Efficacy and Sustainability of a Telerehabilitation Program

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Abstract

Efficacy and Sustainability of a Telerehabilitation Program

Sustainability and appropriateness of care are important components for healthcare systems as they begin integrating telemedicine/telehealth as an integral part of their healthcare delivery. Part of sustainability is incorporating a variety of approaches and technology, utilizing lower-cost options when appropriate. INTEGRIS is formalizing criteria to incorporate a mixture of technological approaches based on the first three years of direct clinical intervention and educational experience.

Technology options, clinical outcomes, patient's perception of quality of life, and reimbursement are components that must be considered. Technology considerations include the healthcare application, bandwidth requirements, and technology needs, focusing on type of technology rather than specific brands or companies. Patient acceptance/fear of different technologies and other intangible factors must be incorporated into the equation. Telecommunications utilized range from a secure internal Wide Area Network (WAN) with dedicated broad bandwidth systems using H320 and H323 to connecting into a public telecommunications backbone to analog options. Telemedicine/ Telehealth equipment is located in a variety of sites including hospitals, public schools, rural health clinics, physician offices and patient homes. A variety of peripherals are utilized to enhance service delivery based on disease or healthcare needs.

This paper provides an overview of telerehabilitation and how it is used for patient intervention. It addresses the different telehealth applications, what has shown to be most successful, which promote sustainability of the program, what problems have been encountered, and how those problems have been addressed. Information includes data from outcome studies and patient satisfaction. Technology options that are cost effective today will be discussed. Finally, the authors will conjecture what is on the horizon for tomorrow.

The purpose of this paper is to discuss the potential of TeleRehab ™ for meeting unmet needs, for providing improved quality of service, and for continuing rehabilitation beyond the shortened length of stay into home and community-based settings. Program feasibility, development, implementation and sustainability will be addressed.

1. INTRODUCTION

Trends indicate that health care organizations will be caring for increasing numbers of people with disabilities who choose rehabilitation to enhance their participation in jobs, community activities, and personal relationships. People may be born with a disabling impairment or acquire one later in life, perhaps as the result of disease or neurological insult. Rehabilitation therapies teach people with impaired motor, cognitive, perceptual, and social abilities how to compensate or regain function. The therapy involved may be physiological, psychological or a combination thereof. This is often a long-term process, sometimes taking months or years to reach optimal outcomes (Palsbo, 2000). If the person requiring rehabilitation lives in a rural and/or underserved area, needed rehabilitation services are often difficult to access.

Rehabilitation therapy has been reimbursed under a cost-based reimbursement, enabling a rehabilitation facility to charge for all services rendered separately. However, a new reimbursement system, prospective payment system (PPS), was enacted in January 2002 and provides a single payment to an acute inpatient rehabilitation facility to pay for a patient's

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healthcare needs. The payment given is based on clinical characteristics of the patient and expected resources that will be needed to care for the patient, rather than on actual reasonable costs incurred. Financial constraints imposed by PPS challenges physical rehabilitation facilities, making these facilities re-examine resource utilization and organizational effectiveness. The effectiveness of effort rather than the expenditure of effort will require providers to seek alternative approaches to patient care (Teams Rehabilitation Systems, Inc., 2001).

A restructuring of traditional physical rehabilitation practice models will evolve as facilities attempt to actively manage quality. Historically, increase in quality was equated with additional allied health personnel. However, over the past few years, there has been a decline in admissions to allied health degree programs, which suggests that there will be fewer healthcare providers to serve patients with a disability. This shortage of health care providers will be most evident in rural areas, many of which are federally designated as medically under-served areas (MUA) and/or health care provider shortage areas (HPSA).

The need for alternative health care delivery models is real and critical. With the advances in the telecommunications industry, innovative approaches have emerged in the medical arena. Technology must fit the specific clinical needs of the providers as well as the capabilities of the local communities. It must be reliable and responsive, and it must have an open architecture in order to allow changes and growth. (Shannon et al., 2002).

1.1 Telemedicine

Telemedicine, as it is commonly called, utilizes telecommunications technology for the provision of health care and consultative services to individual patients and the transmission of information related to care, over distance, using telecommunications technologies. Telemedicine became popular in the 1990's to provide limited healthcare services to persons with certain medical diagnoses. Initially, it was used to monitor patient status. Examples of this service are cardiac remote telepathy and medical consultation via the transmission of vital signs. Telemedicine expanded to include more direct interventions with patients in treatment such as wound care and prevention services such as diabetes education; and wheelchair seating adjustments after discharge from acute inpatient rehabilitation (Vesmarovich, 2002).

