A TELEMEDICINE PROTOCOL FOR A NON-TRADITIONAL RURAL HEALTH CLINIC

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FOR A

NON-TRADITIONAL RURAL HEALTH CLINIC

By

Penelope R. Kiss

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ABSTRACT

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This project has developed a telemedicine procedure protocol which will serve as guidelines for practice in a non-traditional rural health clinic managed by an Advanced Practice Nurse (APN). An outcome of the project will be algorithms that will provide a decision-making tree in the use of telemedicine to augment the healthcare provided in the rural health clinic. It is intended to facilitate the process of any healthcare provider using telemedicine to improve access to health care to the residents of Beaver Island.

This project uses King's conceptual framework and theory to focus on the mutual presence of an APN and a client as they work together regarding the client's health concern. It includes the introduction of a third party as the telemedicine consultant is incorporated into the framework. As an APN and client mutually set client goals and the means to achieve these goals, the focus remains on a client's active involvement in health care with improved understanding to the introduction of new technology and compliance to treatment plans. The interacting systems identified in King's theory assist in the evaluation of the relationship that is formed between the client and the APN and provides a plan for action that will hopefully lead to the successful achievement of health care/telemedicine goals.

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CHAPTER 1

PROJECT OVERVIEW AND PURPOSE

In this project telemedicine is defined as the combined use of telecommunications and information technologies to link medical practitioners with their patients for consultation. This is an emerging technological application that is addressing the lack of access to medical care in rural and inaccessible areas.

Telemedicine is a diverse collection of technologies and clinical applications. The defining aspect of telemedicine is the use of electronic signals to transfer information from one site to another. Telemedicine can be useful for situations in which physical barriers prevent the ready transfer of information between patients and healthcare providers. The availability of information is key to proper medical management (Perednia, 1995).

What is being seen today marks the second wave of telemedicine initiatives. The initial wave of telemedicine occurred during the late 1950s through the early 1980s at which time period several telemedicine applications were launched. The earlier applications include a two-way closed-circuit television used in Nebraska to conduct long-distance group therapy sessions with psychiatric patients. The National Aeronautics and Space Administration (NASA) was a pioneer in the 1960s with its satellite support of a telemedicine project that provided health services to the Appalachian and Rocky Mountain regions and Alaska. In the 1970s, NASA also sponsored the STARPAHC (Space Technology Applied to Rural Papago Advanced Health Care) project, implemented with the Indian Health Service and the Department of Health, Education and Welfare on the Papago Indian Reservation in Arizona. But even though they were

viewed by some as successful from both clinical and patient perspectives, the projects were terminated because of elimination of government funding, the high costs of complex, technically immature systems and/or lack of a robust communications infrastructure in some locales and high operational costs. The 1990s have seen a resurgence of interest in telemedicine because of technological changes and two external forces: politics and economics.

Current developments in communications and increased desktop processing power mean that telemedical applications can take advantage of multimedia constructs to maximize the amount of relevant information given to the clinician. For example, real-time pictures and sound can be transmitted to enable a dermatologist to see a remote patient's skin and communicate with both the patient and provider. As another example, ECG data can be presented to a remotely sited cardiologist who can talk to the clinician located beside the patient. Symptoms based on picture or pattern recognition, utilizing a previously assembled knowledge base, could then be added to help the consultant or remote clinician make a diagnosis (Adamson, 1995).

Telemedicine offers television-quality pictures and sound, allowing for the transmission of images such as X-rays and sounds such as beating hearts heard through electronic stethoscopes. Cameras and monitors at each site allow for emergency medical assistance, medical consultation, and resident and practitioner programs, continuing medical education and other services. A typical telemedicine network may include multiple types of facilities including rural health clinics, nursing homes, physicians' offices and prisons; each one linked to one or more regional medical centers through computers, cameras and video monitors. One camera might have a zoom lens that can

pan a whole examining room or focus on a single skin pore. A second may transmit images of records and test results, while a third attaches to scopes that can be used to inspect the colon, the stomach, or an eardrum of someone's ear. By activating the system, a faraway specialist can discern almost anything that the physical exam would reveal, and can be done in seconds rather than hours or days. Telemedicine, including teleradiology, electronic medical information access, continuing medical education and interactive video consultations, can give local providers increased access to most types of specialty consultants. It can also furnish providers with improved communications capabilities and convenient access to up-to-date information, consultations, and other forms of support (Utah Telemedicine Plan, 1996).

In reality, telemedicine is more than just technology. It is also people and processes working together with the technology to make telemedicine successful. Telemedicine is not just an instrument that you buy to see a patient. And the impact of telemedicine is more than just doing what we used to do in healthcare with a new technology. Telemedicine is a complex system of technology and human factors. It has the potential for profound sociological change.

More than 20 years after the first applications, there has been a resurgence of interest in alternative delivery systems such as telemedicine. An explosion of applications has been sparked by a variety of tensions in the healthcare industry, including competition among providers prompted by the need to become more profitable, the need to reduce the cost of care, the desire to increase access to care for those who have none, and/or the need to improve quality of care.

Beaver Island is a small, isolated island located in the northern part of Lake Michigan and is the largest island in the Lake. It is approximately 56 square miles in size and is located 32 miles from its mainland ferry connection of Charlevoix, Michigan. Residents are scattered all over the island. Transportation to the mainland is expensive and irregular. The ferryboat runs an irregular schedule from April to December and takes 2½ to 3 hours one way at a cost of $30 round trip. Island Airways runs a flying service all year long, weather permitting. A flight takes 17 minutes and costs $62 round trip. Weather can isolate Beaver Island for as long as five days because of ice, fog, snow or rain.

The Beaver Island Medical Center was started in 1954. In 1991, it was declared a federal Rural Health Center. Beaver Island Rural Health Center (BIRHC) provides basic primary care with one Advance Practice Nurse (APN) as the care provider. The one APN is responsible for all healthcare services to the island population such as general exams, emergency care, X-rays and lab work on a limited basis. She is on-call 24 hours per day, 350 days per year. She holds regular office hours and is on-call for all emergencies. The APN responds to all Emergency Medical Service (EMS) calls and participates in emergency care on site, including evacuation of unstable patients off the island. A primary care physician from Pine River Medical Association P.C. in Charlevoix visits the island two times per month, weather permitting, to comply with rural health clinic regulations. The physician is in a collaborative practice with the APN, which provides the APN the ability to prescribe medications under his DEA number. The physician is available to consult on individual cases by telephone and FAX and, when on the island, the physician provides direct care to island residents.

Additional health care practitioners are occasionally available. A psychologist from Northern Michigan Community Mental Health visits the island two times per month to consult with patients. A mainland dentist who sees patients on a weekly basis provides dental services. Ambulance service is provided by certified Emergency Medical Technicians (EMTs). Physician backup is provided by Medical Control, which consists of the emergency room physicians at Charlevoix Area Hospital. The nearest hospital is Charlevoix Area Hospital, a small community hospital with 44 beds across those 32 miles of Lake Michigan.

There are approximately 1,200 patient visits per year at BIRHC. Since January 1994, there have been 34 off-site consults for specialty services in Charlevoix, Petoskey, East Jordan and Traverse City. Routine medical consultations on the mainland are cost prohibitive for the islanders because of the cost of the office visit itself (a large percentage of islanders don't have health insurance), transportation to Charlevoix, possible overnight accommodations, transport to Northern Michigan Hospital if specialty services are needed and loss of two days work.

