with outcome

scores. Previously established valid and reliable instruments were used to collect data

from patients only on outcomes; satisfaction and self-care. A single item measured the

number of hospitalizations. Effect scores for trust, interdependence, communication and

integration of technology will be correlated to outcome scores to determine the impact of

different aspects of relationships on quality patient outcomes. Finally, techniques for

evaluating joint optimization among social and technical characteristics were explored.

CHAPTER IV: RESULTS

Introduction

This chapter includes: description of the sample, psychometrics for the data collection instruments and statistical results pertinent to each of the research questions. All analysis sections are performed using computer software, Statistical Package for the Social Sciences (SPSS) 12.0 for Windows.

Sample Description

The sample from the VHA CCHT system was composed of 95 participants: 9 nurse telecare care coordinators (CC), 43 chronically ill home telecare patients and 43 patient specific home-helpers (HH). The study had a 100% for CCs but it is difficult to determine the response rate for patients and HHs. Recruitment letters contained inclusion criteria, so participants may have self-selected out of the study. Table 2 describes the participation by site. The study did not achieve the goal of 60 groups, despite all reasonable efforts. Table 3 describes reasons and frequencies of ineligibility. Not having a HH accounted for 52% of ineligible participants. All participants who met the inclusion criteria were included.

TABLE 2. Participation

	Tucson	Phoenix	Seattle	Total
Total HHCT patients sent recruitment letters	405	84	314	818
Patient and HH participants	26	6	11	43
CC participants	5	1	3	9

TABLE 3. Reasons for Ineligibility by Site

	Tucson	Phoenix	Seattle	Total
No home-helper	9	2	4	15
Home-helper did not wish to participate	2	0	3	5
Hired caregiver	1	0	1	2
Recently discharged from program	1	0	1	2
Patient not able to answer questions	0	0	1	1
Uses telecare equipment < 2 times per week	3	1	0	4
Total ineligible	16	3	10	29

Patients

All patient participants were male and over the age of 50. Thirty percent did not consider themselves to be experienced with electronic communication. Patients stated that they had telecare in their homes for a variety of reasons. Reasons ranged from being told to enroll in telehomecare by their physician to a diagnosis specific need, 30% stated generally that they had it to be monitored. Diagnosis specific reasons were evenly distributed among chronic cardiac, respiratory and diabetic illness. Inclusion criteria dictated that the patient use the equipment at least 2-3 times per week; however, 95% surveyed used the equipment daily. Patients reported telephone interaction was primarily initiated by the CC. The duration of using the telecare equipment in the home ranged from 2 to 24 months, with 25% using it for 1 year and 12% for 2 years. The total number of interactions by telephone (patient report) had a large range 0 to 50 times. The patient who had the equipment for only 2 months had not had a situation where the CC needed to contact the patient. For those who had received a telephone call from the CC, a ratio of interaction to duration was created. The observed range was from every 6 weeks to 4 times per month, averaging at 1 time per month.

Home-Helpers (HH)

All HH were female and 50 years old or older: 88% were wives, 2% were mothers, 7% were daughters and 2% were girlfriends. Fifty-six percent did not consider themselves experienced with electronic communication. In general, HHs did not engage themselves in CCHT activities; 72% did not use the telecare equipment and 56% had not talked with the CC. Anecdotally, HHs often commented that the telecare equipment was the responsibility of the patient. However, 54 % helped patients with medications or other medically related activities and 30% of this group helped "24/7". There were mild, non-significant correlations between how much the HH helped the patient and amount of help with technology (r= .221) and how much the HH helped the patient and frequency of talking to the CC, (r= .198).

Care Coordinators (CC)

Eight of the nine care coordinators were female, six were 50 years old or older and three were between 30 and 50 years old. Forty-four percent had a BSN and 33% had a Master's degree in nursing as their highest degree. Three nurses had graduated with their highest degree during the last 10 years, yet all considered themselves experienced with electronic communication. All CCs were experienced in telehomecare but only two came to CCHT with experience in home health. One hundred percent reported that they usually or always enjoy helping patients using telecare.

Patients, HH and CC Interaction

Table 4 displays descriptive information based on questions that all participants were asked about their interactions with the specific telecare group and healthcare

system. Patients and HHs were asked these questions verbally by telephone and CCs were asked these questions in a written questionnaire. CCs responded to questions based on their interaction with each of their patients, for a total of 43 responses. In general, patients and HHs responded to the questions similarly. CC responses were mostly divided between agree and neutral. The patient, HH and CC agreed that it was a good idea to help each other learn, 84%, 96% and 82% respectively. Being dependent on others for help managing healthcare bothered 81% percent of patients and 70% of HH. Patients, HHs, and CCs responded that managing healthcare with a small group or professionals were preferred to managing it with just one, 88%, 84% and 68%, respectively. Patients and HH strongly agreed that patients, CCs and HHs have the same goals for home telecare, 91% and 93%. Only 51% of CCs as a group, were confident that their patients and HHs have the same goals as they did.

TABLE 4. Patients, HH and CC Interactions

Descriptive Statement		Pt*	HH*	CC**
It is a good idea for the PATIENT, CARE COORDINATOR and HOME HELPER to help each other learn.	A	83.7	95.4	81.4
	N	7.0	4.6	14.0
	D	7.0	0.0	2.3
	NA	2.3	0.0	2.3
It bothers me that I am dependent on others for help in managing my (or the patient's) healthcare.	A	81.4	69.8	48.9
	N	2.3	4.6	41.9
	D	16.3	25.6	4.6
	NA	0.0	0.0	4.6
I get (or give) better health care when I make my own decisions.	A	67.5	58.2	41.9
	N	11.6	9.2	39.5
	D	18.6	25.6	14.0
	NA	2.3	7.0	4.6
Managing healthcare with a small group of professionals is better than providing care with just one.	A	88.4	83.5	67.5
	N	4.6	6.2	20.9
	D	7.0	7.0	4.6
	NA	0.0	2.3	7.0
PATIENT, CARE COORDINATOR and HOME HELPER have the same goals for Home Telecare.	A	90.8	93.1	51.3
	N	4.6	2.3	39.5
	D	4.6	4.6	4.6
	NA	0.0	0.0	4.6

A- agree or strongly agree, N-neutral, D-disagree or strongly disagree, NA-not applicable
* N= 43
* * N= 9 CCs – 43 responses unique to interaction with each patient and HH.

Telecare Equipment

There were two different types of telehomecare equipment in the homes, Health Buddy (Health Hero Network) and Viterion 100 (TeleHealthcare LLC). Both were text only monitors without videophones. The primary difference between the equipment was availability of peripheral devices that sent data automatically. Health Buddy required that patients collect data about their blood sugar, weight and/or blood pressure from the patient's own glucometers, scales and/or blood pressure cuffs. Patients collected the information in the morning, signed on to the Health Buddy system, answered

preprogrammed questions (specific to diagnosis), entered data and sent the information to the CC. Viterion 100 required that the patient send data from the glucometers, scales and/or blood pressure cuffs that were connected to the telecare monitoring system. Although the system has the capability of individualizing questions, standard questions per diagnosis were used. In all sites, CCs received daily text information in a grid format the day after it was sent. A ranking system for priority calls indicated which patients should be called first. At all sites, CCs called patients Monday through Thursday. Seattle and Tucson also called on Fridays.

<div align="center">Instrument Psychometrics</div>

Five instruments were used for data collection and two instruments were used to measure quality outcomes. Psychometrics performed on the Self-care outcomes scale determined that the scale performed well as two separate subscales: complex and simple. Prior to statistical examination each of participants scale scores were examine by role to describe the sample. Scale descriptive data are displayed in Table 5.

Psychometric tests were performed on each participant's interval rating of each of the other members in their telehomecare triad. The participant's role within the triad provides the basis for subscales' reliability and validity. Consequently there will be six reliability and validity test scores for each scale: three members rating two other members (3x2).

TABLE 5. Descriptive Scale Data

	Role	Target	Mean	Median	SD	Range
Trust	Pt	CC	4.17	4.33	0.62	2.33
		HH	4.15	4.33	0.79	4.00
	HH	Pt	3.52	3.33	0.97	4.33
		CC	3.60	3.66	1.04	5.00
	CC	Pt	3.59	3.50	0.49	2.75
		HH	2.99	3.25	1.36	5.00
Social Interdependence	Pt	CC	4.29	4.37	0.66	3.37
		HH	4.40	4.62	0.59	3.25
	HH	Pt	4.42	4.50	0.38	1.25
		CC	3.93	4.25	1.00	3.75
	CC	Pt	4.27	4.37	0.62	2.25
		HH	3.55	3.87	1.32	4.00
Communication	Pt	CC	4.58	5.00	0.86	4.66
		HH	3.77	4.00	1.10	4.66
	HH	Pt	4.48	4.66	0.55	2.00
		CC	1.59	0.66	1.59	4.66
	CC	Pt	3.67	4.00	0.79	3.66
		HH	1.96	1.00	1.45	4.33
Well Cared For	Pt		3.57	3.75	0.55	3.08
Self Care						
Complex	Pt		8.23	8.2	1.15	5.9
Simple	Pt		8.11	8.4	1.47	7.2

Cronbach's alpha was used as a measure of internal consistency (Cronbach, 1955). Measuring traits, such as social characteristics, is challenging because participants may be influenced by the events of the day. Scales used in behavioral sciences typically have a coefficient α of >.70 for a well established construct; however, somewhat lower standards of reliability are tolerable for preliminary forms of construct-validated measures (Nunnally & Bernstein, 1994). Although the constructs have demonstrated reliability and validity in other studies, there are two distinct differences in this research: 1) adaptation to meet the needs of SRM and 2) use with three different participant roles in

the telehomecare group. Therefore, Cronbach's α for reliability was accepted at .65 or greater. An additional test of scale reliability was used for social characteristic scales; one-way analyses of variance (ANOVA) were performed. An ANOVA was used to evaluate the reliability of participant roles between the two participant roles being rated and between the two participant roles doing the rating. Examining the significance of an ANOVA helped to determine if participants with specific roles used the scale to perceive others in a similar manner. Using an ANOVA to examine the differences in variance between and within further supports reliability of scale by participant role. Differences between groups were considered acceptable at a significance (p) $\leq$ .05.

A confirmatory factor analysis was performed to determine construct validity for each subscale. A salient factor is one with a factor loading of .5 or greater (Nunnally & Bernstein, 1994). Variance explained was impressive for each scale, but may be artificially elevated due to the limited number of items in the scales. Decisions to drop or maintain an item were based on maximizing all the subscales consistently among roles. Therefore, some subscales may not have yielded optimal psychometric test results, yet the subscale was determined to be adequate for use in theory analysis. Tables 6 through 8 display scale psychometrics based on the participant's role in the triad.

Social Characteristics Scales

Trust Scale psychometrics are displayed in Table 6. The item that asked group members to rate level of agreement with the statement, "I wish I could better guide *(member by role)* management of my care" was dropped because it lowered the reliability and validity of the scale. Even when the item was dropped, Trust Scale reliability and

validity varied among participant roles. Low reliability scores may have been the result of the small number of items in the scale. Trust was used as a social characteristic in social relations modeling, however, results should be considered tentative.