The inclusion of prevention services is reflected in a new term, telehealth, which is often used to reflect the scope of these applications. Telehealth is defined as an inclusive term for remote delivery of care from a health care provider to a patient in their home or community. This care site may be a hospital, clinic, school or place of residence (home, assisted living or skilled nursing facility). Telehealth is one method that can significantly reduce the limitations of our current health care system. As with any alternative delivery model, telehealth must satisfy the criteria of improving quality of life and achieving meaningful functional outcomes.

1.2 Telerehabilitation

One specialized area of telehealth is telerehabilitation, or TeleRehab™. TeleRehab™ is the clinical application of consultative, preventative, diagnostic and therapeutic therapy via two-way interactive audiovisual linkage. It is performed in real time, versus a "store and forward" method. TeleRehab™ is an application of telehealth that is demonstrating promising signs of facilitating the transition for specialized rehabilitation follow-up care and services in the home and community-based settings. However, it should be underscored that TeleRehab™ is not meant to replace direct allied health therapy available in local communities, but serve as a medium to provide the skilled therapy services to patients who would otherwise have limited or no services in their post-acute setting.

2. INTEGRIS Health Telerehab™ Model

The INTEGRIS Health TeleRehab™ model has been developed through three years of trial and error. The focus has been on rural patients receiving care from metro facilities. This limitation was due to funding sources and known needs. The model is not static, but is evolving as technology, consumer and therapist acceptance, and reimbursement components change. The model presented is to be taken as one that has proven successful in the current healthcare and legislative arena, and has the promise of continued future viability as healthcare and technology evolve further.

2.1 Scope of Need in Oklahoma

Oklahoma is an extremely rural state with a large population of minorities in both rural and metropolitan areas. Sixty-three of the 77 counties have been federally designated as rural. Twenty-four of these counties are designated as medically under-served areas (MUAs), three counties are

designated as health professional shortage areas (HPSAs), and 28 counties are designated as both. The exact numbers are even more astounding; 678,126 individuals are un-served, and 1,144,061 individuals are under-served.

INTEGRIS Health Inc. is an Oklahoma owned not-for-profit health care corporation with hospitals, rehabilitation centers, physician clinics, mental health facilities, independent living centers and home health agencies throughout much of the state. With so many services spread over such a broad geographic area, the INTEGRIS Board approved of a five year $40 million expenditure for the implementation of information systems across the health care system in 1994. As the system has grown with new operational and organizational imperatives, the infrastructure costs have increased to $50 million. INTEGRIS Health created the state's first telemedicine network in 1993-1994 by connecting several rural INTEGRIS Health hospitals and partners together for voice, video, and data connectivity.

2.2 Rural Telemedicine Grant

In 1997, INTEGRIS Health in Oklahoma was awarded a federal grant from the Office for the Advancement of Telehealth (OAT) for the INTEGRIS Rural Telemedicine Project to increase access to healthcare in rural areas over telemedicine. A secondary purpose of the grant is to give healthcare providers the opportunity to experience different specialties/applications via telemedicine, finding which applications had the best clinical outcomes, were cost effective and/or were well received by patients and healthcare providers. TeleRehab™ is one such component of the INTEGRIS Rural Telemedicine Project.

Telemedicine can increase the depth, as well as the breadth, of health care services that are currently provided, support and expand current initiatives that are currently in operation, as well as establish a market niche that currently does not exist. The focus of the INTEGRIS Health Rural Telemedicine Program has shifted from building infrastructure and development of a distance learning network to direct patient care. There have been over 2,200 clinical teletherapy interventions since 1999.

2.3 Infrastructure

There are several technological, human and logistical variables that influence choice of technology for TeleRehab™. Bandwidth consideration is an important aspect of designing the infrastructure. In general, bandwidth is directly proportional to the data carrying capacity and the cost. INTEGRIS Health Rural Telemedicine Project began with a focus on high-end technology. In the first clinical study H.323 video conferencing systems with dedicated T1 lines were used. While this first pilot study in TeleRehab™ was considered a success, challenges were identified that were associated with the use of this technology (Dawson, Clark & Scheideman-Miller, 2000). It required the patient to travel to the nearest site where H.323 was available, though this was still considerably less than the distance to a specialty rehabilitation outpatient site. This technology was highly reliable utilizing a transfer rate of 384 kbps at 30 frames per second. The cost of equipment and line lease were the major limiting factors.