Emergency evacuation from the island can be handled either by the commercial airlines at a cost of $440 (non-reimbursable by most insurance companies) or via a special medical helicopter located on the mainland at a cost of $1,500 but with extremely limited access to the island. When these processes fail, the Coast Guard will occasionally send in a helicopter for emergency evacuation. All of these means of transportation are available only during acceptable weather conditions.

As an outcome of this project, a telemedicine procedure protocol will be developed which will serve as guidelines for practice in a non-traditional rural health

clinic managed by an APN. An outcome of the protocol will be algorithms that will provide a decision-making tree in the use of telemedicine to augment the healthcare provided in the rural health clinic. It is intended to facilitate the process of any health care provider using telemedicine to improve access to health care to the residents of Beaver Island.

King's conceptual framework and theory focus on the mutual presence of an APN and a client as they work together regarding the client's health concern. As an APN and client mutually set client goals and the means to achieve these goals; the focus remains on a client's active involvement in health care with improved compliance to treatment plans. The interacting systems identified in King's theory assist in the evaluation of the relationship that is formed between the client and the APN and provides a plan for action that will hopefully lead to the successful achievement of health care/telemedicine goals. Application of King's theory of goal attainment, utilizing interactions, transactions, perceptions, and expressions of self, will facilitate mutual APN/client goal identification and achievement.

CHAPTER 2

REVIEW OF LITERATURE

Minimal information was found that directly addressed the use or development of telemedicine protocols to facilitate clinical use. The following review of literature will describe the potential applications of telemedicine in the clinical setting. It will also address some of the facilitators and barriers experienced by telemedicine users. The literature review is intended to educate the potential users of this technology.

Applications of Telemedicine

The provision of healthcare to geographically isolated patients or those who for reasons of circumstance do not have ready access to medical care presents both a challenge to the healthcare community and an opportunity for the use of telemedicine. Through telemedicine, remotely located patients, such as those residing in communities with limited medical resources, inmates in isolated correctional facilities, soldiers in the field, or patients in their homes, can access healthcare through services that are currently unavailable to them. Telemedicine offers the promise of better healthcare by providing more timely access to specialists and vital medical information, benefiting all healthcare delivery system stakeholders and society as a whole (Council on Competitiveness, 1995).

The number of telemedicine users is now expanding rapidly enough that no complete inventory of application is available, especially for projects involving private non-profit and commercial sponsorship or funding (Institute of Medicine, 1996). The future of telemedicine looks bright. Many people predict that the number and breadth of applications will continue to grow rapidly. Michaels (1989) predicted that "Telemedicine

will come of age by the year 2000" Bulkeley (1995) says that "...expanding these practices could save the United States $52 billion in health care costs by the turn of the century." It appears that telemedicine is a phenomenon whose time is rapidly approaching.

The most immediate benefit is telemedicine's ability to connect to a virtually limitless range of subspecialty expertise, whether it's across town, across country or across the world. There are many types of telemedicine applications written about in the literature. Some of the applications of telemedicine include (Crump, Kottke, Perednia, Sanders, 1997)

- supervision and consultation for primary care encounters in sites where a physician is not available including initial urgent evaluation of patients, triage decisions, and pretransfer arrangements.
- routine consultations and second opinions based on history, physical examination findings, and available test data.
- extended diagnostic workups or short-term management of self-limited conditions,etc.
- transmission of diagnostic images.
- medical and surgical follow-up and medication checks.
- management of chronic diseases and conditions requiring a specialist not available locally.
- public health, preventive medicine, and patient education.

The clinical problems that are most amenable to telemedicine solutions are largely cognitive in nature, i.e., problems in which a decision directly affecting treatment or

disposition can be made by providing the appropriate visual, auditory, or written data to a remote consultant.

Advantages of Telemedicine

A review of the literature reveals that there are significant advantages to be gained from the use of telemedicine (U.S. Department of Health and Human Services, 1993; Council on Competitiveness, 1996; Allen & Perednia, 1996; Sanders, 1995;Bergman, 1993). Their thoughts can be summarized into the following categories. Telemedicine

- should improve access to care by allowing previously unserved or underserved populations to receive quality medical care or specialty care.
- may reduce health care costs by avoiding duplication of services, avoiding cost associated with travel for both the patient and specialists, providing service where costs are lower and providing back-up services for rural medical staff. Advocates of telemedicine say costs should decrease because fewer specialists are needed and there will be more reliance on nurse practitioners and physician assistants.
- should improve medical personnel morale by reducing medical personnel's feeling of isolation from peers, which in turn can help lower the turnover or loss of personnel from those areas.
- should improve quality of care by enhancing decision making by allowing easier access to collaborate with specialists; provides continuity of care for the patient by keeping them with the primary care person; reduces duplication of records and allows all medical personnel to access the same records; provides

better control of chronic disease and better adherence to rehabilitation processes by allowing on-going monitoring of patients; and provides education for referring physicians or APNs to increase their ability to handle similar cases in the future.

- should improve educational opportunities by providing an avenue for APNs to learn through consultation on difficult or unusual cases; allows physicians, nurses or emergency medical technicians to participate in continuing medical education programs; provides opportunity for medical personnel to view a variety of specialty medical programs/classes; allow patients to participate in classes designed to assist them in understanding and dealing with a variety of acute or chronic illnesses.

Telemedicine is seen as a tool that could help manage the medical and financial risks of providing patient care in rural and underserved areas. Providers with telemedicine capabilities are hoping to become more competitive in winning health care contracts, to reduce the economic and medical risks associated with caring for patients in rural areas and to provide relatively low-cost specialty services to areas where full-time staffing is impractical or uneconomical. Advocates of telemedicine say costs should decrease because fewer specialists are needed and there will be more reliance on nurse practitioners and physician assistants. If telemedicine improves the timeliness of diagnosis and treatment for rural patients, it will have greatly enhanced the prospects for America's rural citizens to receive the same high quality care as their urban neighbors (Perednia & Allen, 1995; Busack, 1994).

The use of telemedicine can provide several advantages. It can make specialty care more accessible. Video consultations from a rural clinic to a specialist can alleviate what can sometimes be prohibitive travel for patients. Videoconferencing also opens up new possibilities for continuing education for isolated or rural health practitioners, who may not be able to leave a rural practice to take part in professional meetings or educational opportunities.

Facilitators to Telemedicine

Along with the advantages of telemedicine there are also facilitators that need to be considered in implementing a plan. In the study done by Wells and Lemak in 1996 at the University of Michigan, factors that affect the sustained use of telemedicine in rural communities were identified. Telemedicine systems are expected to achieve sustained use in communities with higher physician-to-population ratios, greater availability of nonphysician providers, and greater consumer knowledge of and support for telemedicine. Additionally, telemedicine is more likely to be used in settings where hospital medical staff structures use contractual arrangements that encourage the use of telemedicine or reimburse through capitated systems. Rural physicians are more likely to use telemedicine if they have previous experience in facilities that serve as telemedicine hubs and if they have strong relationships with physicians who are supportive of telemedicine. Physicians whose primary offices are geographically closer to the remote telemedicine installation are more likely to order telemedicine consultations for their patients than are their counterparts further away. Also, telemedicine systems that are

well-managed and easy to use are more likely to achieve sustained utilization by rural physicians (Wells & Lemak, 1996).