Cronbach alpha values for reliability varied from strong (CCs ratings of HHs, α=.90), to negligible, (HHs ratings of CCs, α=.16). Cronbach alphas were acceptable for patients ratings of HHs (α=.65) and CCs ratings of HHs (α=.90). Further investigation with ANOVA showed that there was significant agreement between patients and CCs rating HHs ($p <.01$) as well as patient's and HH's rating of CC's ($p <.01$). The Trust Scale had acceptable validity for patients using all the scale items. Item 1 caused problems for CCs and HHs. Item 1 states, "If I had my way, (member by role) would have greater influence *(more to say about)* over my care." The item is valid as stated for patients rating HHs and CCs as well as for CCs rating HHs (.60, .54, .85). CCs rated patients and HH rated CCs, inversely (-.40, -.35). HHs on the telephone qualified their ratings by saying, "I wouldn't want anything to change, I like it the way it is." When item 1 was considered in an inverse manner, the construct was not reliable or valid for HHs rating CCs or CCs rating patients.

Interdependence Scale psychometrics are displayed in Table 7. All original scale items were maintained. Cronbach alpha values were acceptable for all participant roles. As in the trust scale, the least reliability was noted when the HH rates the CC (α= .59). An ANOVA demonstrated that patients, as a group, had some problems using the scale to rate HHs and CCs. Factor loadings were consistently high for all items in the construct.

The Interdependence Scale performed well as a reliable and valid scale in this study for

all participant roles.

TABLE 6. Psychometrics for Trust Scale

Trust Scale	Participants	Reliability			Factor Analysis range	
		α standard.	ANOVA F	p	Variance Explained	Loadings
3-item scale	Patient rate- HH	.65			47%	.60, .88, .84
	Patient rate- CC	.44			61%	.54, .75, .76
Participants rate	Pt rate HH & CC		.02	.88		
other group	HH & CC rate Pt		.23	.63		
member						
separately	HH rate- CC	.16			47%	-.40, .77, .84
	HH rate- Patient	.40			48%	.42, .86, .70
	HH rate Pt & CC		.13	.73		
	Pt & CC rate HH		23.16	<.01		
	:					
	CC rate - Patient	.30			57%	-.35, .89, .89
	CC rate - HH	.90			83%	.85, .95, .94
	CC rate Pt & HH		7.54	<.01		
	Pt & HH rate CC		9.59	<.01		

TABLE 7. Psychometrics for Interdependence Scale

Interdependence Scale	Participants	Reliability			Factor Analysis	
		α standard.	ANOVA F	p	Var. Exp.	Loadings
5-item scale	Patient rate- HH	.90			72%	.79, .93, .90, .80, .81
	Patient rate- CC	.85			62%	.85, .84, .74, .83, .66
Participants rate other group member separately	Pt rate HH & CC		.66	.42		
	HH & CC rate Pt		1.92	.17		
	HH rate- CC	.59			41%	.84, .45, .83, .59,.29
	HH rate- Patient	.85			72%	.80, .84, .84, .78, .71
	HH rate Pt & CC		9.20	<.01		
	Pt & CC rate HH		14.93	<.01		
	CC rate - Patient	.94			81%	.91, .94, .91, .84, .89
	CC rate - HH	.97			90%	.95, .96, .94, .97, .93
	CC rate Pt & HH		10.50	<.01		
	Pt & HH rate CC		3.88	.05		

Communication Scale psychometrics are displayed in Table 8. All original scale items were maintained. Cronbach alpha values were acceptable for all participant roles in determining scale reliability. As in the Trust and Interdependence Scales, the least reliability was noted when the HH rates the CC (α= .50). Additionally, an ANOVA demonstrated that there was a significant difference in of between and within group scores, with participant as a perceiver and as a target. All the Communication Scale items were valid except item 1. HH's were asked, "How frequently do you communicate with the PATIENT about his/her care?" The factor loading for this item (.09) indicated that this item did not measure the same concept as when participants rated all the other roles. Item 1, which asked about communication with the CC, had a strong factor loading (.85).

TABLE 8. Psychometrics for Communication Scale

Communication Scale	Participants	Reliability		Factor Analysis	
		α standard.	ANOVA F p	Variance Explained	Loadings
3-item scale Participants rate other group member separately	Patient rate- HH	.91		85%	.85, .97, .94
	Patient rate- CC	.75		67%	.81, .85, .78
	Pt rate HH & CC		14.40 <.01		
	HH & CC rate Pt		30.05 <.01		
	HH rate- CC	.50		78%	.82, .94, .90
	HH rate- Patient	.86		56%	.09, .92, .92
	HH rate Pt & CC		126.97 <.01		
	Pt & CC rate HH		42.72 <.01		
	CC rate - Patient	.82		73%	.85, .92, .80
	CC rate - HH	.94		89%	.93, .94, .96
	CC rate Pt & HH		46.16 <.01		
	Pt & HH rate **CC**		117.95 <.01		

Technical Characteristics

Participants were asked to rate the other triad member's amount of technology integration into daily activities by providing a single interval rating between 0-100. Thus, technology integration scores consisted of two ratings: one for each other member of the group. SRM statistics were then applied to the rating to create individual, relational and group effect scores.

Quality Outcome Scales

Two scales used to measure patient quality outcomes were adapted due to patient population differences from their original use: Perception of Being Well Cared For (Verran et al, 2003) and Self Care: Condition Management (Verran et al, 2003). A third study outcome, "number of hospitalizations", was obtained from a one-item question,

Item 17, in the Perception of Being Well Cared For Questionnaire. Number of

hospitalizations did not perform well as an outcome question because as a single multiple

choice question there was not enough information obtained so it was dropped from

further analysis. Each outcome rates only patient perceptions. Table 9 displays the

psychometrics for Quality Outcomes Scales.

TABLE 9. Psychometrics for Patient Quality Outcomes Scales

Quality Outcomes Scale	# of items	Reliability α	Factor Analysis range		Item Comments
			Variance Explained	Loadings	
Well Cared For	12	.92	59%	.51 - .91	Item 2 dropped
Self Care					
Complex	5	.63	44%	.45- .83	Contains items: 1,2,3,4,11
Simple	5	.72	51%	.61 - .91	Contains items: 5,6,7,8,10

The *Perception of Being Well Cared For Scale* rates patient satisfaction. The

scale is reliable (α=.92) and valid for the home telecare patient population in this study.

Item 2 was dropped as a result of the high coefficient α and confirmatory factor analysis

identified a factor loading <.50. Twelve items in this valid scale explained 59% of the

variance.

As in the Impact Study, the *Self Care Scale* factored into two distinct scales:

simple and complex (Shea, 2003). In this study, item 10, "How confident are you that

you can get information from reliable healthcare resources?." factored into complex self

care and in the Impact Study, item 10 factored into simple self care.   Both subscale

α coefficients met the criteria for reliability when there were 5 items in each, in this study. Simple self care involves a directed action toward a single goal, such as: taking medications, medication side effects, exercise, diet and treatment plan. Complex self care involves incorporating multiple health factors toward a more multifaceted goal, such as: manage condition, judge when to get help, adapt treatment plan, reduce how affected by condition and get information from reliable sources. Complex self care contains one item with a factor loading that is below criterion, (.45); however, the item was maintained in an effort to keep five items in each subscale. Additionally, the items in each subscale explained a sizable amount of the variance: Complex (44%) and Simple (51%).

Results Related to Research Questions

Result of correlational analyses will be presented to answer the research questions that were posed in Chapter I. Correlational analysis was performed to explore the relationship between characteristics and outcomes. Social Relations Model statistics were used to obtain individual, relational and group social characteristic scores that were correlated to patient outcome ratings. Pearson's product moment correlation coefficients were computed for bivariate analyses. Since this study focused on strengths of relationships between characteristics and outcomes, correlational magnitude >.29 is considered statistically significant.

Research Question 1

What are the relationships among social characteristics (trust, interdependence, and communication), technical characteristics (technology integration) and quality patient outcomes (perception of being well-cared for, self-care, and hospitalizations) in

individuals involved in telehomecare groups (patient, nurse and caregivers)? Table 10 displays bivariate correlations between individual scores derived from applying SRM statistics to participant scale ratings for trust, interdependence, communication, technology integration and mean values for patient satisfaction and self care ratings.

Research Question 1a asks: What are the relationships among social characteristics and patient outcomes when data are analyzed at the individual level for each member of a unique patient-care group? Trust in the CC (r= .30), dependence on the CC (r= .30) and communication with the HH (r=.57) correlated significantly with the patient's perception of satisfaction. A patients' level of complex self care did not have any significant correlations with social characteristics at the individual level of analysis; however, communication with the HH did correlation significantly (r=-.31) with simple self care.

Research Question 1b asks: What are the relationships among technical characteristics and patient outcomes when data are analyzed at the individual level for each member of a unique patient-care group? Individual technology integration did not correlate significantly with satisfaction. Patient and HH technology integration correlated significantly with complex self care (r= .32, -.38). CC and HH technology integration correlated significantly with simple self care (r= .33, -.44). For both complex and simple self care, there was a significant inverse HH correlation with technology integration.

TABLE 10. Individual Target Effect Correlations

<div align="center">Individual Effect Correlations
Social Characteristics to Quality Outcomes</div>

Section a		Well Cared For		Complex Self Care		Simple Self Care	
		r	p	r	p	r	p
Trust	Pt	-.22	.15	-.00	.99	.14	.37
	HH	.03	.85	.06	.71	-.09	.57
	CC	*.30	.05	-.05	.76	-.13	.49
Interdependence	Pt	-.08	.60	.14	.37	.20	.21
	HH	-.15	.34	-.10	.50	-.11	.49
	CC	*.30	.06	-.09	.55	-.17	.27
Communication	Pt	-.28	.07	.19	.20	.19	.23
	HH	*.57	<.01	-.10	.51	-.31	.04
	CC	-.19	.22	-.16	.32	.05	.74
Section b							
Technology	Pt	-.11	.50	*.32	.04	.02	.90
Integration	HH	-.09	.58	*-.38	.01	*-.44	<.01
	CC	.17	.29	.01	.931	*.33	.03

* correlation coefficient (r) magnitude >.29

<div align="center">*Research Question 2*</div>

What are the relationships among social characteristics (trust, interdependence, and communication), technical characteristics (technology integration) and quality patient outcomes (perception of being well-cared for, self-care, and hospitalizations) in dyads involved in telehomecare groups (patient, nurse and caregivers)?

Table 11 displays bivariate correlations between dyad relational scores derived from applying SRM statistics to participant scale ratings for trust, interdependence, communication, technology integration and mean values for patient satisfaction and self care ratings. Triad group analysis using the SRM provides 6 dyad scores (Pt/CC, CC/Pt, CC/HH, HH/CC, HH/Pt, Pt/HH); the magnitude of the correlation coefficient values are always the same between dyad members but the order is different (i.e. Pt/CC, CC/Pt). Only three dyad correlations will be shown as absolute values to display magnitude.

