TELEMENTAL HEALTH: Delivering Mental Health Care at a Distance

A Summary Report

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FOREWORD

The provision of mental health services in America's rural and frontier areas remains a critical health services challenge. Telemental health - the provision of mental health services from a distance, using telecommunications technologies – is increasingly helping to surmount that challenge.

This report is a joint effort of the Center for Mental Health Services, Substance Abuse and Mental Health Services Administration (SAMSHA) and the Office for the Advancement of Telehealth, Health Resources and Services Administration (HRSA). It was produced to inform Federal, State and local mental health administrators about options for utilizing telecommunication and information technologies to improve the delivery of mental health services to rural and frontier populations.

Since the re-emergence of telemedicine programs in the late 1980's, telemental health services have consistently been one of the top three most frequently provided health services using telehealth technologies. In 1998-99, over 61 programs in 35 states were delivering telemental health services. Telemental health services are bridging the health services access gap not only for those who traditionally have had limited access to mental health services, in particular those in rural and frontier areas, but also for those who because of mobility problems, poverty, or incarceration have limited access to health care services.

Telemental health services are being delivered in a range of settings -- rural primary care clinics, hospital emergency rooms, community mental health centers, schools, and nursing homes. They are also being delivered directly into homes as well as on board Navy ships and in jails, and state and federal prisons.

Telemental health technologies are being utilized to provide the full range of mental health services, including pre-admission and discharge planning, assessments and evaluations, case management, medication management, family visits, pyschotherapy, court commitment hearings, and family and consumer support groups. These technologies also provide a means to train mental health providers for rural practice. In some states, the one-year clinical internship of master's level prepared social workers is supervised via telehealth technologies. The use of these technologies for continuing education and in-service sessions is also providing access to educational opportunities that have been limited in rural areas.

Increasingly, state and local agencies responsible for mental health services are exploring the use of telehealth technologies to assist them in delivering services to rural and frontier populations and meeting their mandates. Some have begun to invest in telehealth technologies or provide payment for services delivered via telehealth. We hope that this report will assist policy makers, as well as mental health professionals and consumers, as they explore how to effectively utilize these technologies, integrate the technologies into their practices, or advocate for their use to enhance access to services.

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EXECUTIVE SUMMARY

For mental health care providers and consumers in rural and frontier America, the future is now. Interactive telecommunication and information technologies make it possible for mental health providers to literally be in two places at once, extending scarce resources to individuals, and to entire regions, that are medically underserved.

Recent Growth

Telecommunication technologies have been used for some 40 years to provide limited mental health interventions, mostly on an experimental basis. Beginning in the 1990s, however, the use of interactive telecommunication technologies flourished. The number of telemedicine programs in the United States grew from nine in 1993 to over 100 in 1997, and most of them provide mental health services. The seven most active telemental health projects in the nation, highlighted in this report, conducted approximately 70% of all the telemental health service contacts reported by the 50 most active projects in 1996.

Substantial Benefits

The range of mental health services provided to rural consumers over a telemental health network is virtually limitless. At the present time, it appears that all traditional mental health services, which do not involve direct physical contact with the client, can be provided by telemental health. Telemental health networks are also used for education and training for mental health staff, and to bring consumers and family members together for information and support.

In some situations, telemental health services may be superior to face-to-face services. For example, telemental health allows a psychiatrist to observe a patient close up, without invading his or her personal space. This makes it easier to examine a patient for side effects of psychotropic medications.

Telemental health applications also enhance continuity of care for consumers in rural areas. With telemental health, a "virtual treatment team" can be formed between the community and the inpatient psychiatric facility staffs. Consumers can be followed in the community by the same physician who treats them in the hospital, and family members can be involved in treatment and discharge planning.

Positive Outcomes

Much of what is known about the impact of telemental health comes from the combined experience of staff and consumers who operate and participate in these networks. Though no rigorous outcome studies have been done to date, informal findings suggest that telemental health improves continuity of care for rural consumers, increases family and consumer involvement in treatment, and reduces lengths of stays and readmission rates to state psychiatric facilities. Participant satisfaction surveys reveal that consumers perceive telemental health services as worthwhile, of high quality, and worth continuing.