Sometimes travel is not possible for patients, so the next step in the project was to explore technology options that could be used in the home. Since the use of high-end technology was not feasible for patient homes, the "plain old telephone system" (POTS) was used for the TeleRehab™ connections. A decision was made not to invest in the computer/Internet platform since many of the rural patients were limited in their access and knowledge of computers. Concerns about confidentiality over the Internet also precluded the use of computers..

For patient home interventions, therapists in the INTEGRIS Rural Telemedicine Project utilize H.324 desk top videophones. .Simplicity of installation is preferred, and this device only requires the user to plug the video telephone into any ordinary phone jack. Operation is easy requiring only the actions of dialing a telephone to connect the audio and pushing a button to connect the video. The unit provides instant real time video communications in seconds with adequate quality video and audio connection. This unit will operate with an array of external audio-video devices, cameras, monitors, projection devices, medical peripherals, TV displays, VCR's and a list of others. The maximum transfer rate is 33.6kbps with video streaming at 18-22 frames per second and costs between $1,600 and $2,500 depending on the model and capabilities.

The other device used is a less sophisticated set-top device that requires the use of an existing telephone for audio capabilities and a television for video linkage. The connection of this device to existing communication equipment in the home is fairly simple depending on the skill of the patient/caregiver and type of communication equipment available in the home. However, the use of this set-top device is somewhat of a challenge since some people have difficulty

connecting the device to their telephone and television. It also difficult to provide technical support over the phone without seeing what kind of television cable connection is available. After a successful connection, the use of the device is equally as simple as the more sophisticated device. The maximum transfer rate of a set-top unit is 33.69bps with a maximum frame rate of 10-15 frames-per-second with costs between $300 and $350. A set-top can interface with another set-top or a videophone.

3. Program Sustainability

Telemedicine is novel to many healthcare professionals and administrators. Unless teletherapists expend time and effort to educate all stakeholders, the probability of long-term sustainability is limited. It should be integrated into the strategic business plan of the organization. A partnership of clinical, technical and administrative professionals will help insure the success of a telemedicine program.

3.1 Organizational Strategy

There is a desire in most healthcare professionals to engage in clinical activities that make a difference in people's lives. Likewise, they would like to have the organization in which they work be successful. In other words, the task of the clinician is to insure that when they step aside, their job, or at least the organization, still exists for the next generation. Health care organizations are multidimensional and continue to be in the midst of revolutionary transformation. An organization is continually evolving and developing within this transformation process. Strategic management and development are methods to achieve this process. Strategy reflects an organization's values as expressed in its vision and mission. Strategy is future-oriented and sets direction for the organization. It guides the organization to develop a clear concept, specific goals and consistency in decision-making (Smith, 2002). A health care organizational strategy addresses the customer (health care service deliverable and satisfaction); clinical operations (business processes and structure); financial (cost containment and revenue enhancements); and clinical development for health care providers and the organization.

The organization as a whole must be supportive of any program to insure sustainability. The Telehealth Network (ITN) itself has been in operation since 1994. ITN is self-supporting with a staff to cover it 24 hours, seven days a week. The INTEGRIS Rural Telemedicine project works in conjunction with the INTEGRIS Telehealth Network, which is under Information Technology. ITN and the Rural Telemedicine Project are included as key components in the INTEGRIS Information Technology five-year strategic plan.

3.2 Establishment of Need

Before venturing into the emerging field of telerehabilitation, several factors need to be considered. First and foremost, a need for TeleRehab™ services must exist. Based on findings from the Proceedings State of the Science Conference on Telerehabilitation and Applications of Virtual Reality (2002), a necessary condition for acceptance and use of telerehabilitation appears to be expectation that it will be useful. When participants perceive potential utility, (and this potential is realized) adoption is highly likely.