Research Question 2a, asked: What are the relationships among social characteristics and patient outcomes when data are analyzed at the dyadic level in a unique patient-care group? Trust between dyads did not correlate with any measured outcomes. Interdependence (r= .31, .29, .30) and communication (r= .61, .60, .61) between all three dyad members did correlate significantly with patient satisfaction.

Research Question 2b, asked: What are the relationships among technical characteristics and patient outcomes when data are analyzed at the dyadic level in a unique patient-care group? Correlation coefficients for technology integration and trust in dyads approached, but did not meet the significant level of correlational magnitude.

TABLE 11. Dyad Relational Correlations

Dyad Relational Correlations

Section a		Well Cared For		Complex Self Care		Simple Self Care	
Social Characteristics to Quality Outcomes							
		r	p	r	p	r	p
Trust	Pt/CC	.20	.19	.03	.86	.22	.15
	CC/HH	.20	.21	.03	.86	.22	.16
	HH/Pt	.20	.19	.02	.87	.22	.16
Interdependence	Pt/CC	*.31	.05	.11	.49	.02	.88
	CC/HH	*.29	.06	.10	.52	.03	.86
	HH/Pt	*.30	.05	.10	.53	.03	.85
Communication	Pt/CC	*.61	<.01	.03	.87	.04	.82
	CC/HH	*.60	<.01	.02	.88	.03	.85
	HH/Pt	*.61	<.01	.02	.89	.04	.82
Section b							
Technology	Pt/CC	.25	.11	.14	.374	.03	.84
Integration	CC/HH	.25	.11	.14	.387	.03	.84
	HH/Pt	.24	.12	.13	.402	.02	.88

Correlations displayed in absolute values

* correlation coefficient (r) magnitude >.29

TABLE 12. Group Correlations

Group Correlations

Section a		Well Cared For		Complex Self Care		Simple Self Care	
Social Characteristics to Quality Outcomes							
		r	p	r	p	r	p
Trust	Group	*.31	.05	.11	.48	-.04	.81
Interdependence	Group	.22	.16	-.04	.78	-.09	.56
Communication	Group	*.47	<.01	-.00	.99	-.07	.63
Section b							
Technology Integration	Group	*.35	.02	.00	.99	-.02	.90

* correlation coefficient (r) magnitude >.29

Research Question 3

What are the relationships among social characteristics (trust, interdependence,

and communication), technical characteristics (technology integration) and quality patient

outcomes (perception of being well-cared for, self-care, and hospitalizations) in telehomecare groups (patient, nurse and caregivers)? Table 12 displays bivariate correlations between group scores derived from applying SRM statistics to participant scale ratings for trust, interdependence, communication, technology integration and mean values for patient satisfaction and self care ratings.

Research Question 3a, asked: What are the relationships among social characteristics and patient outcomes when data are analyzed at the group level providing unique patient care as a group? Trust and communication are significant at the group level (r= .31, .47) respectively, when correlated with satisfaction. Group level analysis scores did not correlate significantly with self care outcomes.

Research Question 3b, asked: What are the relationships among technical characteristics and patient outcomes when data are analyzed at the group level providing unique patient care as a group? Group technology integration did correlate with satisfaction (r=.35) but not with either self care subscale.

Research Question 4

Can group joint optimization between each social characteristic and technical characteristic be evaluated? According to the STS Theory, the principle of joint optimization is that service delivery systems function optimally only if the social and technological characteristics of the subsystem groups fit the demands of each other and the environment (Emery, 1959). The common processes of joint optimization, when applied, have consistently demonstrated an ability to guide groups in the production of quality outcomes (Pasmore et al., 1982). Telehomecare is a new method of delivery and it

is unknown what the demands of this environment are. This research has hypothesized that telehomecare will produce better outcomes when the participants function as a group. Therefore, the product of the group score for each social characteristic and technology integration was computed into three values that represent a measure of joint optimization.

Research Question 4a, asked: Is there a relationship between joint optimization (each social and technical characteristic) and outcomes? Each value was then correlated to each quality outcome to investigate the strength of the relationship between joint optimization measure and outcome. The patient's perception of being well cared for correlated significantly with each measure of joint optimization: trust multiplied by technology integration ($r=.41$, $\underline{p} <.01$), interdependence multiplied by technology integration ($r=.38$, $\underline{p}=.01$), and communication multiplied by technology integration ($r=.45$, $\underline{p} <.01$). Correlations between both self care outcomes and measures of joint optimization did not correlate significantly.

Research Question 4b, asked: What is the influence of joint optimization on outcomes? A multiple regression was performed to evaluate the influence of social and technical characteristics on outcomes. Three joint optimization scores (trust x technology integration, interdependence x technology integration, and communication x technology integration) were regressed onto outcomes. Joint optimization explained 16% of the variance ($R^2= .16$, $\underline{p}=.02$) for satisfaction. The influence of joint optimization between technology integration and: trust ($\beta=.20$), interdependence ($\beta =-.43$) and communication ($\beta =.66$) were significant.

Summary

This chapter reported the results of data analysis in three sections: description of the sample, instrument psychometrics and results related to research questions. Data were collected at three western United States VHAs sites: Tucson, Phoenix and Seattle. All 43 patients participants were male, 43 HHs were female and 8 of 9 CCs were female. All three site CCs participated in the study.

The three scales on social characteristics: trust, interdependence and communication, and two scales on outcomes: Perception of Being Well Cared For, Complex and Simple Self Care were analyzed for reliability and validity. None of the scales have been used for the populations represented in this study or used with SRM statistical procedures. Lower standards of reliability are tolerable for preliminary forms of construct-validated measures. Cronbach's alpha $\geq$ .65 and ANOVA significance of $\leq$ .05 were accepted for reliability. Confirmatory factor analysis provided factor loadings to determine construct validity. Scale items with factor loading $\geq$ .5 were accepted as valid. Creation of scales that are reliable and valid for different participant roles is challenging, for example the trust scale. Decisions to drop or maintain an item were based on maximizing all the subscales consistently for every participant. Therefore, some scale items did not meet criteria but were maintained. Outcomes scales for satisfaction and self care were only used by the role of patient as participant. The satisfaction scale: Perception of Being Well Cared For, was reliable and valid with all 12 items. Self care factored into two separate reliable and valid subscales: complex and simple.

SRM statistics were used to create scores at multiple levels of analysis for social and technical characteristics. Individual, relational and group scores were correlated with patient outcomes to evaluate relationships. The results of bivariate correlations at multi-levels provided the answers to the research study questions. At the individual level: trust in CC interdependence of the CC and communication with HH correlated significantly with satisfaction; patient and HH (inverse) technology integration correlated significantly with complex self care; communication with HH; and CC and HH (inverse) technology integration correlated significantly with complex self care. At the dyad relational level: interdependent and communicative relationships between every dyad in the patient, HH and CC group correlated significantly with satisfaction. At the group level: higher scores on group trust, communication and technology integration correlated significantly with higher satisfaction.

Another way to discuss findings is by characteristics. Trust was associated with satisfaction at the individual and group levels. Interdependence was associated with satisfaction at the individual and dyad levels. Communication was associated with satisfaction at all levels of analysis and simple self care at the individual level. Technology integration was associated with satisfaction at the group level and both simple and self care at the individual level.

The final research question explored joint optimization. Three measures of joint optimization were created: the product of each social characteristic and technology integration. A multiple regression explored the influence that joint optimizations have on

outcomes. Joint optimization between all social and technical characteristics was shown to have significant influence on patient's perception of being well cared for.

CHAPTER V: DISCUSSION

Introduction

The specific purpose of this research was to examine the relationships among patients', caregivers' and nurses', their social and technical characteristics and quality outcomes in telehomecare. Sociotechnical Systems Theory and statistical procedures from the Social Relations Model serve as guides for examining influences on telehomecare at three different levels: individual, relational (dyad) and group (triad). This chapter includes: discussion of scales, discussion of findings, implications for nursing, limitations of the study, recommendations for future studies, conclusions and summary. Significant findings will be discussed at three different levels of analysis as they pertain to research questions.

Discussion of Scales

Psychometric analysis determined that some scale items be dropped. The trust scale did not meet acceptable levels for reliability. Alterations to the scale were made based on recommendation from a content analysis done by 10 experts (Shea, 2006). The experts were not all nurses but they were all professionals in the medical field. This may be a reason for the scale performing best for nurses. However, any conclusions or implications must be viewed with caution so trust will not be discussed as a multi-level influence on outcomes in Chapter V. Trust will however be discussed as a component of joint optimization. Two social characteristics, one technology characteristic and two outcomes remained in the final analysis.

Scales

The Social Interdependence scale was psychometrically sound; participant roles used the scale in a consistent manner to evaluate other participant roles in their group. Communication scale means indicate that different roles had different communication experiences. Again, the scale was psychometrically sound for using it within the telehomecare groups to evaluate other members. Technology integration required a great deal of time from participants to rate each other member in their group on a single 100-point scale item. The Perception of Being Well Cared For Scale was reliable and valid for patients in telehomecare. The Self Care: Condition Management Scale performed as it had in the Impact Study, factoring into two reliable and valid outcome subscales that provide of more specific information for best practices in telehomecare.

Discussion of Descriptive Findings

Descriptive findings related to interactions showed the nature of group interdependence as shown in Table 4. Patients are bothered by having to rely on others to manage their healthcare. However, patients want to have the benefit of input from several professionals and to make their own decisions. CCs realize the complexity of having several healthcare providers, but perform in a healthcare role that collaborates with other professionals. HHs are supportive but want the patient to be independent because that is what the patient wants. Over half of HH's have never talked on the phone to the CC, but 95% think it is a good idea to help the CC learn. McGrath (1984) has defined interdependence as a key determinate of defining a group. Interdependence ratings were the highest of all three social characteristics. Telehomecare groups are clearly

interdependent. Interdependence toward common goals is a unifying factor of groups. Patients and HHs believed that CCs shared the same goals for telehomecare. However, CCs weren't as sure that patients and HHs had the same goals as CCs. Goal scores that are independent among group members are classified as individualistic interdependence (Johnson & Norem-Hebeisen, 1979). Telehomecare members indicate that they have some attributes of a group but other attributes of functioning as individuals.

Research Question 1: What are the relationships among social characteristics, technical characteristics and quality patient outcomes in individuals involved in telehomecare groups? Figure 4 displays a diagrammatic representation of statistically significant correlation between individual social and technical characteristics and outcomes.

Satisfaction with a telecare CC may be challenging because patients are not meeting face to face with the healthcare provider. Patients send healthcare information in the form of data, and receive telephone feedback from the CC only when their data is abnormal. Every patient in this study sent information about his healthcare condition to the nurse at least 2-3 times per week. The majority sent information daily. The results of this research show that communication and interdependence are important for patient satisfaction. In particular, communication with the HH improves when the patient is satisfied. Less than half of the HHs communicated with the CC. However, the higher CCs and patients rate their communication (frequency, timeliness and understandability) with the HH, the higher patients rate their satisfaction with telehomecare. This research

finding supports the importance of communication with the caregiver in the home. Caregivers contribute to patient outcomes by being present for support and crises.