Organizational Considerations

The introduction of telemedicine into a rural mental health care program requires leadership, vision, and authority. Typically, there is a consortium of member sites, comprised of decision-making personnel, that meets on a regular basis to oversee the development, management, and growth of the network. This group identifies the consumers to be served, designs the clinical system, determines staffing levels, creates informed consent and confidentiality procedures, and researches technological issues. Front-line staff meet to share practical knowledge and suggestions.

Technology Needs

Start-up costs for a telemental health network are becoming more affordable due to decreasing equipment costs, and are therefore now within reach of most rural mental health programs. Indeed, in many cases, providers will find it more cost-effective to join a network than to purchase an automobile to transport mental health consumers to distant service providers. However, the single biggest limitation on the use, expansion, and long term sustainability of telemental health systems is often the ongoing telecommunication costs.

The type of telecommunication service(s) available from telephone companies will dictate network design and cost. In many rural areas, advanced transmission technologies or services, such as Integrated Services Digital Network (ISDN), are not yet available. Also, transmission charges are often more expensive in rural areas because many transmission rates are distance-based.

The more advanced the transmission technology, the greater the bandwidth a telecommunications system will have available. Bandwidth refers to the information-carrying capacity of the telecommunications channel (i.e., the size of the pipeline that carries the video and audio signals). At higher bandwidths, picture and sound are transmitted more quickly and with better quality. Lower bandwidth systems are more affordable, but they create noticeable lags in video and audio transmission that may negatively impact the service applications.

Financing

Ongoing expenses often prove to be a barrier to continued operation of a telemental health network. In response, many programs form alliances to gain a broader base of support, and network members share the costs for equipment, maintenance, personnel, and transmission systems. Federal, State, and private funds, and third-party reimbursement and service contracts, help sustain these vital efforts.

Meeting the Challenge

Telemedicine, and in particular, telemental health networks, have the potential to diminish the disparity of mental health care based on population density characteristics. However, additional funding is needed to support research into the effectiveness of telemental

health programs, and to enable additional areas of the country to benefit from this new tool for mental health service provision.

INTRODUCTION

For mental health care providers and consumers in rural and frontier America, the future is now. Telecommunication technologies have been used for some 40 years in limited mental health interventions, mostly on an experimental basis. Beginning in the 1990s, however, the use of interactive telecommunications technologies moved past the demonstration and experimental phase into routine mental health service integration. It's not an exaggeration to say that one mental health treatment specialist can now be in two or more places at the same time.

Rural Characteristics

Telemedicine, and in particular, telemental health networks, have the potential to diminish the disparity of mental health care based on population density characteristics. Rural and frontier communities typically are the last areas to receive advances in mental health care, such as newer antipsychotic medications or specialized treatment programs.

Funding of the public mental health care system is often based on population size, which limits the amount of money available to develop an adequate continuum of care in less populated areas. Further, psychiatrists are usually located in urban areas, leading to a scarcity of services for people with serious mental illnesses in rural communities.

The use of telecommunication technologies to provide rural mental health services offers the following benefits:

- extending scarce resources into geographic areas of service need,
- improving existing services, and
- creating new services and applications that are unique products of the use of this technology.

Today, not only is it possible to access a mental health care provider located in an urban center, but within a rural and frontier region, a telemental health network can unite groups and organizations that have common goals and interests. These networks can be used to attract additional resources from outside the region, as well as to expand the boundaries of the rural/frontier mental health care village.

Key Definitions

Many of the key terms used throughout this report are defined in the Glossary. Several are worth mentioning at this point. In particular, the term "telemedicine" refers to the use of modern telecommunication and information technologies to deliver health care services at a distance. "Telepsychiatry" is the specific application of telemedicine to psychiatry.

A "telemedicine system or network" is an integrated health care network that uses modern telecommunication and information technologies to provide comprehensive health care

services to a specific group. When the system-wide influence of these approaches is considered, the term "telemental health" is used in this report.

Telemental health has a broader mental health care systems meaning, and includes non-clinical applications, such as family and consumer support meetings, civil commitment hearings, case conferences, and prevention and education. A telemental health system uses interactive telecommunication technologies to integrate, within a region, a comprehensive array of mental health care services of related organizations.

National Telemental Health Leaders

The number of telemedicine programs has grown from only nine in 1993 to over 100 in 1997. Almost all telemedicine programs provide mental health services. In 1996, these services accounted for nearly a quarter of all telemedicine consultations or sessions conducted.