Barriers to Telemedicine

Technology in this new age has piqued the interest in the use of telemedicine. Along with the advantages and facilitators of telemedicine there are also many issues/barriers that need to be considered in implementing a plan. Following is a summary of the literature (US Department of Health and Human Services, 1993; Council on Competitiveness, 1996; Allen & Perednia, 1996; Crump, Kottke, Perednia & Sanders, 1997; Makoul, 1994; Institute of Medicine,1996). Barriers include

- technical problems including equipment failure, especially at the beginning of a project. There continues to be limitations associated with equipment and the availability of adequate maintenance/support can be a real problem in remote areas.
- cost for equipment and telecommunication lines including maintenance and support. With the advancements in computer technology, costs have become more reasonable with lap top computers and existing telephone lines but there will always be equipment maintenance and monthly telephone line charges.
- will telemedicine lead to telelicensing? Currently medical personnel are licensed by each state independently. Telemedicine allows connectivity across state lines and country boundaries. The legality of "practicing medicine without a license" must be resolved. In April 1996, the Federation of State Medical Boards adopted model legislation to regulate telemedicine

practiced "regularly or frequently across state lines. State medical boards will need to figure out how to address these concerns.

- fear of malpractice suits is another consideration for physicians. There is a concern regarding malpractice exposure and potential litigation associated with telemedicine. Another issue is the lack of FDA guidelines regarding the use of technology in telemedicine systems; some people wonder if the FDA will treat telemedicine like a medical device and insist on regulating it.
- currently there is no reimbursement for providers involved in most telemedicine consultations. Current Medicare and Medicaid regulations require face-to face sessions between physicians and patients. An electronic session (telemedical encounter) does not qualify. The Health Care Financing Administration (HCFA) will reimburse for teleradiology and telepathology, but not for specialty consultations for Medicare patients; many private insurers also will not reimburse. Skeptical third-party payers will need to be convinced of the advantages (benefit/cost analysis) of telemedicine before there is uniform agreement to reimburse physicians and other health care professionals for their telemedical services.
- there is a concern about protecting patient privacy and confidentiality in an environment, which supports widespread access to patient information.
- telemedicine and information technologies are frequently "user friendly". Among some problems reported are the lack of time to learn the correct use of complicated hardware or software that requires extensive training and continued reference to lengthy and highly technical user manuals. Providing

adequate training at a convenient time and in a convenient location is a problem in many telemedicine settings. Medical personnel have busy schedules and, while they understand the importance, often have difficulty getting the training they need to be successful with telemedicine. Fortunately with the advancements in computer technology, costs have become more reasonable with lap top computers and existing telephone lines.

In addition to the issues discussed above there are some cultural/human barriers, which can impact the success of telemedicine application. These revolve around the medical practitioner, healthcare delivery method and concern about patient reaction to the use of telemedicine for consultations (Council on Competitiveness, 1995; Institute of Medicine, 1996).

The goal of current research is therefore to marry medicine with technology, capitalizing on the advantage of telemedicine and producing a robust system that delivers an acceptable service at an appropriate price. The ability to use this advanced technology in the rural setting will also promote a triad of collaboration between the APN, the referral physician and the patient. This will allow the APN to exchange information and offer advice to the patient and to other health care professionals in a single setting.

After reviewing the current research literature available it appears that protocols must be developed to facilitate implementation of this technology as a paradigm in health care. Protocols identify the activities or processes involved in practicing as an APN that have traditionally been within the realm of medicine. Advanced Practice Nurses are in the forefront of health care reform and must be willing and able to take an active role in the implementation of new programs.

CHAPTER 3

CONCEPTUAL FRAMEWORK

The purpose of this conceptual framework is to develop a structure for the implementation and evaluation of telemedicine in a rural health clinic. The relationship between nursing models and nursing practice is becoming clearer. Advanced practice nurses (APNs) are finding a sense of purpose and increased effectiveness achieved through use of systematic and thoughtful forms of nursing practice. The concepts of Imogene King (1981) are examples of theoretical ideas that can be applied to practice.

King's (1981) nursing theory of goal attainment is that APNs and patients can interact in such a manner that goals are identified and decisions are made concerning the means to achieve goals. These goal directed interactions are referred to as transactions, which is the underlying framework for the Theory of Goal Attainment. Transactions help to reduce stress or tension during the introduction of new technological processes. King's theory of goal attainment is utilized to describe the relationship between telemedicine providers and patients in a collaborative relationship. The theory is useful for APNs in planning and implementing nursing interventions for patients undergoing telemedicine procedures. The interacting systems identified in King's theory assist in the evaluation of the relationship that is formed between the client, the APN and other health care provider. It provides a plan for action that will lead to successful achievement of health care goals. As an APN and patient mutually set patient goals and the means to achieve these goals, the focus remains on a patient's active involvement in health care. Active involvement promotes better understanding, improved participation and compliance and better outcomes.

King's (1981) conceptual framework for nursing practice is based on three interacting systems: the personal, interpersonal, and social systems (Fitzpatrick & Whall, 1989; King, 1981). The interpersonal system is the core of King's conceptual framework (King, 1981). Perceptions, communication and transactions within the nursing theory are the primary components of the human interactional process. Perceptions involve the acceptance and organization of information, processing and acting on the information provided, storing information for future use, and providing information to the health care providers. The interactional process involves both verbal and nonverbal behaviors between the health care provider and the patient and/or family. Providing information to the patient to facilitate positive health behaviors and outcomes is defined as the communication process (Fitzpatrick & Whall, 1989). Communication is the verbal and nonverbal transfer of information between two or more individuals (King, 1981). The effectiveness of the health care provider-patient relationship is based on the quality of the interaction. This communication process is a positive, nurturing, reciprocal interaction where trust and intimacy are integral to its overall quality and success.

The transaction is the process of interaction in which the health care provider and patient relate to environmental factors to achieve valued goals (Fitzpatrick & Whall, 1989). The transactions that occur between the health care provider and the patient validate beliefs, symptoms or decreased functional status and affirms self worth to develop or obtain needed resources to promote health. This support assists the patient and/or family in taking on new roles and reducing stress during their exposure to new technology. The exchange of information is relative to the demands of illness involving social exchange, bargaining, and mutual goal setting.

Role is identified within the interpersonal system because it depicts the interactive relationship between the APN and the patient, and the style and manner of communication that takes place (King, 1981) is the level of communication where patient satisfaction with both the health care provider and the information received occurs. The patient negotiates new roles and establishes goals for the immediate future with plans to achieve them for continued growth and development through out the crisis (Clements & Roberts, 1983).

In the clinical setting the APN utilizes collaboration and consultation with other members of the health care team, technical skills and nursing knowledge to assess and formulate nursing diagnosis while providing direct primary health care. The formal educational process an APN receives enables him/her to base assessments and nursing diagnosis on nursing theory to promote the clients ability for self-care, maintenance of health, promotion of rehabilitation in relation to disabilities, and effectively cope with health problems.

The process of interactions between two or more individuals represents a sequence of verbal and nonverbal behaviors that are goal-directed. Two interacting human beings present a complex set of variables. Each individual in the situation brings personal knowledge, needs, goals, expectations, perceptions, and past experiences that influence the interactions.