Complex self care involves incorporating multiple health factors toward a multifaceted goal. Patient's integration of technology into daily activities had a positive association with complex self care. When patients use the information that they send to the CC on a daily basis, they were better equipped to incorporate factors to help them make better complex decisions. Complex decisions are based on the incorporation of many factors. High levels of complex self care was reported by patients when CCs and HHs perceived that the patient was using the telecare information daily in an effort to improve healthcare. When patients incorporate health indicators such as vital signs and blood sugar levels into their meal planning, exercise and medication administration, they better understand what the values mean. Correspondingly, the better that patients can perform complex self care, the less that the HHs has to be involved with telecare. The individual nature of this finding indicates that more independent patients don't depend on HHs to integrate technology. HHs can remain uninvolved with telehomecare technology without a detrimental effect,until the patient needs help. HHs will be required to integrate telehomecare information more when a patient is no longer as independent.

Simple self care involves a directed action toward a single goal. The findings supported the straightforward, directive nature of simple self care. CCs that were perceived to integrate technology more have patients that were better at simple self care. When a CC observed telehomecare information that was abnormal for a specific patient, then a patient got feedback in the form of a phone call. The CC then directed the patient

toward correction of the abnormality by doing activities such as: taking medications, exercise, diet and following a treatment plan. The more the CC integrated technology information daily, the more likely abnormalities in health care information were acted on. In this study, there was an inverse relationship between HH communication and patient simple self care, as well as, between HH technology integration and patient simple self care. Both these findings supported the common sense notion that when HHs are less involved with care, the greater patient independence.

Study findings indicated that self care is a result of individual and not group behavior. The study also raised some questions about the consistency of goals among members. Nurses should establish patient goals with the patient and the caregiver. Self care is a desirable goal that should be discussed with patients and caregivers. This study showed that there are different types of self care that are influenced by technology integration by patients and caregivers.
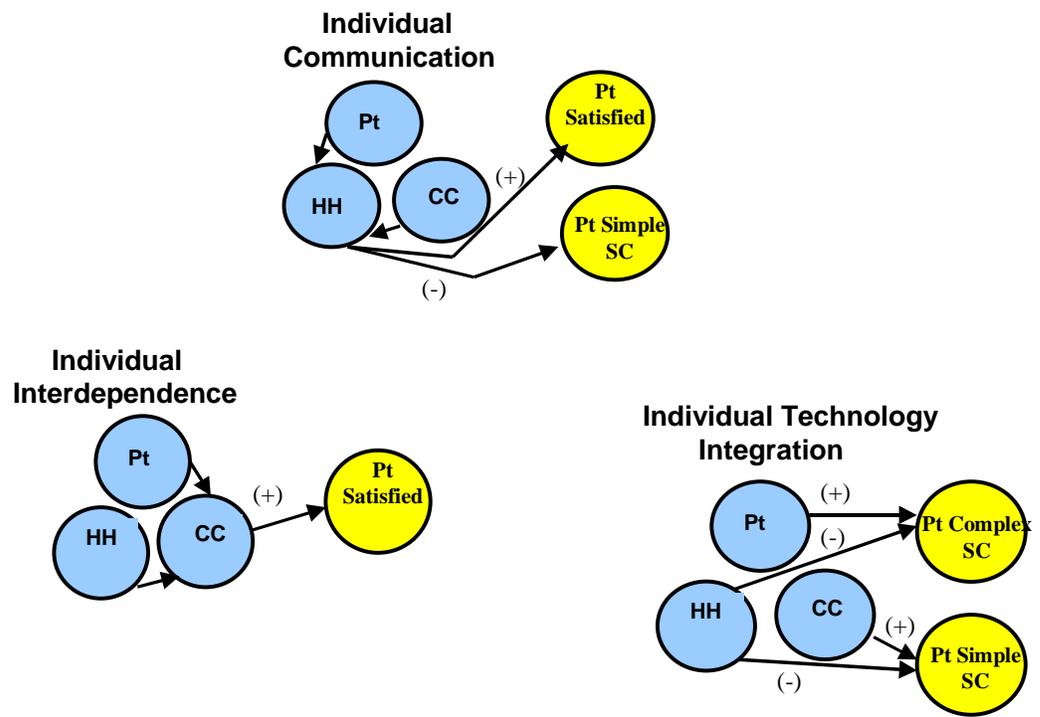
FIGURE 4. Individual as Target of Perceptions Correlated with Outcomes

Research Question 2: What are the relationships among social characteristics

and patient outcomes when data are analyzed at the dyadic level in a unique patient-care

group? Figure 5 displays a diagrammatic representation of correlations between

significant dyad social and technical characteristics and outcomes.

Relationships between the dyads within the group were important for satisfaction.

Communication and interdependence were associated with patient satisfaction. The

findings support the benefits from group interaction because every dyad in the group is

significant. Further indication of group behavior is the need for interdependence and communication between each dyad in the group for the patient to be satisfied with care.
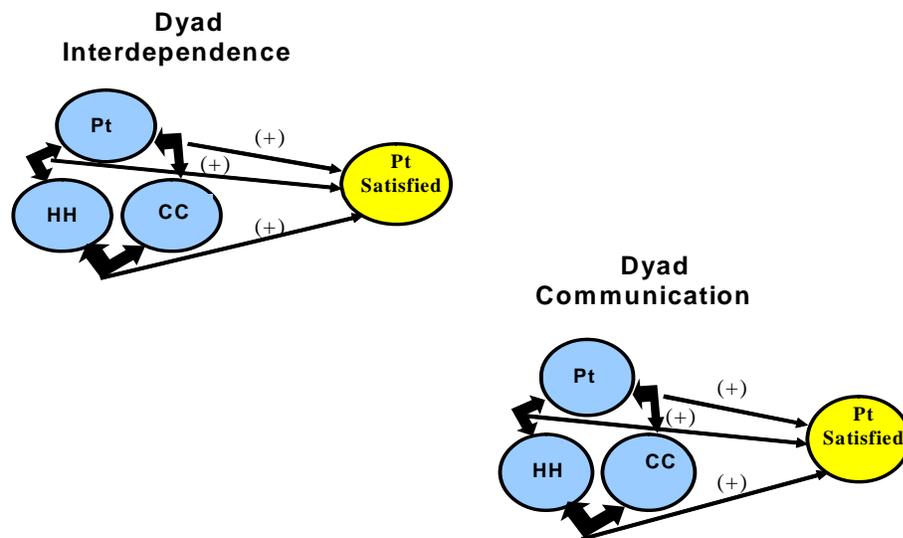
FIGURE 5. Relational Dyad Correlations with Outcomes

Research Question 3: What are the relationships among social characteristics, technical characteristics and quality patient outcomes in telehomecare groups? Figure 6 displays a diagrammatic representation of correlations between significant group social and technical characteristics and outcomes.

Communication and technology integration were significantly associated with the patient's satisfaction of being well cared for. Telehomecare groups that communicate and integrate technology result in a greater patient's perception of being well cared for. Interdependence was the only social characteristic in the study that did not correlate with

satisfaction as a group. Proponents of using telehomecare as a method for educating

patients about being independent in their own care are supported by the low correlation

between group interdependence and satisfaction with care. Patients are satisfied when

there is group communication but not satisfied significantly when there is group

interdependence. However, the members of the group needed to depend on one other

member of the group for the patient to be satisfied with care. This finding lends support

to the unique requirements of outcomes in telehomecare. A question is raised, " How

does communication fit with interdependence in telehomecare?"

Group Communication

Group Technology Integration
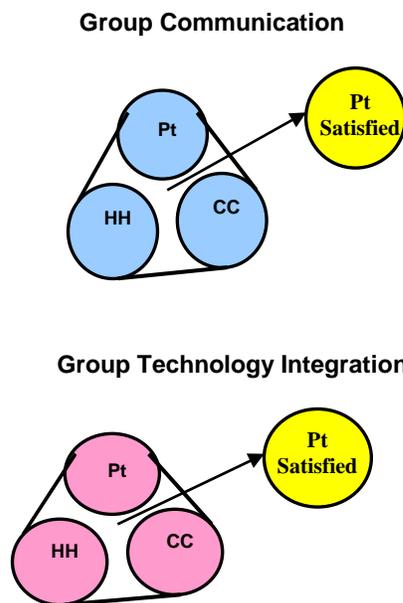
FIGURE 6. Group Correlations with Outcomes

Research Question 4: Can joint optimization between each social characteristic and technical characteristic be evaluated? Figure 7 displays a diagrammatic representation of joint optimization correlation with outcomes.

The principle of joint optimization is that service delivery systems function optimally only if the social and technological characteristics of the subsystem groups fit the demands of each other and the environment (Emery, 1959). It was challenging to create a measure of joint optimization because an example does not exist in the literature. A joint optimization measure was created based on the definition. Each group's social characteristics (trust, interdependence and communication) and corresponding group technology integration provided three separate measures of joint optimization that have been shown to influence the patient's perception of being well cared for. The principle of joint optimization would predict that when the greatest score for social characteristic, such as interdependence, was combined with the greatest score for technology integration, then it would result in the highest outcome scores. This study did find these results for all three social characteristics and technology integration. But there were additional unusual mathematical interactions. In this sample, interdependence, as a component of joint optimization, influenced satisfaction; yet as a group measure, it did not correlate with higher levels of satisfaction. Greater interdependence and technology integration when multiplied to create a joint optimization score did, however, produce greater satisfaction.

The Sociotechnical Systems Theory and the principle of joint optimization guided this study. Emery's (1959) definition of joint optimization states that social and

technological characteristics of the subsystem groups fit the demands of each other and

the environment. This research study findings show that communication, interdependence

and technology integration do fit the demands of the environment and the group, when

the outcome is satisfaction. Group characteristics have not been demonstrated to be

beneficial to self care. Self care as an outcome necessitates that the patient perform as an

individual. Functioning as a group in telehomecare has been shown to be optimal when

the desired outcome is patient satisfaction with being well cared for. Further investigation

is needed.
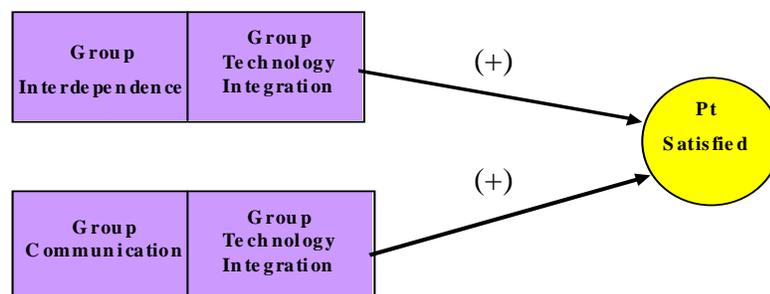
FIGURE 7. Joint Optimization Correlated with Outcomes

Question 4b, asked; What is the influence of joint optimization on outcomes?