This report was produced primarily from the collective experiences of seven of the most active telemental health projects in the nation. These projects are the Appal-Link Network of Virginia, The Menninger Center for Telepsychiatry (Kansas), the Eastern Montana Telemedicine Network, the University of Kansas Medical Center Telemedicine Services, RODEO NET (Oregon), VideoLink of St. Peter's (Montana), and the Northern Arizona Regional Behavioral Health Authority. These seven projects carried out approximately 70% of all of the clinician/patient telemental health service contacts reported by the 50 most active telemedicine projects in 1996.

The Summary Report

This summary report explores, in brief, the applications, accomplishments, and benefits of telemental health systems, particularly as they impact service delivery to people with serious mental illnesses in rural and frontier areas. The summary addresses (1) the history of telepsychiatry/telemental health and recent developments; (2) mental health services that are, or could be, provided with interactive telecommunications; (3) selected client and service system outcomes of telemental health services; and (4) organizational, technological, and financial considerations involved in establishing a telemental health system.

Full Text Report

Readers who would like to explore this topic in more detail are referred to the full report *Telemental Health: Delivering Mental Health Care at a Distance – A Guide for Rural Communities*, which is available from the Office for the Advancement of Telehealth, HRSA. *(An updated Summary Report will be available Spring of 2002.)*

SECTION I

History and Recent Developments

For the past 40 years, telemental health projects have increased access to needed services for consumers in rural and remote regions of this country. Though early telemental health efforts used less advanced technologies and had limited applications, these projects paved the way for later advancements by establishing several important principles.

History

The first documented use of telecommunications technology to provide health care at a distance occurred in 1920 at Haukeland Hospital in Norway, where radio links were established to provide health care support services to ships at sea. It wasn't until the 1950s, however, under the pioneering efforts of Dr. Cecil Wittson and his staff at the Nebraska Psychiatric Institute (NPI), that telemedicine was used in the field of mental health.

The technology used by these early projects would be considered primitive by today's standards. The University of Nebraska designed a simple one-way closed circuit system using small black and white televisions for lectures and instructional purposes. More than 1,000 students at the Medical College of Nebraska received instruction via this network in the 1954-55 academic year.

The following year, the National Institute of Mental Health (NIMH) funded an interactive audio link connecting Nebraska Psychiatric Institute to seven hospitals in Nebraska, Iowa, and North and South Dakota. The Institute broadcast its weekly visiting lecturer series to the rest of the network and participants could ask questions to the lecturer in Omaha, allowing audience interaction with the site of origin for the first time.

With continued Federal funding, the University of Nebraska program expanded throughout the late 1950s and 1960s. Milestones included the first audio-visual interactive system in 1959, and the use of microwave technology to open a link in 1964 with Norfolk State Hospital, which was 112 miles away. This latter development meant that picture and sound could originate from multiple locations at either site. In the late 1960s, the Nebraska project linked the Veteran's Administration hospitals in Omaha, Lincoln, and Grand Island into the existing network.

In 1968, NIMH funded a project to develop a closed circuit link using two microwave relay stations between the Department of Psychiatry at Dartmouth Medical School and a rural hospital in Claremont, New Hampshire. The technology allowed for timely mental health consultation without moving the patient from his or her home environment. Also, for the first time highly trained technicians were not needed. Program staff, with limited technical training, could now operate these more "user-friendly" systems, eliminating the problem of down time due to technical difficulties.

In 1968, Dr. Thomas Dwyer expanded an existing telemedicine project at Massachusetts General Hospital to provide emergency psychiatric consults to staff at Logan Airport Medical Station in Boston, some 2.7 miles away. This project used a bi-directional television transmission system equipped with remote camera control that allowed the consulting psychiatrist at the hospital to pan, zoom, and focus the camera located at the remote site.

This capability helped psychiatrists observe physical and emotional nuances without invading an individiual's personal space (Baer, Cukor and Coyle, 1997). In particular, doctors reported that communication with adolescents, children, and certain patients with schizophrenia was easier than the conventional face-to-face interview process. For the first time, the technology was said to be more effective with these groups than the established "best practice" model.

Lessons Learned

Several important lessons emerged from the early telepsychiatry projects. Most important, consumers and physicians found the new technology both useful and comfortable.