Figure 1 shows the APN and the patient who meet in the clinical situation. In their interactions they are perceiving each other, making judgments about the other, taking some mental action, and reacting to each one's perceptions of the other. Perception, judgment, action, and reaction in the diagram are behaviors that cannot be

directly observed. One can only make inferences about these types of behavior. The next step in the process is interaction. Interactions of the APN and the patient can be directly observed, and raw data (no judgments or inferences) can be recorded. The last term in the diagram, transaction is defined as achievement of a goal.

The APN in a primary care setting interacts with the patient/family to share information, knowledge, and set goals as a means to successfully meet the needs of the patient while promoting interventions for optimal treatment outcomes. Mutual goal setting and identification of stresses is based on a mutually trusting and intimate communication process. The transaction that occurs leads to goal attainment.

Figure 2 represents Kiss' modified diagram of a Theory of Goal Attainment relative to telemedicine and the collaboration that occurs between the APN, the patient and the consulting health care provider. The introduction of this third party into the diagram is demonstrated by the changes in the flow of the communication, the transactions and perceptions between this triad of individuals. This may affect the acceptance of telemedicine. Through telemedicine a collegial relationship is built between the medical and nursing disciplines that also encompasses the patient/family. A positive collaborative relationship with the consulting health care provider is a major key to the success of the APN as an effective and competent provider of telemedicine. When relevant information is shared with the aim of ensuring comprehensive quality patient care, communication between the consultant, the APN and the patient remains open, honest and respectful. Shared accountability and responsibility for patient care, and the success of telemedicine technology progresses and develops, and trust is enhanced.

The theory of mutual goal attainment assumes that transaction, action and reaction take place between the APN, health care consultant and the patient. Herein is the exchange of information that guides the individual health care plan based on the needs of the patient, which is the driving force for the exchange of information/education between the APN, the health care consultant and the patient.

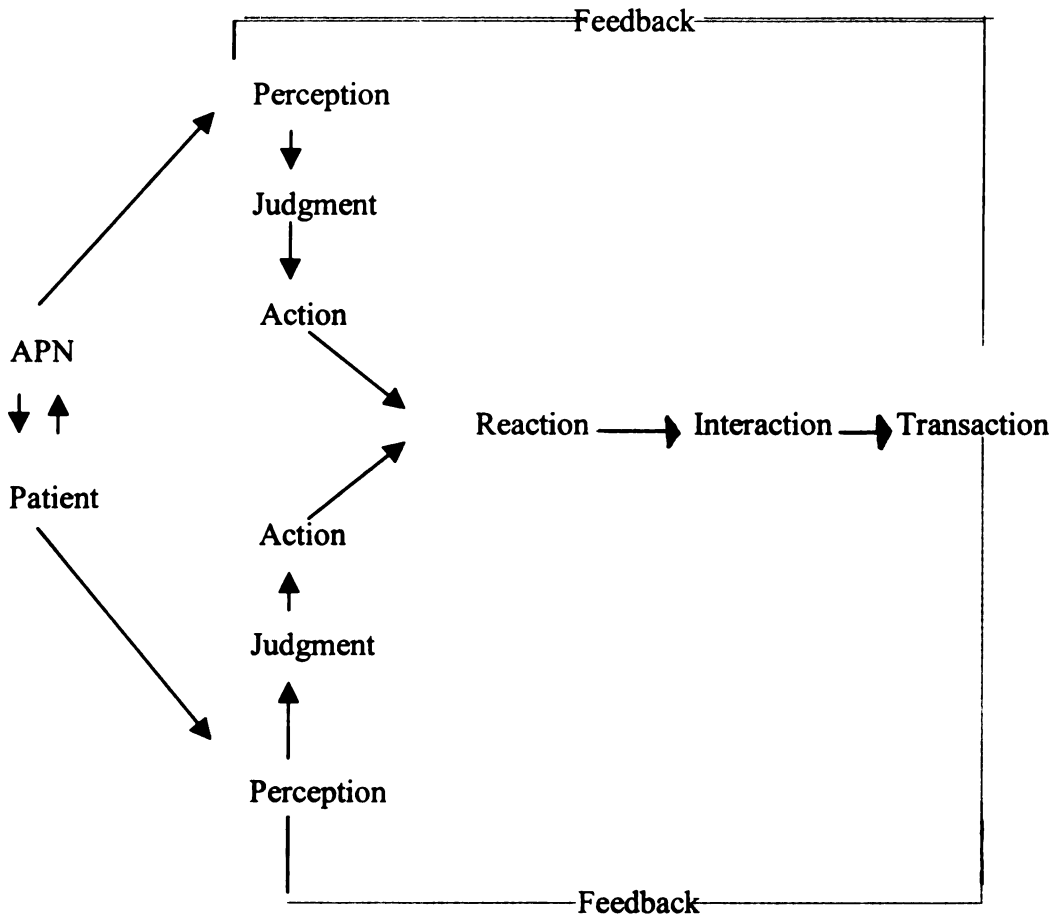


Figure 1: A Process of Human Interaction (I.M. King, *Toward a Theory for Nursing*, New York, John Wiley & Sons, 1971,p.92.)