Joint optimization for group trust, interdependence and communication combined with

technology integration did predict patient satisfaction. This finding supports joint

optimization viewed as a group phenomenon. When the members function as a group

(indicated by a high group score) both in social characteristics and technology integration, the patient is more satisfied with being well cared for. Figure 8 displays the strength of each combination of social and technical characteristic that predicts satisfaction. Satisfaction had a negative relationship with interdependence and a strong relationship with communication. This research finding was believed to have been caused by communication being nested within interdependence. Further study is needed to better understand how to measure this phenomenon.
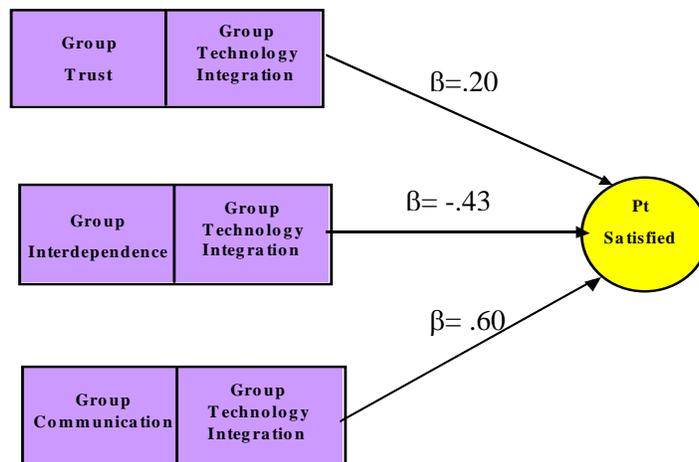
FIGURE 8. Prediction of Influence of Joint Optimization Scores on Outcomes

Seven processes of joint optimization were discussed in Chapter I. Joint optimization can be evaluated by applying study findings to each process in telehomecare.

1) Open environmental systems (adaptation) – The members of the group must consider the outcomes or goals of telehomecare. Adaptation of service delivery to the home care environment using technology is important for successful outcomes.

2) Organizational choice (equifinity) – Each member of the group is a leader in their own role, which supports an outcome. All the members' roles work toward the common outcome goal. Realization that a member's contribution to the group may be to remain in the background, such as the caregiver, is important to group outcomes. The caregiver is vital as support and will need to take a more active role when the patient depends on the caregiver for help. Communication with the caregiver is important during times when the patient is independent.

3) Control of Variance (autonomy) – Individual contributions to the group, enhances group outcomes. Interdependence is a group attribute, however dependence on each group member at all times does not influence satisfaction. Each member best understands their role and communication with the other members permits members to be aware of the reasons for any deviations from expected norms.

4) Boundaries (communication) – The value of communication was supported at the individual, relational and group levels of analysis. Communication is the only social characteristic, in the study, that has a relationship with simple self care.

5) Support congruence (shared mission) – All members of telehomecare should understand the values of sociotechnical theory. It is important for telehomecare group members to understand the relevance of joint optimization of social and technical characteristics with respect to desirable outcomes. Technology integration is important at

all levels, but becomes much more significant when combined with trust, interdependence and communication. The results of this study demonstrate the importance of technology integration and also raise awareness of the potential to focus too much on technology equipment.

6) Support subgroups (self-regulation) – Technology integration is influential at every level. When technology is integrated at the appropriate level, it is significantly linked to simple and complex self care as well as satisfaction. Patients should recognize the value of all the information that they send. Nurses need to indicate to the patients that they are using all of the telecare information to influence simple self care by some sort of feedback mechanism. Feedback enhances communication and encourages technology integration. Patients need to indicate to work with nurses to integrate the technology information into their daily lives so that they can make monitoring their condition into a lifestyle. Having a lifestyle that incorporates understanding of vital signs and other indicators of trouble with chronic illness establishes more independent, complex self care decisions.

7) Continued learning and education – New research and technology in telehomecare is prolific. Nurse education is needed to inform nurses of best practice evidence. Daily monitoring is part of the educational process of joint optimization. Nurses not only formally learn about telehomecare skills but they are continually reevaluating patients and their unique environment coupled with evidence-based practice will provide for optimal outcomes.

Implications for Practice

This study has many implications for nurses providing home health care using telehomecare technology. By understanding how social and technical characteristics can influence quality outcomes, nurses can use the knowledge to optimize outcomes. This study demonstrated many best practice methods that nurses can employ.

Communication is the only social characteristic that is significant at every level of analysis. Knowing when to increase communication with the caregiver is important to optimal care. Nurses should understand that if the patient's level of independence seems to be decreasing, then the caregiver requires more communication. Increasing communication with the caregiver assists the patient to perform simple self care. When activities of simple self care falter, then the patient may start to decline. Even though communication with the caregiver may not be usual practice, the nurse should remember to keep them in the loop for when the patient's condition warrants greater assistance.

Individual patient and caregiver interdependence on the nurse may not be apparent to the nurse because she is monitoring so many patients at one time. Since there is often only one interaction during a month, it is easy for the nurse to forget that the patient can caregiver are depending on them. This study's findings show that there is a better perception of being well cared for when the patient and caregiver perceive interdependence with the nurse. Respecting and understanding the influential role that the nurse plays is important to outcomes.

Outcomes are a result of goal achievement. Patient goals are a prudent springboard for communication. Patients and caregivers in the study perceived that all

group members had the same goals. Care coordinators did not have the same perception. This discrepancy implies that goals, both short and long term, need to be communicated. Formal goals will provide the patient and caregiver with a better understanding of the benefits of telehomecare. Self-care is a goal that will improve patient health, emancipate the caregiver and permit the patient to remain independent at home for a greater amount of time. Care coordinators should routinely discuss and work toward goals, reevaluating as necessary. Goals in a group are shared goals should be developed and clarified for each member of the group.

Communication is not complete without feedback. Many of the patients and caregivers did not know how the information they sent was being used by the nurse, yet they sent it every day for as much as two years. Nurses should inform patients about how the information is used. Patients may have forgotten what the nurse does with the information over time. Feedback that the nurse received the health information would help to confirm the value of daily monitoring in a healthy lifestyle. Feedback could be linked to the technology, such as a light that illuminates when the nurse opens the data or a text message.

Working as a group is important to patient's perceptions of being well cared for. Interdependence can be obvious or obscure. Patients are interdependent on both the nurse and the caregiver, even though the degree of dependency may vary based on the level of health that the patient is experiencing. This study demonstrated that although the caregiver is transparent to the nurse, the caregiver was a vital part of the group. Nurses should appreciate efforts that caregivers make to be supportive while encouraging the

patient to be independent. Even subtle increases in the amount of interaction with the caregiver, may indicate to the nurse that the patient's health status is declining.

Integrating technology into daily practice is a significant factor in self care, both simple and complex. Nurses should reinforce the use of telecare information in the patient daily healthcare efforts: exercise, diet, medication administration and knowledge that determine when your condition requires a health professional. Decision-making that is involved with complex self care is a primary goal that permits the patient to remain independent in their home. This research supports the health care industry's claims that telehomecare is beneficial to helping patients learn about their self care activities. Nurses should remember to evaluate how much of the telecare information the patient is integrating into their daily health routine.

Social and technical characteristics are important and attention to only one type of characteristic risks providing optimal outcomes. Nurses can achieve optimal outcomes by being aware of the processes of joint optimization in the patient, nurse and caregiver group. Technology-mediated telehomecare nurses should remind themselves of all the social issues that patients and caregivers deals with daily because it is easy to get lost in the technical aspects of healthcare. As healthcare moves away from face-to-face contact with patients, awareness of the seven primary processes that operationalize joint optimization provides a framework for nurses dealing with the seemingly daunting task of monitoring 100 patients per day.

Limitations

Several limitations were identified. The first set of limitations pertains to sample. All the participants were male patients with female caregivers. Although this represents the majority of the populations (Hokenstad, 2005), this study limits findings to gender specific groups. Each site was only represented by a small percentage of the total population. Additionally, there was not equal representation of each site; one site represented 60% of the sample. Group research is challenging due to power requirements for sample size. Since Pearson's r correlation will be the primary analysis for interpretation, a sample size of 43 would only provide a power of .50 (Polit, 1996). This means that there is a 50-50 chance of committing a Type II error (incorrectly accepting a false null hypothesis).

The next set of limitations pertains to data. The Trust scale is reliable only for rating caregivers and must be used with caution for other members. Since the study examine groups, this trust scale, as it is, can not be used in telehomecare group analysis. SRM statistics challenges psychometric tests and the use of scales. Since each scale was used for different roles, there is not equal reliability and validity for each role using the scale. Only three social and one technical characteristic were surveyed. Selecting and limiting social and technical characteristics have provided a narrow view of how joint optimization can be applied to telehomecare.

Recommendations for Future Research

This study found several statistically significant results. The results raise more questions and provide a basis for future research studies. Caregiver and patients

combined with nurses in a group has been a theoretical concept but this research has statistically actualized the concept. Further research using the Social Relations Model for analysis is important, given the direction of home-based health care.

Recruitment letters stated having a caregiver as a criterion for inclusion. Still 3% of the respondents were not eligible due to having not caregiver in the home. Many patients do well with telehomecare due to the method of delivery and its benefits to self care. Future studies may include patients without caregivers.

Results indicate that feedback is important and is possibly represented by findings with communication and technology integration characteristics. Repeated anecdotal comments were made from patients about feedback. Future studies will include a measurement for feedback. This research was done with text only monitoring. Future research is needed that would explore social and technical characteristics while examining other types of monitoring, such as visual and auditory.

Number of hospitalizations is an important outcome variable. It was not operationalized adequately and therefore dropped in this study. Issues such as hospitalizations address another of the triple threats to health care, which is cost. This study only addressed one of the triple threats to healthcare: quality outcomes. Future research will focus on applying the STS to the other triple threats such as: cost and accessibility.

Joint optimization is a combination of group social and technical characteristics. Future studies will investigate other levels of social characteristics that are different from levels of technical integration that can be optimized effectively with outcomes. Statistical

representation of joint optimization requires further exploration. Theoretically, joint optimization may occur at different levels of analysis; for example, a certain social characteristic at the individual level combined with group level technology characteristics may provide various optimal outcomes.

<div align="center">Conclusions</div>

Despite the limitations of the study, there were many significant results. Results suggest many varied conclusions. Overall, the study showed that Sociotechnical Systems Theory can be applied to telehomecare service delivery systems. Additionally, the Social Relations Model can be utilized to provide insight into individual, relational and group optimization of social and technical characteristics. Multi-level analysis serves to provide information on which social and technical characteristics are needed individually, between dyads and as a group to produce optimal outcomes. Groups are central to STS and optimizing social and technical characteristics. Optimizing group social and technical characteristics applies to patient satisfaction; but joint optimization may not always be at the group level, depending on the environment. Patients, nurses and caregivers function; as a group to benefit the patient's perception of being well cared for and as individuals to benefit the patient's self care. Patient who are able to communicate and integrate technology require less from caregivers and patients are better with simple and complex self care. The more that patients integrate technology into their daily health efforts, the better they are able to make complex decision regarding self care.