If the health care needs of the community are adequately satisfied by conventional methods or if there is not "buy-in" from the patient/family or local providers, the implementation of a TeleRehab™ program will be challenging and most likely unsuccessful. There are instances when rehabilitation patients in rural communities are not being seen because local rehabilitation services are not available secondary to a limited number of professionals with the necessary expertise. Other challenges include geographic or distance barriers and lack of transportation to health care settings (Bull, 2001). In these situations, TeleRehab™ can be a viable alternative.

The high percentage of counties in Oklahoma that are medically underserved make it abundantly clear that alternative methods of health care delivery are needed to bridge the gap and to offer basic health care services to the majority of the population.

3.3 Organizational Stakeholders

In order for telerehabilitation to overcome obstacles and thrive, it will be important that program development be driven by a blend of professionals – rehabilitation engineers, allied health clinicians, and hospital administrators. Without joint planning to develop, evaluate, and refine telerehabilitation projects, the field will not achieve its full potential in the health care arena. Well-placed champions for telerehabilitation programs/projects are needed who are willing to think "outside the box" and accept a certain level of risk. These spokespersons and early adopters must advocate for the field, not only to other professionals but also to state and federal legislators. The critical role for champions among administrators is to advocate for third-party reimbursement for services to insure long-term

sustainability for programs after grant funds are spent.

3.4 Organizational Commitment

In order for a teletherapy program to be embraced and supported from the outset, a business plan should be developed and approved by the administration of the health care organization. Collaborators within an organization include clinical, technical and administrative professionals. Without internal partnerships and ownership of the telemedicine program, the probability of long-term viability is limited. This concept is new, and many hospital administrators or chief financial officers (CFOs) may not be familiar with telemedicine programs. Education is key to successful start-up and operations of a telemedicine program.

At INTEGRIS, there is a separate cost center for Telemedicine with a dedicated director and a telemedicine coordinator. Key hospital and system administrators have been educated about the concept, benefits (tangible and intangible), innovativeness, and feasibility of the project. This is an on-going educational process in which the business plan is re-evaluated on an annual basis.

4. HUMAN FACTORS

When technological innovations such as telerehabilitation are not accepted, generally the failure may be traced to a poor fit between the nature of the innovation and the vested interests, resources, and expectations of its major gatekeepers (Grigsby, 2002). It is important to remember that TeleRehab™ is only a tool to provide the therapeutic skilled service and not the therapy itself. Before implementing a TeleRehab™ program, a traditional face-to-face session should be conducted with the patient and designated caregivers or support persons. This initial session is needed to evaluate the patient and assess the level of impairments. Although the quality of the video display is adequate, it does not provide as much information as a traditional session where touch can be incorporated.

4.1 Teletherapists

Long-term commitment of therapists contributes to sustainability of any rehabilitation program. Specialized training for teletherapists is highly recommended both for initial comfort of the therapist and to help counterbalance frustrations that can occur due to technology and unfamiliarity of the modality. Beyond instruction and familiarization with telecommunication technologies, teletherapists will need to learn new verbal skills, in particular unambiguous description and instruction since hands-on demonstration is unavailable. The proficiency of the teletherapist is essential to the success of a TeleRehab™ program. Experienced interdisciplinary teletherapists collectively identified features they deemed as important for a teletherapy intervention to be productive and meaningful. The list below outlines the attributes that were believed to be paramount to successful teletherapy interventions.

Attributes of Successful Teletherapists

- Flexibility
- Professional Maturity
- Creativity
- Motivated
- Clinical Competence
- Sense of Humor
- Good Interpersonal Skills
- Person First Philosophy
- Intuitive
- Tenacious
- Excellent Problem Solver
- Empathic
- Good Communication Skills