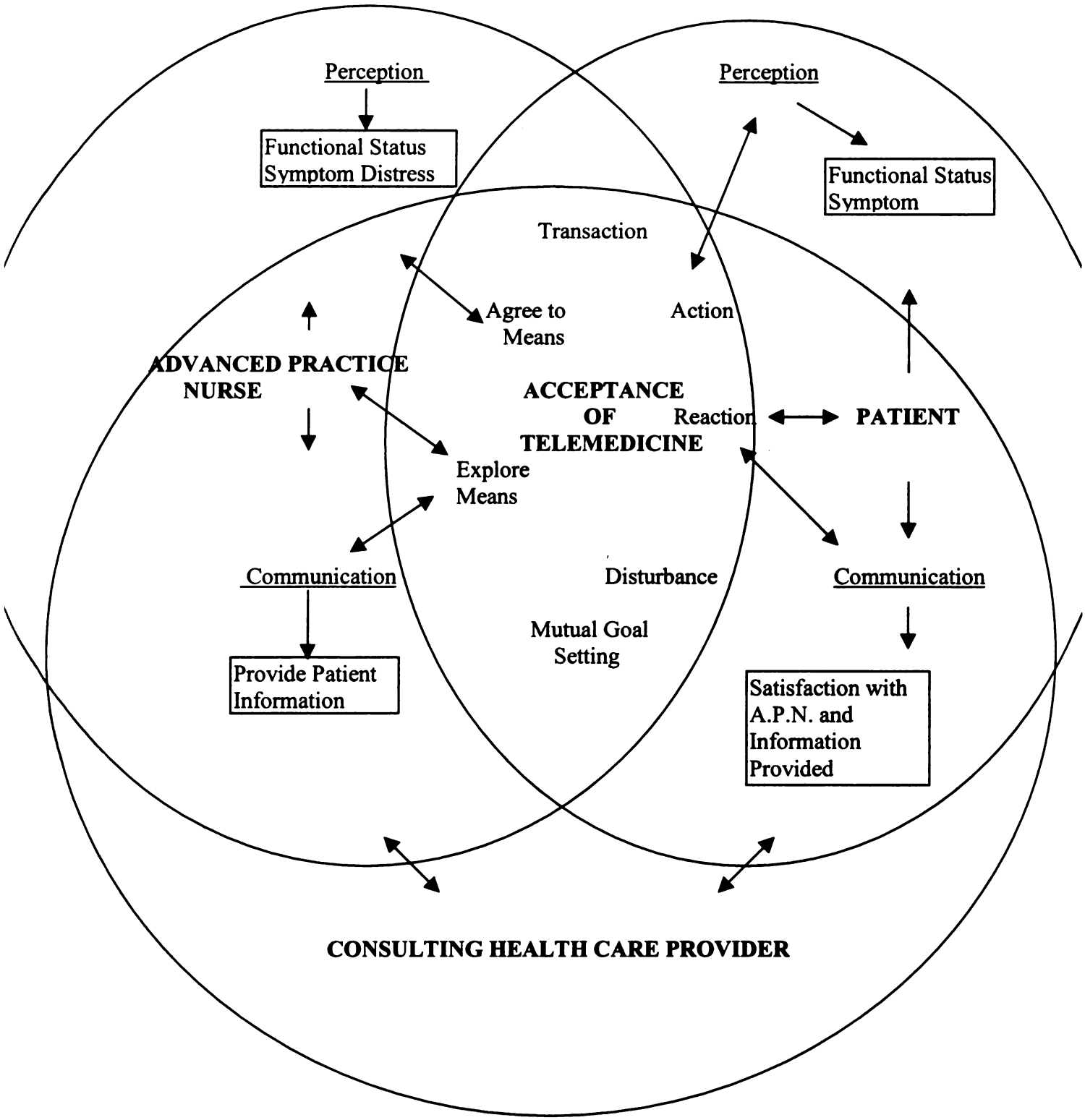


Figure 2: Kiss' Modified Diagram of a Theory of Goal Attainment Relative to Telemedicine and the APN.

CHAPTER 4

Beaver Island Rural Health Center

TELEMEDICINE PROTOCOL

I. INTRODUCTION AND DEFINITION

Telemedicine is the electronic transmission of medical information and images from one location to another for purpose of interpretation and/or consultation. Telemedicine may allow more timely evaluation of health care needs and give greater access to secondary consultations and to improved continuing education. Users in different locations may simultaneously view images. Appropriately utilized, telemedicine can improve access to quality medical consultations and thus significantly improve patient care. It is no longer the paradigm of transporting the expert knowledge worker, but transporting the knowledge worker's expertise. **Old paradigm**=patient comes to primary care provider, primary care provider does triage and either takes care of patient at the point of care or sends patient to the appropriate specialist. **New paradigm**=patient comes to primary care provider, primary care provider does same triage, and if specialty expertise is required, the primary care provider will import that expertise to the point of care telemedically. Telemedicine at Beaver Island Rural Health Center will be used primarily as an extension of the nurse practitioner as healthcare provider and secondarily as a new diagnostic or therapeutic tool. Further extension can interactively involve nurse practitioner, primary care physician and consulting specialist, which differs substantially from the current pattern of practice.

II. TELEMEDICINE APPLICATIONS

The following telemedicine applications will be available to improve healthcare delivery to the patients of the Beaver Island Rural Health Center

- supervision and consultation for primary care encounters in sites where a physician is not available. Initial urgent evaluation of patients, triage decisions, and pretransfer arrangements.
- routine consultations and second opinions based on history, physical examination findings, and available test data.
- extended diagnostic workups or short-term management of self-limited conditions.
- transmission of diagnostic images.
- medical and surgical follow-up and medication checks.
- management of chronic diseases and conditions requiring a specialist not available locally.
- public health, preventive medicine and patient education.

III. TELEMEDICINE PROCEDURE

1. Health care provider negotiates with patient/family to use telemedicine-enabled health care services.
2. Health care provider obtains an order for the use of telemedicine; determines type of consult, names of necessary participants at both sites and the name of outlying institution or agency.

2. Complete the Telemedicine Log.

3. Health care provider will schedule the date, time, and room availability with

the consulting facility telehealth coordinator and confirm date, time, transmission, equipment, and staff needs with all clinicians, technical support staff involved in the consult, and patient/family.

4. At least three days prior to scheduled appointment reconfirm date, time, and equipment needs, etc. with all involved clinicians, technical support staff, and patient/family.

5. DAY OF VISIT

A. Patient/significant other will be informed of the risks and benefits of telemedicine, the process to take place and that he/she can stop the videoconference at any time and request to see his/her physician. The patient is to sign a consent form for both institutions as appropriate.

B. Initiate the checklist for conducting video telemedicine consultations.

C. Privacy during the consultation will be provided by placing the videoconference system out of view from the door/window or by placing a blind over the window. Both sites will have room panned by camera as each person in both rooms is introduced. Signage on the outside of the door should indicate only authorized personnel may enter.

6. Documentation will be done by site health care provider using telemedicine documentation form. Information will include participants at all sites, procedures/tests (wound assessment, auscultation using electronic stethoscope, transmission of fetal ultrasound, etc.), band width used, type of visit (post-surgical, pre-chemotherapy assessment, peri-natal, specialty consultation, etc.).

7. Billing-site health care provider is responsible to obtain chart and billing sheet and process according to clinic policy.