This research presents evidence that begins to support decisions that nurses make when choosing best practice methods in telehomecare. It demonstrates that some nursing

approaches are better directed toward the individual while others are better as a group effort, depending on the goal. Caregivers are an important component that may seem nonexistent to the nurse who is monitoring at a distance. Understanding the role that caregivers play as a quiet member is also is vital to achieve desirable outcomes. Considering the environment and the group that the nurse is working with will help the nurse formulate a goal directed plan for the patient in telehomecare.

                              Study Summary

Home health nursing is a source of valuable healthcare delivery that is increasing in demand as the population of elderly patients with chronic illnesses grows. Telehomecare using distance technology allows nurses to monitor more patients. Nurse-patient relationships have been shown to improve patient health, well-being and recovery (McMahon & Pearson 1991, 1998). Trust, interdependence and communication are characteristics of nurse-patient relationships that can benefit the comprehensive nature of home health nursing. Nurses interact with the patient and caregiver as co-workers to produce quality outcomes in home health care. Sociotechnical Systems Theory (STS) and the principle of joint optimization can be applied to the group of patient, nurse and caregiver in home health care. Social Relations Model provides the statistical process for examining individual, relational and group social and technical characteristics. Correlational and regression analysis examines the influence that social and technical characteristics have on outcomes.

Three different VHA sites in the south and northwestern United Sates provided data on their social and technical characteristics. Patients provided data on their

satisfaction with Being Well Cared For and Self Care. Trust, Interdependence and Communication Scales were used to measure social characteristics, technology integration ratings were used to measure technology characteristics. Quality outcome were measured by adapted versions of Perception of Being Well Cared For (Verran et al, 2003) and Self Care: Condition Management (Shea, 2003) Scales. The number of hospitalizations was dropped as an outcome measure. Psychometric tests determine that the scales performed adequately for all three participant roles. The results of bivariate correlations at different levels provide the basis for answering the first three research study questions. There were significant correlations at every level of analysis. Patient perception of being well cared for was positively influenced at every level. Self care: Condition Management Scale identified two different types of self care; complex and simple. Both types of self care were influenced only at the individual level by social characteristics. Complex self care inversely correlated with HH technology integration and positively correlated with patient technology integration. Simple self care correlated inversely with HH communication and technology integration, and positively with technology. The principle of joint optimization supported patients, nurses and caregivers functioning as a group toward the patients perception of being well cared for. Future studies are needed to investigate how social and technological characteristics of the subsystem groups fit the demands of each person in the group and the environment. Application of the study's results to the seven principles of joint optimization helped to explore best practice methods in telehomecare.

The study outcomes had many implications for nursing best practices in telehomecare. Nurses in telehomecare should be aware of the value of considering patients and caregivers as a group and relating to them. However, some outcomes respond better to an individual approach to relationships. Trust, interdependence, communication and technology integration are components of the nurse-patient relationship that can enhance patient satisfaction and self care. Home health care nurses are able to benefit more patients with their valuable services when they use technical monitoring. By integrating social and technical characteristics effectively, telehomecare nurses will deliver desired quality outcomes to patients in a more efficient manner.

APPENDIX A

PATIENT HOME TELECARE QUESTIONNAIRE

Script for reading to Patient on Telephone

<u>PATIENT HOME TELECARE QUESTIONNAIRE</u>

Patient inclusion criteria:

Home-helper agrees to participate
Over 50 years of age
Enrolled in Care Coordinated Home Telecare (CCHT) program for at least 2 weeks
Routinely uses telecare monitor two or more times per week
Has a home-helper (family, friend, hired acquaintance) that is not a hired professional

1. Gender?
2. Why do you have the home telecare system in your home?
3. Approximately how long have you had the home telecare system?
4. Do you consider yourself experienced with electronic communication? i.e. e-mail, computers, internet
5. Who is the nurse coordinator that you communicate with?

PART I

TRUST

Instructions: The following questions are about trust in others involved in your home telecare experience. Please state whether you; SA, MA, N, MD, SD, or N/A with the statement. The first questions will be about the Care Coordinator. The Care Coordinator is the nurse who you interact with in telecare. The questions will then repeat themselves but ask about your home-helper. Your Home-helper is the person who routinely helps you with the telecare interaction.

1. If I had my way, my CARE COORDINATOR would have greater influence *(more to say about) or* over my care.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

2. I am comfortable giving my CARE COORDINATOR responsibility for my care decisions.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

3. I wish I could *(had the opportunity to)* better guide my CARE COORDINATOR's management of my care.
   ❑ Strongly Agree (1)
   ❑ Moderately Agree (2)
   ❑ Neutral (3)
   ❑ Moderately Disagree (4)
   ❑ Strongly Disagree (5)
   ❑ Not Applicable (0)

4. I am comfortable giving my CARE COORDINATOR an important care task even if I am not present to observe him/her.
   ❑ Strongly Agree (5)
   ❑ Moderately Agree (4)
   ❑ Neutral (3)
   ❑ Moderately Disagree (2)
   ❑ Strongly Disagree (1)
   ❑ Not Applicable (0)

5. If I had my way, my HOME HELPER would have greater influence *(more to say about)* over my care.
   ❑ Strongly Agree (5)
   ❑ Moderately Agree (4)
   ❑ Neutral (3)
   ❑ Moderately Disagree (2)
   ❑ Strongly Disagree (1)
   ❑ Not Applicable (0)

6. I am comfortable giving my HOME HELPER responsibility for my care decisions.
   ❑ Strongly Agree (5)
   ❑ Moderately Agree (4)
   ❑ Neutral (3)
   ❑ Moderately Disagree (2)
   ❑ Strongly Disagree (1)
   ❑ Not Applicable (0)

7. I wish I could better guide my HOME HELPER in the management my care.
   ❑ Strongly Agree (1)
   ❑ Moderately Agree (2)
   ❑ Neutral (3)
   ❑ Moderately Disagree (4)
   ❑ Strongly Disagree (5)
   ❑ Not Applicable (0)

8. I am comfortable giving my HOME HELPER an important care task even if I am not present to observe him/her.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

PART II

SOCIAL INTERDEPENDENCE
Instructions: The following statements are about dependence on others involved in your home telecare experience.

Please state whether you; SA, MA, N, MD, SD, or N/A with the statement.

1) It is a good idea for the PATIENT, CARE COORDINATOR and HOME HELPER to help each other learn.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

2) It bothers me that I am dependent on others for help in managing my healthcare.
   - ❑ Strongly Agree (1)
   - ❑ Moderately Agree (2)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (4)
   - ❑ Strongly Disagree (5)
   - ❑ Not Applicable (0)

3) I get better health care when I make my own decisions.
   - ❑ Strongly Agree (1)
   - ❑ Moderately Agree (2)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (4)
   - ❑ Strongly Disagree (5)
   - ❑ Not Applicable (0)

4) Managing healthcare in a small group (*of professionals*) is better than providing care with just one.
- ❑ Strongly Agree (5)
- ❑ Moderately Agree (4)
- ❑ Neutral (3)
- ❑ Moderately Disagree (2)
- ❑ Strongly Disagree (1)
- ❑ Not Applicable (0)

5) My HOME HELPER, CARE COORDINATOR and I have the same goals for Home Telecare.
- ❑ Strongly Agree (5)
- ❑ Moderately Agree (4)
- ❑ Neutral (3)
- ❑ Moderately Disagree (2)
- ❑ Strongly Disagree (1)
- ❑ Not Applicable (0)

6. I like to help my CARE COORDINATOR learn about my care needs.
- ❑ Strongly Agree (5)
- ❑ Moderately Agree (4)
- ❑ Neutral (3)
- ❑ Moderately Disagree (2)
- ❑ Strongly Disagree (1)
- ❑ Not Applicable (0)

7. I like to share new ideas and information that I learn about my care with the CARE COORDINATOR.
- ❑ Strongly Agree (5)
- ❑ Moderately Agree (4)
- ❑ Neutral (3)
- ❑ Moderately Disagree (2)
- ❑ Strongly Disagree (1)
- ❑ Not Applicable (0)

8. I like to work as a team with my CARE COORDINATOR.
- ❑ Strongly Agree (5)
- ❑ Moderately Agree (4)
- ❑ Neutral (3)
- ❑ Moderately Disagree (2)
- ❑ Strongly Disagree (1)
- ❑ Not Applicable (0)

9. I can learn important things from my CARE COORDINATOR.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

10. I like my CARE COORDINATOR helping me to manage my healthcare.
    - ❑ Strongly Agree (5)
    - ❑ Moderately Agree (4)
    - ❑ Neutral (3)
    - ❑ Moderately Disagree (2)
    - ❑ Strongly Disagree (1)
    - ❑ Not Applicable (0)

11. I like to help my HOME HELPER learn about my care needs.
    - ❑ Strongly Agree (5)
    - ❑ Moderately Agree (4)
    - ❑ Neutral (3)
    - ❑ Moderately Disagree (2)
    - ❑ Strongly Disagree (1)
    - ❑ Not Applicable (0)

12. I like to share new ideas and information that I learn about my care with the HOME HELPER.
    - ❑ Strongly Agree (5)
    - ❑ Moderately Agree (4)
    - ❑ Neutral (3)
    - ❑ Moderately Disagree (2)
    - ❑ Strongly Disagree (1)
    - ❑ Not Applicable (0)

13. I like to work as a team with my HOME HELPER.
    - ❑ Strongly Agree (5)
    - ❑ Moderately Agree (4)
    - ❑ Neutral (3)
    - ❑ Moderately Disagree (2)
    - ❑ Strongly Disagree (1)
    - ❑ Not Applicable (0)

14. I can learn important things from my HOME HELPER.
- ❏ Strongly Agree (5)
- ❏ Moderately Agree (4)
- ❏ Neutral (3)
- ❏ Moderately Disagree (2)
- ❏ Strongly Disagree (1)
- ❏ Not Applicable (0)

15. I like my HOME HELPER helping me to manage my healthcare.
- ❏ Strongly Agree (5)
- ❏ Moderately Agree (4)
- ❏ Neutral (3)
- ❏ Moderately Disagree (2)
- ❏ Strongly Disagree (1)
- ❏ Not Applicable (0)

PART III
COMMUNICATION SCALE
Instructions: Choose the one best answer for each question.

1. How frequently do you communicate with the CARE COORDINATOR about your care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
O	O	O	O	O	O

2. How frequently do you communicate with the HOME HELPER about your care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
O	O	O	O	O	O

3. Does the CARE COORDINATOR communicate with you in a timely way about your care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
O	O	O	O	O	O

4. Does the HOME HELPER communicate with you in a timely way about your care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
O	O	O	O	O	O

5. Does the CARE COORDINATOR communicate with you in an understandable way about your care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
	O	O	O	O	O
O					

6. Does the HOME HELPER communicate with you in an understandable way about your care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
	O	O	O	O	O
O					

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PART IV

DEGREE OF INTEGRATION

Instructions: Home care technology is a new method of healthcare in Home and Community-Based Care at the Veteran's Health Administration. The following statements refer to how much the telecare technology information is used to guide healthcare efforts. Healthcare efforts are defined as exercise, diet, medication administration and knowledge that determine when your condition requires a health professional.
Please rate the amount of telecare information that is used on a
SCALE OF 0 TO 100.
0 means the telecare information is never used to guide healthcare efforts and 100 means the telecare information is used to guide all your healthcare efforts, with 50 as average.
Place the rating number in the box.