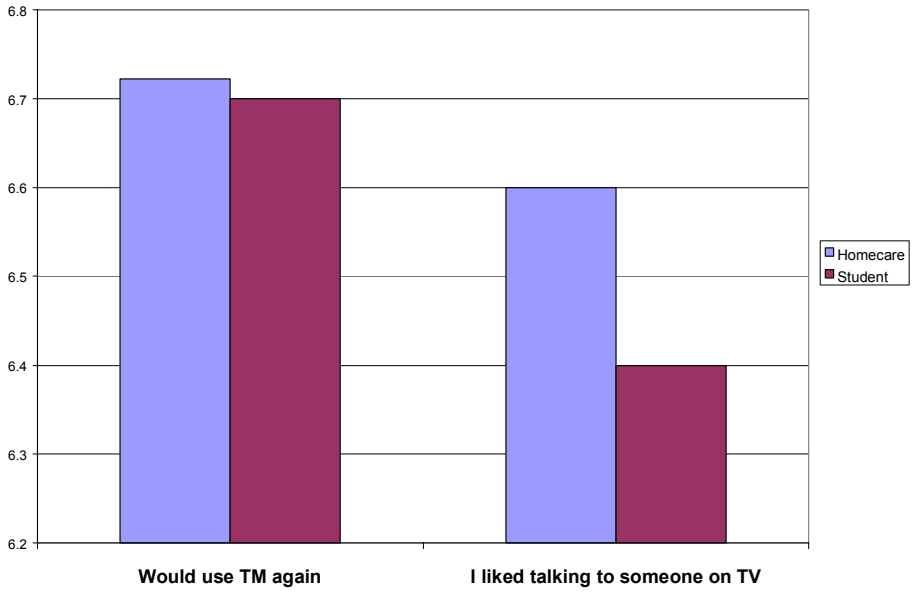
4.2 Patients/Caregivers

Just as there are suggested attributes for successful teletherapists, there are inclusion criteria for patients who receive teletherapy. It is beneficial that the patient participated in a successful acute inpatient hospitalization and be medically stable. Patient motivation is paramount to successful teletherapy interventions.

A support person is required for teletherapy if patient requires supervision for either physical or cognitive impairments. The patient's support person(s) need to be educated about the mechanics of the equipment and become familiar with the procedures of operation. It is also beneficial for the distant healthcare providers that will be part of the treatment team to be included in the initial assessment in order to become more familiar with the equipment and teletherapy approach.

If the patient needing therapy requires physical intervention of another person, the attributes of the caregiver/assist person cannot be minimized. The assist person must be able to comprehend audio-visual information, have no or minimal physical restrictions, have at least nominal knowledge of the rehabilitation treatment approach, and a basic understanding of the technology used for this application. The assist person must be caring and compassionate and be "invested" in the patient. Honest and open communication is very important; the safety of the patient and all involved depends on the interaction between the therapist and assist person. In essence, the assist person becomes the "hands" and "senses" of the therapist.

Chart 1: Patient Satisfaction with Telemedicine
1= Dislike 7= like very much

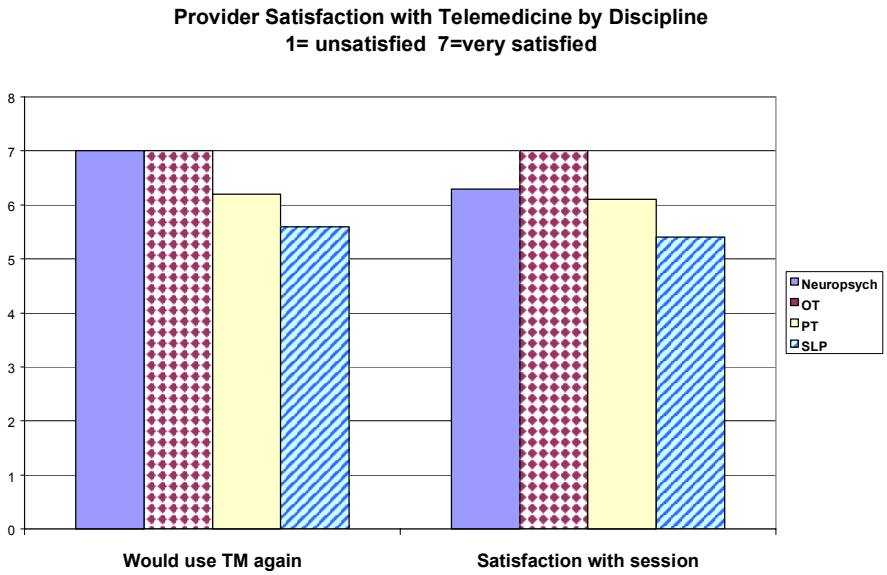


4.3 User Satisfaction

A satisfaction survey was given to both providers and patients/caregivers. The questionnaire allows for open comments. Overall, students were slightly less satisfied with telemedicine sessions than were homecare patients and their caregivers. Part of the reason is that students weren't given a choice as to whether they wanted to have their speech therapy over telemedicine or not. Home patients were given the option to use and discontinue the sessions. Some of the negative responses from the students were due in part to outside influences. One student didn't want to be there because he was missing physical education (PE) and another said he was sleepy from medication. The relationship they had with their therapist also seemed to affect whether they were satisfied with the session.