BEAVER ISLAND RURAL HEALTH CENTER TELEMEDICINE

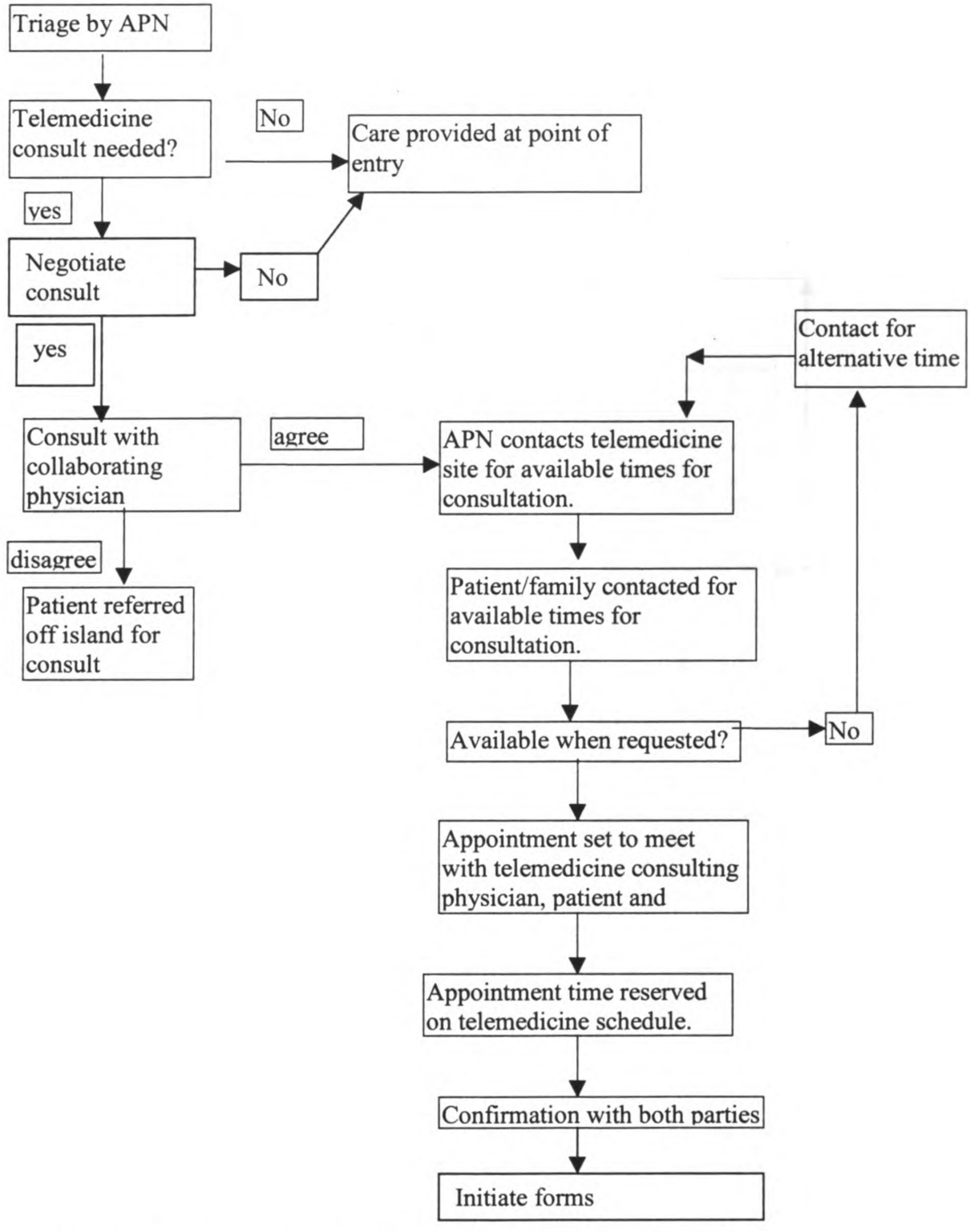


Figure 3:Proposed Schematic Algorithm

BEAVER ISLAND RURAL HEALTH CENTER TELEMEDICINE

PHYSICIAN TO PHYSICIAN CONSULT

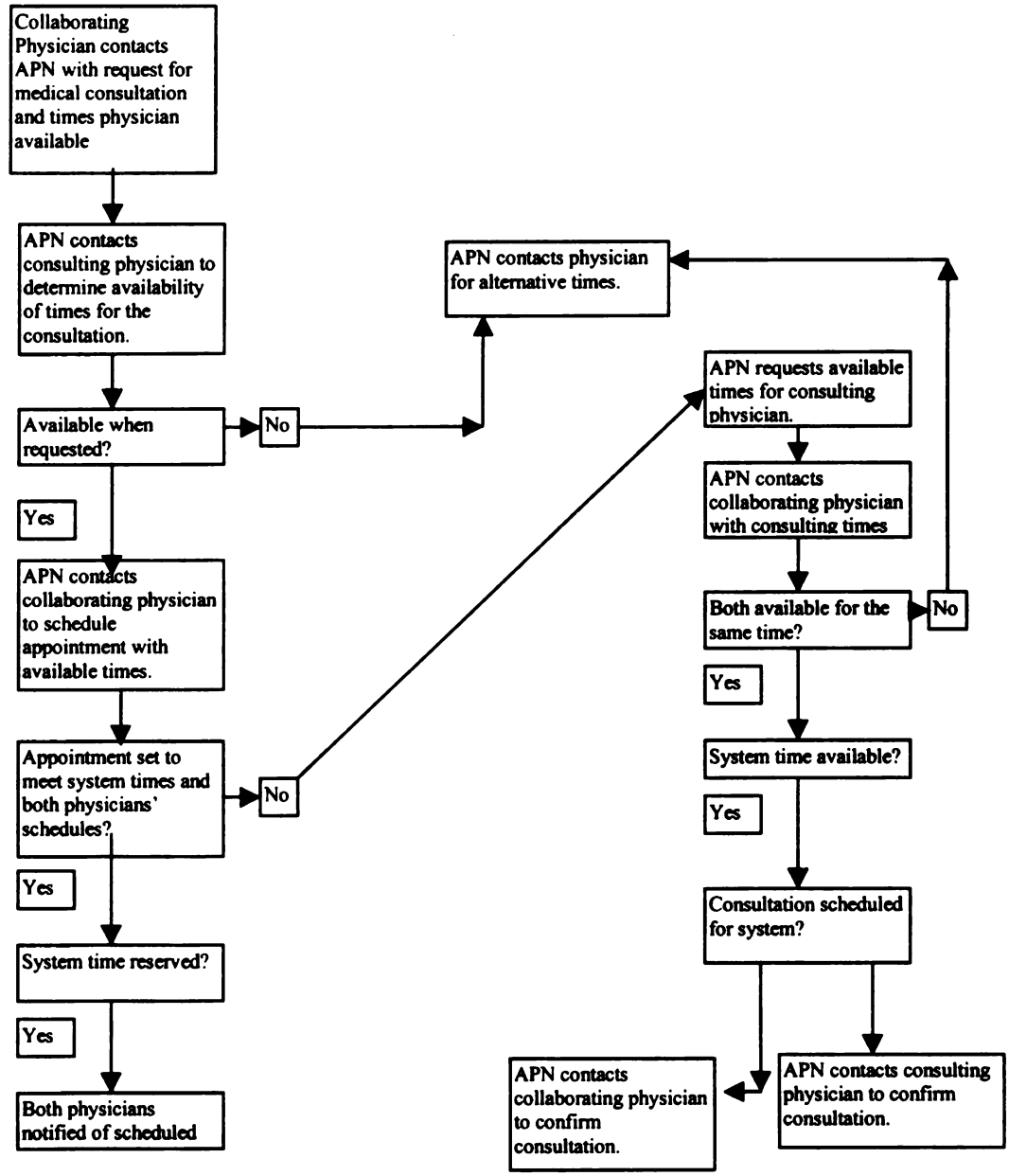
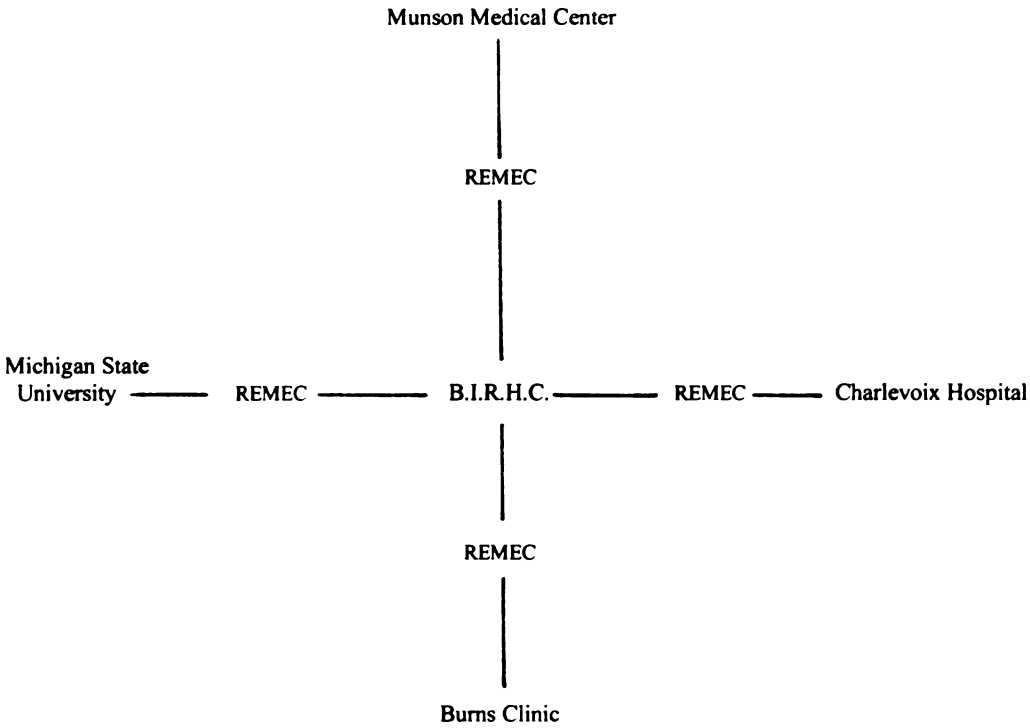