1. I use the home telecare technology information to guide my daily efforts to manage my health care.

2. It is my opinion that, the CARE COORDINATOR uses the home telecare technology information to guide his/her daily efforts to manage my health care.

3. It is my opinion that, the HOME HELPER uses the home telecare technology information to guide his/her daily efforts to manage my health care.

PART V

<u>PATIENT QUALITY OUTCOMES</u>
How Well Cared For Were You? (WCF)
Patient Questionnaire
Instructions: Please indicate which answer best describes your opinion of your home telecare experience.

1. Considering your particular needs, how appropriate are the home telecare services you have received?
   ❑Highly appropriate (4)
   ❑Generally appropriate (3)
   ❑Generally inappropriate (2)
   ❑Highly inappropriate (1)

2. Have the home telecare services you received helped you to deal more effectively with your problems?
   ❑ Yes, it helped a great deal
   ❑Yes, it helped somewhat
   ❑No, it really didn't help
   ❑No, it seemed to make things worse

3. How satisfied are you with the amount of home telecare healthcare you have received?

   ❑ Quite dissatisfied (1)
   ❑ Indifferent or mildly dissatisfied (2)
   ❑ Mostly satisfied (3)
   ❑ Very satisfied (4)

4. When you talked to the care coordinator, how closely did he or she listen to you?
   ❑Not at all closely (1)
   ❑Not too closely (2)
   ❑Fairly closely (3)
   ❑Very closely (4)

5. How clearly did the care coordinator understand your problem and how you felt about it?
   ❑Very clearly (4)
   ❑Clearly (3)
   ❑Somewhat unclearly (2)
   ❑Very unclearly (1)

6. How competent and knowledgeable was the care coordinator?
   ❑Poor abilities at best (1)
   ❑Only of average ability (2)
   ❑Competent and knowledgeable (3)
   ❑Highly competent and knowledgeable (4)

7. In an overall, general sense, how satisfied are you with the home telecare services you have received?
   ❑Very satisfied
   ❑Mostly satisfied
   ❑Indifferent or mildly dissatisfied
   ❑Quite dissatisfied

8. In an overall, general sense, how satisfied are you with the care coordinator?
   ❑Very satisfied
   ❑Mostly satisfied
   ❑Indifferent or mildly dissatisfied
   ❑Quite dissatisfied

9. How satisfied are you with the respect shown to you by home telecare care coordinator?
   ❑Quite dissatisfied (1)
   ❑Indifferent or mildly dissatisfied (2)
   ❑Mostly satisfied (3)
   ❑ Very satisfied (4)

10. How satisfied are you with the amount of time the care coordinator spent with you?

   ❑ Quite dissatisfied (1)
   ❑ Indifferent or mildly dissatisfied (2)
   ❑ Mostly satisfied (3)
   ❑ Very satisfied (4)

11. If a friend were in need of similar care, would you recommend home telecare care to him or her?

   ❑No, definitely not (1)
   ❑No, I don't think so (2)
   ❑Yes, I think so (3)
   ❑Yes, definitely (4)

12. How satisfied were you that the care coordinator worked on your behalf to get you the care you needed?

❑ Quite dissatisfied (1)
❑ Indifferent or mildly dissatisfied (2)
❑ Mostly satisfied (3)
❑ Very satisfied (4)

13. How many times have you been hospitalized since you began using the home telecare equipment?

❑ Greater than 10
❑ 8 – 10
❑ 6 – 8
❑ 4 – 6
❑ 2 – 4
❑ less than 2
❑ never

Thank you for completing this questionnaire!

PART VI

SELF-CARE: CONDITION MANAGEMENT
PATIENT QUESTIONNAIRE

Having a chronic condition required home self-care. We would like to know how confident [comfortable] you are in doing certain activities. For each of the following questions, on a scale of 1 – 10, with 1 as not confident and 10 as totally confident, please indicate the number that corresponds to your confidence that you can do the task today.

How confident are you that you can……

1. Do all the things necessary to manage your condition on a regular basis at home.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

2. Judge when changes in your condition mean you should get skilled medical help.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

3. Adapt your health treatment plan safely without contacting a professional health care provider.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

4. Do things to reduce how much your condition affects your everyday life.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

5. Take your medications as prescribed to manage your condition or symptoms.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

6. Recognize problems due to your condition or its treatment such as difficulties due to unexpected side effects to medications.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

7. Manage exercise activities as they relate to your condition.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

8. Manage diet requirements as they relate to your condition.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

9. Get help with your medical care routine, if necessary.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

10. Follow your prescribed treatment plan.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

11. Get information about your condition from reliable health care resources.

Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident

APPENDIX B

HOME HELPER TELECARE QUESTIONNAIRE

Script for reading to Home Helper on Telephone

HOME HELPER TELECARE QUESTIONNAIRE

Inclusion criteria for HH:

Patient agrees to participate

Devotes time weekly to helping patient

Not a hired professional.

1. Gender?
2. Over 50?
3. Approximately how much time do you devote weekly to helping patient?

4. Do you help the patient use the telecare technology?

5. How often have you talked directly to the telecare Care Coordinator?

6. Do you consider yourself experienced with electronic communication? i.e. e-mail, computers, internet

PART I

TRUST

Instructions: The following questions are about trust in others involved in your home telecare experience. Please state whether you; SA, MA, N, MD, SD, or N/A with the statement. The first questions will be about the Care Coordinator. The Care Coordinator is the nurse who you interact with in telecare. The questions will then repeat themselves but ask about your home-helper. Your Home-helper is the person who routinely helps you with the telecare interaction.

1. If I had my way, PATIENT would have greater influence *(more to say about)* over his/her care.
   - ❏ Strongly Agree (5)
   - ❏ Moderately Agree (4)
   - ❏ Neutral (3)
   - ❏ Moderately Disagree (2)
   - ❏ Strongly Disagree (1)
   - ❏ Not Applicable (0)

2. I am comfortable giving the PATIENT responsibility for his/her care decisions.
   - ❏ Strongly Agree (5)
   - ❏ Moderately Agree (4)
   - ❏ Neutral (3)
   - ❏ Moderately Disagree (2)
   - ❏ Strongly Disagree (1)
   - ❏ Not Applicable (0)

3. I wish I could better help guide the PATIENT to manage his/her care.
   - ❑ Strongly Agree (1)
   - ❑ Moderately Agree (2)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (4)
   - ❑ Strongly Disagree (5)
   - ❑ Not Applicable (0)

4. I am comfortable giving the PATIENT an important care task even if I am not present to observe him/her.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

5. If I had my way, the CARE COORDINATOR would have greater influence *(more to say about)* over the patient's care.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

6. I am comfortable giving the CARE COORDINATOR responsibility for patient care decisions.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

7. I wish I could *(had the opportunity to)* better guide the CARE COORDINATOR to manage the patient's care.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑ Strongly Disagree
   - ❑ Not Applicable

8. I am comfortable giving the CARE COORDINATOR an important care task even if I am not present to observe him/her.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

PART II

SOCIAL INTERDEPENDENCE

Instructions: The following statements are about dependence on others involved in your home telecare experience.

Please state whether you; SA, MA, N, MD, SD, or N/A with the statement.

1. It is a good idea for the PATIENT, CARE COORDINATOR and HOME HELPER to help each other learn.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

2. It bothers me that I am dependent on others for help in managing my healthcare.
   - ❑ Strongly Agree (1)
   - ❑ Moderately Agree (2)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (4)
   - ❑ Strongly Disagree (5)
   - ❑ Not Applicable (0)

3. I get better health care when I make my own decisions.
   - ❑ Strongly Agree (1)
   - ❑ Moderately Agree (2)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (4)
   - ❑ Strongly Disagree (5)
   - ❑ Not Applicable (0)

4. Managing healthcare in a small group *(of professionals)* is better than providing care with just one.
   - ❏ Strongly Agree (5)
   - ❏ Moderately Agree (4)
   - ❏ Neutral (3)
   - ❏ Moderately Disagree (2)
   - ❏ Strongly Disagree (1)
   - ❏ Not Applicable (0)

5. The PATIENT, CARE COORDINATOR and I have the same goals for Home Telecare.
   - ❏ Strongly Agree (5)
   - ❏ Moderately Agree (4)
   - ❏ Neutral (3)
   - ❏ Moderately Disagree (2)
   - ❏ Strongly Disagree (1)
   - ❏ Not Applicable (0)

6. I like to help the PATIENT learn about his/her care needs.
   - ❏ Strongly Agree (5)
   - ❏ Moderately Agree (4)
   - ❏ Neutral (3)
   - ❏ Moderately Disagree (2)
   - ❏ Strongly Disagree (1)
   - ❏ Not Applicable (0)

7. I like to share new ideas and information that I learn about their care with the PATIENT.
   - ❏ Strongly Agree (5)
   - ❏ Moderately Agree (4)
   - ❏ Neutral (3)
   - ❏ Moderately Disagree (2)
   - ❏ Strongly Disagree (1)
   - ❏ Not Applicable (0)

8. I like to work as a team with the PATIENT.
   - ❏ Strongly Agree (5)
   - ❏ Moderately Agree (4)
   - ❏ Neutral (3)
   - ❏ Moderately Disagree (2)
   - ❏ Strongly Disagree (1)
   - ❏ Not Applicable (0)

9. I can learn important things from the PATIENT *(about his healthcare)*.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

10. I like to provide healthcare with the PATIENT helping me.
    - ❑ Strongly Agree (5)
    - ❑ Moderately Agree (4)
    - ❑ Neutral (3)
    - ❑ Moderately Disagree (2)
    - ❑ Strongly Disagree (1)
    - ❑ Not Applicable (0)

11. I like *(or would)* to help the CARE COORDINATOR learn about the patient's care needs.
    - ❑ Strongly Agree (5)
    - ❑ Moderately Agree (4)
    - ❑ Neutral (3)
    - ❑ Moderately Disagree (2)
    - ❑ Strongly Disagree (1)
    - ❑ Not Applicable (0)

12. I like *(or would)* to share new ideas and information that I learn about patient care with the CARE COORDINATOR.
    - ❑ Strongly Agree (5)
    - ❑ Moderately Agree (4)
    - ❑ Neutral (3)
    - ❑ Moderately Disagree (2)
    - ❑ Strongly Disagree (1)
    - ❑ Not Applicable (0)

13. I like *(or would)* to work as a team with the CARE COORDINATOR.
    - ❑ Strongly Agree (5)
    - ❑ Moderately Agree (4)
    - ❑ Neutral (3)
    - ❑ Moderately Disagree (2)
    - ❑ Strongly Disagree (1)
    - ❑ Not Applicable (0)

14. I can learn important things from the CARE COORDINATOR.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

15. I like to manage the patient's healthcare with *(knowing that)* the CARE COORDINATOR helping me.
   - ❑ Strongly Agree (5)
   - ❑ Moderately Agree (4)
   - ❑ Neutral (3)
   - ❑ Moderately Disagree (2)
   - ❑ Strongly Disagree (1)
   - ❑ Not Applicable (0)

PART III

COMMUNICATION SCALE

Instructions: Choose the one best answer for each question.