Home patients seemed more satisfied and tolerant of technical difficulties. It is important for a patient and their caregiver to be comfortable and satisfied with the intervention or non-compliance may become a problem. This can translate to less than optimal outcomes for the patient and lost productive time for the therapist.

The provider comments mirrored technology difficulties. When the technology worked well without freezing or video breaks, the comments were more positive. As technical difficulties increased, scores tended to be lower, indicating less satisfaction with the modality. Also, therapists are trained to "touch" the patient. A therapist's training and predominant experience has been with physical touch. The use of telemedicine requires them to "connect" with the patient in another manner, such a verbally or through demonstration. This can be less than satisfactory for therapists. The speech language pathologists rated telemedicine lower than did their fellow therapists. However, open comments with lower ratings indicated technology problems, especially early in the school speech teletherapy program. These problems have been addressed and higher ratings have resulted.



5. REVENUE/COST SAVINGS

Any rehabilitation program has to have revenue to be sustainable for the long haul. Sustainability does not always equate profitability, especially in early stages of a program. Eventually, however, profit must be achieved for most programs to be continued. In order for a rehabilitation program to be sustainable, there must be a stream of revenue and marginal profit. Diversifying sources of revenue, much like diversification of an investment portfolio, is a logical strategy. A combination of more stable, if more marginal, funding sources with revenue streams that are intermittent but have a higher return on the investment help with long-term sustainability. Contracting is an example of a stable revenue stream, with the more traditional fee-for-service reimbursement as an example of an intermittent funding source. All aspects of financial benefits to a provider must be considered. Financial benefits to a program can include revenues, cost savings, or a combination of both.

5.1 Contracts

Contracting is often associated with captive populations, such as schools or prisons, which require interventions for a number of people over a long period of time. Contracting overcomes some limitations offered by traditional third-party payers such as whether is it required by the state to reimburse for telemedicine or not. Additionally, it can be based on hours or as a set monthly fee.

The contracts for the school therapy program at INTEGRIS went through four stages of evolution. The first stage was a flat fee, regardless of number of students seen or hours used. When extensive technology problems precluded service delivery for six weeks, billing adjustments had to be made. The next year, the contract was structured to bill based on hours only. This arrangement had the negative effect of making it easy for classroom teachers to cancel speech teletherapy sessions at will. As a result, the speech therapist often had unproductive time that could have been spent with other patients. The third year brought a hybrid contract, requiring reimbursement for half of the anticipated sessions, whether they were used or not. Compliance greatly increased benefiting both the student and the speech teletherapy program. The final change to the contract was a slight charge increase to help pay for the extra time in for paperwork required for the school to received Medicaid reimbursement for some of the students. This has been a popular feature of the INTEGRIS speech teletherapy program because it helps the school receive funds for special education otherwise unavailable to them.

5.2 Reimbursement / Fee for Service

Third party payers are the biggest source of revenue for healthcare facilities. Reimbursement for telemedicine varies from state to state for private insurance companies and Medicaid. In the state of Oklahoma, reimbursement (except Medicare) is given equally for telemedicine as for traditional interventions. Only physician and psychology telemedicine services are reimbursable under current Medicare regulations. Enhanced reimbursement, including therapy, is being pursued legislatively. It is anticipated that Medicare will reimburse therapy in the future.

For billing and compliance purposes, the teletherapist should work with administration to

orient and educate intra-organizational departments about the practice and value of teletherapy. Working with the management of Admissions, Business Office, Corporate Compliance, Health Information, Decision Support, and Information Technology is critical to the establishment and viability of a successful teletherapy program. Policy and procedures as well as teletherapy protocols need to be developed early on in the program. CPT codes, therapy procedures, service units, and costs for teletherapy services need to be developed and documented for reimbursement purposes.

Private insurance companies, worker's compensation, and the Oklahoma Medicaid program (Healthcare Authority) are paying for TeleRehab™ services. Recent acceptance by professional associations and interested state and federal legislators is facilitating legislation for demonstration projects to address home health and therapy applications. Finally, arrangements for telemedicine reimbursement can be made through other healthcare providers such as Indian Health Centers or veteran administration hospitals.