Figure 4:Proposed Schematic Algorithm for Telemedicine Connection

Beaver Island Rural Health Center

TELEMEDICINE NETWORK



REMEC=Rural Emergency Medical Educational Consortium

Figure 5:Proposed Telemedicine Network

BEAVER ISLAND RURAL HEALTH CENTER TELEMEDICINE RELEASE FORM FOR TELEMEDICINE CONSULTATION

Patient Name: _____

Registration Number: _____ Date: _____

I understand that I will be engaging in a Telemedicine consultation using interactive video conferencing technology. My physician or healthcare provider has explained to me how this technology works and how it will be used for the purpose of this consultation about my medical condition.

I understand that this telecommunication video link may fail, and in that event the interactive consultation may have to be terminated.

understand that either site participating in this consultation may videotape, record, film or photograph this event and grant my consent for these images to become a part of my medical record. I further understand that I am not eligible for any compensation for participating in this telemedicine consultation. I hereby release Beaver Island Rural Health Center of any and all liability that may arise from authorized use of images.

I have read this document carefully, and consent to participate in a Telemedicine Consultation at the Beaver Island Rural Health clinic under the terms described. I understand that I will have an opportunity to ask questions and have received satisfactory answers from my healthcare provider.

_____ _____

Patient Name: please print Date and Time

_____ _____

Patient Signature Witness

If patient is a minor: less than 18 years of age; or requires a guardian for legal consent:

_____ _____

Parent or Legal Guardian: please print Date and Time

_____ _____

Parent or Legal Guardian: please print Witness

Figure 6:Proposed Telemedicine Release Form

BEAVER ISLAND RURAL HEALTH CENTER TELEMEDICINE LOG

Date: Start Time: End Time:

Patient Name:

Registration Number:

Insurance Name/Policy Numbers:

Referring Health Provider:

Receiving Consultant(s):

Receiving Hospital(s)/Clinic(s):

Patient Diagnosis:

Reason for Interactive Consultation:

Alternate action without interactive consultation:

Outcome of Interactive Consultation:

Rate Satisfaction of Teleconsultation:

Rate Satisfaction of Technology:

Cost Savings Realized by using Interactive Consultation:

Avoided duplication of diagnostic procedures (list):

Avoided duplication of referring personnel (e.g. accompanying patient to mainland/avoid staff shortages/coverage staff):

Avoided unnecessary patient transfer cost (e.g. Air Ambulance Service; Boat Travel):

Avoided duplication of receiving personnel (repeat exams, diagnostics, procedures):

Healthcare Benefits Realized from this Interactive Consultation:

Reduce time for Medical Intervention:

Improved Healthcare Access:

Coordination/Collaboration of Healthcare Needs:

Improved Medical Outcome:

Figure 7:Proposed Telemedicine Log

BEAVER ISLAND RURAL HEALTH CENTER
TELEMEDICINE

Checklist for Conducting Video Telemedicine Consultations

Preparing for a Consult

Check System Operation

The system should be powered up and the call established 10 minutes in advance.

1. Is network switched to room in use? _____
2. Are microphones properly placed? _____
3. Are camera presets to be used and are they programmed? _____
4. Are all other system features to be used operational? _____

Medical Records and Images

1. Have any needed medical records or imaging studies been collected? _____

Patient Consent

1. If a patient is to participate in the consult, the remote site coordinator must obtain a signed consent form from all patients or family members or others involved. _____

Medical Peripheral Devices

1. Any medical peripheral devices to be used are connected to the system and tested for satisfactory operation. _____

Videotape

1. Load a video tape in the recorder._____

Lighting

1. Lighting checked? _____
2. Are any additional light sources needed for patient examination? _____

During the Consult

1. Note start time. _____
2. Start videotape recorder. Confirm on tape that consents have been obtained. _____

Upon Completion of Consult

1. Hang up call. _____
2. Note stop time. _____
3. Stop VCR. Label and place tape in secure storage area. _____
4. Shut down telemedicine enduser equipment and medical peripherals. _____
5. Clean up room in preparation for next session._____

Figure 8: Proposed Checklist for Conducting Video Telemedicine Consultations

CHAPTER V

TELEMEDICINE PROTOCOL

IMPLEMENTATION

The proposed protocol and corresponding algorithms are designed for health care providers in the rural health clinic to initiate the use of telemedicine. It provides a comprehensive step-by-step plan that can be followed by even a novice of the advanced health care technology. The proposed protocol and algorithms are designed to be combined with sound clinical nursing judgment, and patient/caregiver, primary health care provider and consulting service collaboration.

PROPOSED PROJECT EVALUATION METHODOLOGY

One of the problems in evaluating telemedicine applications is the small number of cases generated by most demonstration or pilot projects. Thus, it will be with Beaver Island unless the project is incorporated in data of other rural health clinics. Presented here is Beaver Island Rural Health Center's conceptual framework for evaluating the Telemedicine Protocol. This framework is a work in progress, as it will change the approach to collect and evaluate the project in the best ways possible. The following is a set of guidelines and generic questions that will be used in further designing the evaluations. Broad-based and inclusive assumptions, definitions and guidelines for telemedicine evaluations will be used that will encourage collaboration among the Beaver Island telemedicine team while permitting each team member to address its unique situation and requirements.

Evaluation Framework

The evaluation of the Telemedicine Protocol will be designed to address questions in the following areas:

Clinical Outcomes: Are desirable clinical outcomes facilitated by the use of the Telemedicine Protocol?

Health System Interface: How well is the protocol integrated into the overall Beaver Island health system?

Patient/Provider Acceptability: Will the patients and health providers of Beaver Island accept and use the Telemedicine Protocol?

Access: Will the use of Telemedicine Protocol improve access to healthcare on Beaver Island?

These areas for the Beaver Island Telemedicine Protocol evaluation framework are not mutually exclusive, because factors that affect one area may not have an equally profound effect on another. With evolving technologies, applications, and situations, the specific questions germane to the Beaver Island Telemedicine Protocol will change as the evaluation system matures from concept to implementation.

In the remaining portion of this section, examples of evaluation questions are provided that might be studied under each area.

Clinical Outcomes: Clinical acceptability can be determined using outcome measurement methods. Definitions of outcomes associated with the clinical acceptability of the Beaver Island Telemedicine Protocol are illustrated by the following questions:

Intermediate Outcome Measures: Does use of the Telemedicine Protocol facilitate a user-friendly initiation of telemedicine-enabled health care?