1. How frequently do you communicate with the PATIENT about his/her care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
O	O	O	O	O	O

2. How frequently do you communicate with the CARE COORDINATOR about the patient's care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
O	O	O	O	O	O

3. Does the PATIENT communicate with you in a timely way about his/her care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
O	O	O	O	O	O

4. Does the CARE COORDINATOR communicate with you in a timely way about the patient's care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
	O	O	O	O	O
O					

5. Does the PATIENT communicate with you in an understandable way about the patient's care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
	O	O	O	O	O
O					

6. Does the CARE COORDINATOR communicate with you in an understandable way about the patient's care?

Not Applicable (0)	Never (1)	Rarely (2)	Occasionally (3)	Often (4)	Always (5)
	O	O	O	O	O
O					

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PART IV

DEGREE OF INTEGRATION

Instructions: Home care technology is a new method of healthcare in Home and Community-Based Care at the Veteran's Health Administration. The following statements refer to how much the telecare technology information is used to guide healthcare efforts. Healthcare efforts are defined as exercise, diet, medication administration and knowledge that determine when your condition requires a health professional.

Please rate the amount of telecare information that is used on a
SCALE OF 0 TO 100.
0 means the telecare information is never used to guide healthcare efforts and 100 means the telecare information is used to guide all your healthcare efforts, with 50 as average.
Place the rating number in the box.

1. I use the home telecare technology information to guide my daily efforts to manage the patient's health care

☐

2. It is my opinion, that the PATIENT uses the home telecare technology information to guide his/her daily efforts to manage his/her health care.

☐

3. It is my opinion, that the CARE COORDINATOR uses the home telecare technology information to guide his/her daily efforts to manage the patient's health care.

☐

APPENDIX C

CARE COORDINATOR QUESTIONNAIRE

CARE COORDINATOR QUESTIONNAIRE

The purpose of this research is to explore human relationships among care coordinator, patient and their home-helper when home telecare is used. Please answer the questions with your opinions about the PATIENT with the following Subject ID _____ and
HOME HELPER that is their _____.

Patient = the CCHT recipient with chronic illness Home Helper = the non-professional person who most frequently helps the patient with their care.

PART I
TRUST
Instructions: Please place an X IN THE BOX beside the answer that best matches your opinion.

Please choose the answer that best describes your opinion.

1. If I had my way, this PATIENT would have greater influence *(more to say)* over his/her care.
   ❑ Strongly Agree
   ❑ Moderately Agree
   ❑ Neutral
   ❑ Moderately Disagree
   ❑ Strongly Disagree
   ❑ Not Applicable

2. I am comfortable giving this PATIENT responsibility for his/her care decisions.
   ❑ Strongly Agree
   ❑ Moderately Agree
   ❑ Neutral
   ❑ Moderately Disagree
   ❑ Strongly Disagree
   ❑ Not Applicable

3. I wish I had the opportunity to better guide this PATIENT's management of his/her care.
   ❑ Strongly Agree
   ❑ Moderately Agree
   ❑ Neutral
   ❑ Moderately Disagree
   ❑Strongly Disagree
   ❑Not Applicable

4. I am comfortable giving this PATIENT an important care task even if I am not present to observe him/her.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑Strongly Disagree
   - ❑Not Applicable

5. If I had my way, this HOME HELPER would have greater influence over *(more to say)* the patient's care.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑ Strongly Disagree
   - ❑ Not Applicable

6. I am comfortable giving this HOME HELPER responsibility for making patient care decisions.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑Strongly Disagree
   - ❑ Not Applicable

7. I wish I had the opportunity to better guide this HOME HELPER's management of the patient's care.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑Strongly Disagree
   - ❑Not Applicable

8. I am comfortable giving this HOME HELPER an important care task even if I am not present to observe him/her.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑Strongly Disagree
   - ❑Not Applicable

PART II

Social Interdependence

Instructions: The following questions are about dependence on others involved in your home telecare experience.

Please answer the questions by placing an X IN THE BOX to indicate whether you; SA, MA, N, MD, SD, or N/A. .

1. It is a good idea for this PATIENT, CARE COORDINATOR AND HOME HELPER to help each other learn.
   ❑ Strongly Agree
   ❑ Moderately Agree
   ❑ Neutral
   ❑ Moderately Disagree
   ❑Strongly Disagree
   ❑Not Applicable

2. It bothers me that I am dependent on others for help in managing this patient's healthcare.
   ❑ Strongly Agree
   ❑ Moderately Agree
   ❑ Neutral
   ❑ Moderately Disagree
   ❑ Strongly Disagree
   ❑ Not Applicable

3. I can provide better health care when I make decisions independently.
   ❑ Strongly Agree
   ❑ Moderately Agree
   ❑ Neutral
   ❑ Moderately Disagree
   ❑ Strongly Disagree
   ❑ Not Applicable

4. Managing healthcare with a small group *(of professionals)* is better than providing care with just one.
   ❑ Strongly Agree
   ❑ Moderately Agree
   ❑ Neutral
   ❑ Moderately Disagree
   ❑ Strongly Disagree
   ❑ Not Applicable
   ❑ Not Applicable

5. The PATIENT, HOME HELPER and I have the same goals for Home Telecare.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑ Strongly Disagree
   - ❑ Not Applicable

6. I like to help this PATIENT learn about care needs.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑ Strongly Disagree
   - ❑ Not Applicable

7. I like to share new ideas and information that I learn about care with this PATIENT.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑ Strongly Disagree
   - ❑ Not Applicable

8. I like to work as a team with this PATIENT.
   - ❑Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑ Strongly Disagree
   - ❑ Not Applicable

9. I can learn important things from this PATIENT.
   - ❑ Strongly Agree
   - ❑ Moderately Agree
   - ❑ Neutral
   - ❑ Moderately Disagree
   - ❑ Strongly Disagree
   - ❑ Not Applicable

10. I like this PATIENT to help me to manage their healthcare.
    - ❑ Strongly Agree
    - ❑ Moderately Agree
    - ❑ Neutral
    - ❑ Moderately Disagree
    - ❑ Strongly Disagree
    - ❑ Not Applicable

11. I like to help this HOME HELPER learn about care needs.
    - ❑ Strongly Agree
    - ❑ Moderately Agree
    - ❑ Neutral
    - ❑ Moderately Disagree
    - ❑ Strongly Disagree
    - ❑ Not Applicable

12. I like to share new ideas and information that I learn about patient care with this HOME HELPER.
    - ❑ Strongly Agree
    - ❑ Moderately Agree
    - ❑ Neutral
    - ❑ Moderately Disagree
    - ❑ Strongly Disagree
    - ❑ Not Applicable

13. I like to work as a team with this HOME HELPER.
    - ❑ Strongly Agree
    - ❑ Moderately Agree
    - ❑ Neutral
    - ❑ Moderately Disagree
    - ❑ Strongly Disagree
    - ❑ Not Applicable

14. I can learn important things from this HOME HELPER.
    - ❑Strongly Agree
    - ❑ Moderately Agree
    - ❑ Neutral
    - ❑ Moderately Disagree
    - ❑ Strongly Disagree
    - ❑ Not Applicable

15. I like this HOME HELPER to help me to manage the patient's healthcare.
  - ❑ Strongly Agree
  - ❑ Moderately Agree
  - ❑ Neutral
  - ❑ Moderately Disagree
  - ❑ Strongly Disagree
  - ❑ Not Applicable

Aubert, B. A., & Kelsey, B. L. (2003). Further Understanding of Trust and Performance in Virtual Teams. *Small Group Research, 34*(5), 575-618.

PART III

COMMUNICATION SCALE

Instructions: Choose the one best answer for each question**.**

1. How frequently do you communicate with the PATIENT about his/her care?

(write in approximate number _____)

Not applicable	Never	Rarely	Occasionally	Often	Constantly
O	O	O	O	O	O

2. How frequently do you communicate with the HOME HELPER about the patient's care?

Not applicable	Never	Rarely	Occasionally	Often	Constantly
O	O	O	O	O	O

3. Does the PATIENT communicate with you in a timely way about his/her care?

Not applicable	Never	Rarely	Occasionally	Often	Constantly
O	O	O	O	O	O

4. Does the HOME HELPER communicate with you in a timely way about the patient's care?

Not applicable	Never	Rarely	Occasionally	Often	Constantly
O	O	O	O	O	O

5. Does the PATIENT communicate with you in an understandable way about his/her care?

Not applicable	Never	Rarely	Occasionally	Often	Constantly
	O	O	O	O	O
O					

6. Does the HOME HELPER communicate with you in an understandable way about the patient's care?

Not applicable	Never	Rarely	Occasionally	Often	Constantly
	O	O	O	O	O
O					

PART IV

DEGREE OF INTEGRATION

Instructions: Home care technology is a new method of healthcare in Home and Community-Based Care at the Veteran's Health Administration. The following statements refer to how much the telecare technology information is used to guide healthcare efforts. Healthcare efforts are defined as exercise, diet, medication administration and knowledge that determine when your condition requires a health professional.
Please rate the amount of telecare information that is used on a
SCALE OF 0 TO 100.
0 means the telecare information is never used to guide healthcare efforts and 100 means the telecare information is used to guide all your healthcare efforts, with 50 as average.
Place the rating number in the box.

1.   I use the home telecare technology information to guide my daily efforts to manage the patient's health care.

☐

2.   It is my opinion, that the PATIENT uses the home telecare technology information to guide his/her daily efforts to manage his/her health care.

☐

3.   It is my opinion, that the HOME HELPER uses the home telecare technology information to guide his/her daily efforts to manage the patient's health care.

☐

Instructions: Please place an X in the appropriate box.

1. Gender
   - ❑ Male
   - ❑ Female
2. Age
   - ❑ Under 30
   - ❑ 30-50
   - ❑ Over 50
3. What is your basic nursing degree?
   - ❑ ADN
   - ❑ BSN
   - ❑ MS or MSN
   - ❑ Other
4. What is your highest degree?
   - ❑ ADN
   - ❑ BSN
   - ❑ MS or MSN
   - ❑ Other
5. When did you graduate with your highest nursing degree?
   - ❑ After 1997
   - ❑ Between 1980 and 1997
   - ❑ Before 1980
6. Approximately how long have you been working with home telecare?
   - ❑ Less than 1 month
   - ❑ Between 1 and 3 months
   - ❑ Greater than 3 months
7. Were you involved in Home Health Care before working with home telecare?
   - ❑ No
   - ❑ Yes
8. Do you consider yourself experienced with electronic communications (e-mail, computers, internet)
   - ❑ No
   - ❑ Yes
9. Do you enjoy helping patients using home telecare?
   - ❑ Always
   - ❑ Usually
   - ❑ Sometimes
   - ❑ Almost Never
   - ❑ Never

Thank-you for your participation!!!

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