5.3 Cost Savings

Studies have shown home health cost reduction to be approximately $50/visit due to reduced travel expenses and decreased loss of productivity time (Dimmick, et al, 2000). This savings increases as the geographical area is increased (Barker et al, 2000). Telemedicine enables better utilization of limited resources. For example, a physical therapist that specializes in working with people following neurological insult would not be fully utilized in a rural area. They would need to serve other counties as well to maximize their expertise. Geographical distances involved would reduce the therapist's productive time. Telemedicine can provide a modality for several PT services, enabling the PT to spend more time working with patients and less time traveling.

Further cost savings result when existing equipment and infrastructure is utilized, saving start-up costs. One of the largest costs for high-end technology connections is the monthly line lease charges. In the United States, the federal Universal Subsidy Program, Rural Health Care Division, offers a partial line lease reimbursement for rural facilities, making telemedicine a more viable option. Utilization of POTS decreases line lease costs significantly..

A final point worth mentioning is that telemedicine, by virtue of availability to almost any site that has a telephone line, can serve people in their home community. This has the advantage of bringing services to people that might not otherwise get services. The availability of the right service in a timely manner has been shown to decrease secondary health costs in a variety of diagnosis and in some instances has increased compliance. This benefits both patients and their providers. While most cost savings items are harder to financially quantify, they nevertheless contribute to the sustainability of a program.

6. OUTCOMES

While a service may be delivered at a lower price, it must be researched to determine if it is efficacious. The question is do people get equivalent service at home as they do at a clinic or in traditional outpatient settings?

Table 1: Patient Interventions by Discipline

Discipline	# consults	Hours
Audio/Verbal Therapy	82	77
Neuropsych	23	19
Occupational Therapy	39	21
Physiatry	126	32
Physical Therapy	458	384
Speech Language Pathology	1454	888
Vocational Rehabilitation	3	3
Total	**2,185**	**1,424**

6.1 Case study clinical anecdotal outcomes

Although hands-on interventions are always the preferred mode of delivery, case studies related to using telerehabilitation have shown encouraging clinical outcomes. All the physical therapy case studies in the TeleRehab™ project were with patients with an acquired brain injury (ABI). The two primary diagnoses were traumatic brain injury (TBI) and cerebral vascular accident (CVA or stroke). Prior to telerehabilitation interventions, most of the physical therapy patients were functionally dependent for activities of daily living and at risk for institutional placement at discharge from acute inpatient rehabilitation. Subsequent to physical telerehabilitation, almost all patients were functionally independent in their home settings with assistive devices and caregiver support.

6.2 School speech teletherapy outcomes

Children with special needs are evaluated on a regular basis, usually yearly, to determine language goals for their Individual Educational Plan (IEP). Students receiving speech teletherapy have comparable outcomes to those receiving traditional speech therapy. Several students reached their goals in a shorter time frame and were able to discontinue speech services. Some of the success may be attributable to the individualized format as opposed to the group therapy that is often utilized in a school setting, but does not negate the overall positive outcomes of the use of the technology.

6.3 Telerehabilitation Research Needed

Telerehabilitation research to date has been primarily been case studies or small pilot studies. While good as a start, such small studies do not support major reimbursement or clinical practice changes. A solid database of evidence will be required to demonstrate to providers, regulators and payers the need to reduce the licensure, regulatory, and funding barriers that are the primary obstacles to providing more effective telerehabilitative services to people with disabilities.

For telerehabilitation to become an established part of rehabilitative healthcare practice, there needs to be solid evidence that it enhances clinical outcomes. The standard approach for addressing this problem is to identify appropriate outcomes, determine how to measure these, and implement a controlled study to gather objective data to evaluate defined outcome measures. While the allied health professions have defined their mission as "enhancing function" third-party payers add the criterion of cost reduction to the definition of success (Winters, 2002).

Other outcomes, which can be measured include frequency of hospitalizations; frequency of a desirable behavior or one meant to be extinguished; revenue dollars; benefit/cost efficiency; consumer satisfaction ratings; self-report of rapport between professional and patient; mean time between equipment failures; subjective ratings of pain; the rate of usage and growth of a newly created program; or quality of life.