Health Systems Interface: Integration of the Telemedicine Protocol into the existing medical practice and healthcare delivery requires special considerations and evaluations. The key point here is that the protocols should enhance and not hinder overall Beaver Island Rural Health Center operation.

1. How does the Telemedicine Protocol fit into or change the existing work flow and communication patterns, including current referral and consultation patterns?
2. Are there any new skills that are required to use the protocol?
3. Does the Telemedicine Protocol enable the Beaver Island healthcare system to become more productive, more efficient, or more effective? Does it foster better coordination of patient care?
4. Is the use of the protocol and algorithm efficient for the practitioner, patients and healthcare organizations involved in the telemedicine process?

Patient/Practitioner Acceptability: The true success or failure of the Telemedicine Protocol/Algorithm rests on many less tangible organizational and behavioral factors that will be judged by Beaver Island's practitioner and patients.

1. Do patients and practitioners of the Beaver Island Rural Health Center believe that the use of the protocol is medically useful and adequate for patient care? Does the use of the protocol promote more frequent use of telemedicine-enabled health care?
2. Does the use of the Telemedicine Protocol facilitate or interrupt the flow of the normal work pattern?

In the final analysis, it will be the human component at each end of the system-not the technology-that will determine whether it is successful or not!

CHAPTER 6

IMPLICATIONS FOR ADVANCED PRACTICE NURSES

Advanced Practice Nurses, because of the diversity of practice settings and advanced knowledge, are in a key position to articulate health care technology changes to the public.

Each individual must learn personal lessons if he or she is to survive healthcare reform and adapt to a changed environment. The technology is ever changing and evolving. Each Advanced Practice Nurse (APN) needs to identify his or her own area of needed change. One needs to keep an eye on the trends in the healthcare marketplace and stay ahead of the ever-changing horizon. Never stop learning. The times and technology will pass one by if one ceases ongoing learning. Selectively learn what you need to learn. Certainly, know the use of computers and how they will continue to be a part of our healthcare delivery system. It is essential that one keep his or her mind open to unlimited possibilities while reading about advancing technology.

There are implications for education and teaching technology needs to be integrated into the curricular content of the Masters program in Nursing. The relative issues need to be addressed to prepare the APN to deal with telemedicine. The reality may be that telemedicine will become a significant part of healthcare delivery in the next 10 years. Incorporating it into the curriculum of advanced education will help to make using telemedicine more user friendly and facilitate integrating technology into an individual's current practice.

The APN involved with telemedicine will need to consider developing a website for the sharing and coordinating of information with other remote sites throughout the United States. What an efficient source of the ongoing changes and new ideas involved with telemedicine.

Be politically astute. So many changes in healthcare are part of an ongoing political process, yet many APNs are politically naïve. One needs to be extremely aware and informed of the political process and how it affects healthcare. The more one knows about the political process, the more one tends to become involved. It becomes rewarding when APNs realize they not only can, but also must, be politically involved to influence political changes in healthcare in the future. As a leader and change agent the APN must be involved in healthcare policy. According to Murphy (1992), as nurses take part in decision making by developing and using networks of professional relationships, they encourage decision-makers to consider solutions guided by the principles of primary healthcare practice (p.161). The APN must articulate the need for governmental financing of telemedicine technology and to target primarily underserved areas with grant monies. The APN utilizes knowledge to persuade payers that the marriage of telemedicine technology and primary care services is a cost-effective means of providing healthcare.

The APN as a primary healthcare provider is in an excellent position to educate other healthcare providers, RNs allied healthcare providers, patients and their families about the advantages of using telemedicine to improve access, quality and cost-effectiveness of their healthcare.

The APN's knowledge of research-based preventive interventions facilitates successful patient outcomes. As a researcher, the APN can evaluate patient outcomes. The APN has an obligation to promote the profession of nursing. Publications and oral presentations are idea ways to educate the public about new technologies and the role of the APN. Through various meetings and/or conference presentations, the APN has the opportunity to act as an educator while at the same time articulating nursing's domain.

The APN is an agent of change and in the process of introducing and coordinating this telemedicine protocol is critical to its success. He/she needs to feel comfortable with the technology, their relationship with the consulting health care provider and be able to convey this to the patient/family.

Providing quality, cost effective care, is a primary goal of the APN. As educator to both patients and other healthcare providers, the APN applies learning theories and methods to identify and meet health educational needs. Patient's needs become readily apparent with the use of a systemic approach that assists in decision-making and facilitates prevention of illness. The APN as a leader and change agent impacts healthcare policy and governmental reform. Health promotion and access to care must be some of the principal aims of healthcare reform and APNs are in the forefront of health policy improvement and revision. The clinician provides direct patient care that is based on sound theory and clinical judgment. As a researcher the A.P.N. seeks to gain a new body of knowledge to advance healthcare beyond what it is today. APNs serving in these roles continue to advance and improve primary healthcare. Technology is ubiquitous in our practice and pervasive in our lives. For us, the advanced practice nurses of the next

century, the question is how to keep pace with the technology and incorporate it wisely into practice.

THE FUTURE OF TELEMEDICINE

What's next? Virtual in-home check-ups as routine as pay-per-view programming. Last August, the FDA cleared for marketing a home-based telemedicine program that collects and transmits data on heart rhythm, blood pressure, pulse, temperature, and pulse oximetry over standard telephone lines to a central nursing station that is staffed around the clock. Known as the HANC Network, it also schedules self-care activities, offers reminders and instructions-telling patients how to change dressings, for example-and has the capability to create live video visits (Crump, Kottke, Perednia & Sanders, 1997).

A Health Maintenance Organization in Minnesota is testing a video house call system developed by Kahlid Mahmud, MD, and a hematologist-oncologist in the Minneapolis area. In California, family physician Jack Higgins, MD is creating a telemedicine network that enables him to examine sick youngsters in schools (Crump, Kottke, Perednia & Sanders, 1997).

The primary goal of home-based telemedicine systems is to keep complications of chronic illnesses from mushrooming into problems that lead to ED visits, hospital stays, or nursing home admissions. Bringing this technology into the home can also be appealing for physicians who want to provide telemedicine consultations from the comfort of their home office or study.

determine if they are not only effective but also "sustainable" (destined to become a telemedicine buzzword) over time.

What is the shelf life of telemedicine beyond the test stage? And what is each project's business plan for success? One reality to contend with is the rapid evolution and obsolescence of computer equipment, telemedicine's success may hinge on building an infrastructure in which different components can work smoothly with on another and be readily upgraded or replaced. In some parts of the country, difficulty in gaining access to adequate telephone lines will put obstacles in telemedicine's path.

Studies are needed to determine which aspects of patient care best lend themselves to telemedicine. Researchers hope to explore not only issues of cost, technical quality, and outcomes but also such dimensions as patient and provider satisfaction. What effect will this new technology have on the patient and provider relationship? Will trust be affected? Will the introduction of a third party in this technology cause some concern? Some questions will defy easy answers. Can telemedicine compensate in any way for what it can't provide-the healing power of touch and the therapeutic effect of direct eye contact? Perhaps that is expecting too much of this technology. Wrapping telemedicine in realistic expectations, in fact, may be the best way to send it to its proper place in the world.

These new technologies require current rules on reimbursement, licensure, and liability to stretch. We need more research on the value of these technologies and, as the results of that research become available, we can decide how those rules should be changed to accommodate them.

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