Telerehabilitation has much potential for meeting unmet needs, for providing improved quality of service, and for continuing rehabilitation beyond the shortened length of hospital stay into the home and community. Two studies have addressed the effectiveness of telerehabilitation – one a large, randomized controlled study and the other a small group of patients in a simulated-distance setting (references of studies). Additional experimental studies are needed in order to expand current studies and produce clinical data, which is essential to the telerehabilitation field.

A multi-institutional group is working collaboratively to increase telerehabilitation numbers by aligning data gathering instruments and developing a framework to collect data across multiple institutions. Preliminary work has been done, with decisions made as to evaluation instruments and satisfaction surveys decided upon. A database is being developed at INTEGRIS as a pilot, with future plans to follow this format including other institutions. The hope is to create a nation-wide database looking at both clinical and efficacy criteria.

7. CONCLUSION

With approximately 2,200 TeleRehab™ sessions totaling over 1,400 hours of intervention completed in the first three years of the program, new territory has been forged in "virtual rehabilitation therapy." There have been some remarkable successes and have learned some valuable lessons in the process. This TeleRehab™ approach is a feasible and viable option for the delivery of health care services within the patient's home. It has proven to be effective in minimizing impairments, improving functional abilities of the patients, and decreasing costs (i.e., reduced travel expenses for patient and no clinic overhead costs). It has been demonstrated that telerehabilitation can increase access to individuals who otherwise would not receive services; prevent secondary complications and hospital recidivism rates; and be a cost-effective approach for rehabilitation service delivery.

A telerehabilitation pilot study can be started with a minimum of planning. A sustainable telerehabilitation program, however, requires careful thought and follows traditional strategic planning processes. This includes the establishment of the need, identification and education of key stakeholders, and utilization of the appropriate type of technology needed for an application. Recognition and addressing of human factors early in the program will help through the unforeseen but inevitable setbacks that all new programs encounter. Revenue and cost savings must be recognized and pursued to enable a program to be viable enough to continue to serve patients after grant or other extraneous funding disappears.

When implementing a TeleRehab™ program, it is important to obtain clinician "buy-

in" and mitigate their anxieties about not being able to physically "touch" the patient. From a therapy perspective, most all clinicians teach patients to perform an independent home program. The two-way interactive real-time audiovisual format simply allows for an expansion of this concept.

Proceed cautiously during the initial implementation phase. Pilot studies are suggested with targeted patient populations based on identified needs at the health care facility. One of the keys to success is developing and maintaining relationships with all stakeholders including physicians, consumers, insurance case managers, clinicians, and technological consultants. When possible, initial face-to-face session with the patient and their support system is essential to the success of teletherapy interventions. Establish written procedures and maintain standardized medical records and satisfaction inventories, which will help in justifying the telerehabilitation program and also provide data for quality assurance and research.

After three years of program operation, the teletherapy team has learned numerous lessons. Struggles have been in both the technology and human domains including equipment limitations (especially poor compatibility); failures when relationships weren't adequately established; numerous technological difficulties (a dedicated telemedicine coordinator in this area is a key); and clinician skepticism. The good news is that all these challenges can be overcome. Track all costs associated with the program, including telephone line charges, long distance phone bills, room allocations, and manpower expenses. Balance these costs against the costs of a traditional model. It is important to remember billing is on a per case basis and this telerehabilitation services are not currently reimbursable under Medicare for allied health therapies of physical therapy (PT), occupational therapy (OT) and speech language pathology (SLP).

TeleRehab™ has its challenges and is not designed to replace the traditional therapy environment. It does, however, provide an alternative for traditional therapy as adjunctive treatment or may be all that is available to certain individuals. The teletherapist will be challenged in many different ways using this medium but the rewards are well worth the investment.

The future is bright for TeleRehab™. Case managers, vocational rehabilitation counselors, psychiatrists and other health care professionals are exploring applications of this technology to their respective fields (Appell, 2002; Sumner, 2001). Post acute rehabilitation can be greatly complemented by TeleRehab™. Therapists may become traditional home-based operators and consumers more invested in rehabilitation process. But, most importantly, patients improve with this model of therapy. With the changes and cutbacks in healthcare reimbursement, TeleRehab™ is a viable resource to utilize in managing available funds. TeleRehab™ allows for increased access to services at a reduced cost. It could revolutionize the whole concept of the length of rehabilitation and recovery expectations. By "staying connected" to patients over the long haul, we should assuredly see improved outcomes and recovery to the point that patients return to being people living and enjoying their lives.

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