Further, these early projects tested some new applications that were found to be effective, such as psychiatric evaluations, family member visitations, and pre-discharge planning. They also addressed potential roadblocks to widespread acceptance of telepsychiatry, including initial hesitancy of staff members to use the technology, technical problems such as sound pick-up and camera operations in larger groups, and the high costs of equipment and transmission time.

Without continued external funding, however, these projects could not maintain the high costs of transmission and network support expenses. When Federal funding for these projects ended by the early 1970s, and third-party reimbursement options were not available, the programs were forced to close.

Recent Developments

The inauguration of telemedicine's third generation began in the late 1980s. Renewed Federal funding, the rapid advancement of telecommunication and computer technologies, and the introduction of managed care created opportunities to further investigate potential applications of this still-emerging technology. Seven current projects, and their key components, are outlined below.

Current Projects

Oregon's RODEO NET. The first of these third generation projects in the field of mental health was Oregon's RODEO NET. The Eastern Oregon Human Services Consortium in La Grande received a three-year Rural Health Outreach grant in 1991 from the Federal Office of Rural Health Policy (ORHP), Health Resources and Services Administration (HRSA), DHHS. The grant enabled the Consortium to use a new statewide telecommunications system (Oregon

ED-NET)--which offered the capability of video-conferencing via satellite and dial-up access to the Internet--for the delivery of mental health services, training, and information. By providing scheduling, protocols, procedures, evaluation and training, RODEO Net became the interface for providers to make use of the systems of the Oregon ED-NET.

Because there are many locations throughout Oregon with limited telephone transmission technology and access to the satellite network, RODEO NET broadened its reach by incorporating a mixture of satellite, microwave, and POTS (plain old telephone service)-based technologies. By using this combination of technologies, RODEO NET has been able to expand its services, which include psychiatric consultation, case management, and medication management, to a larger number of rural Oregonians.

The University of Kansas and the Menninger Center for Telepsychiatry. A study of rural health care needs at the University of Kansas Medical Center led to the implementation in 1992 of a state-wide interactive telemedicine network providing clinical and educational services for residents throughout the state of Kansas. Residents at more than 20 sites throughout Kansas--from group homes to hospitals and jails--have access to more than 200 specialists at the Medical Center.

The Menninger Center for Telepsychiatry in Topeka provides specialty consultation services via this interactive network and manages the adult and child/adolescent units at Providence Medical Center in Kansas City, Kansas, some 80 miles from the Menninger campus. The Menninger Center is also involved in distance learning and continuing education to other psychiatric and medical facilities across the nation.

The Eastern Montana Telemedicine Network. The Eastern Montana Telemedicine Network (EMTN) began as a cooperative effort among health care providers to research the potential of using two-way, interactive video conferencing technology to provide medical and mental health services throughout their region. Begun in 1993, EMTN has continued to expand its 11-site network providing a variety of clinical, educational, administrative, and community development services to the region.

A grant from the U.S. Department of Agriculture's Rural Electrification Administration (REA), now the Rural Utilities Service (RUS), funded the equipment for the original five sites. A three-year Rural Telemedicine grant in 1994 from the Federal Office of Rural Health Policy, HRSA allowed EMTN to expand. Telemental health services are the leading medical application from a wide array of other specialty areas that make EMTN one of the more comprehensive networks in the nation.

Northern Arizona Regional Behavioral Health Authority. In 1996, the Northern Arizona Regional Behavioral Health Authority (NARBHA) received funding from the Arizona Department of Health Services to develop a telemedicine system to enhance the delivery of behavioral health services throughout northern Arizona. NARBHA contracts with a network of community-based agencies that provide behavioral health services to adults, children, families, and people with serious mental illnesses in a 62,000-square-mile rural area with a population of 440,000.

The system, NARBHA NET, uses advanced technology capable of delivering two-way interactive video and audio, tape recordings, and numerous computer applications. Twelve video conferencing sites, including the Arizona State Hospital in Phoenix, participate, with at least four additional sites planned.

Video Link of St. Peter's (Montana). In 1994, the Federal Office of Rural Health Policy awarded a three-year Rural Health Outreach grant to St. Peter's Hospital Foundation in Helena, Montana, to develop an interactive telecommunications system within the region. VideoLink of St. Peter's (formerly Southwest Montana Telepsychiatry Network) serves a 12-county, 28,509-square-mile area with a population of 190,000. The service area has a population to psychiatrist ratio of 30,000 to 1.

VideoLink uses two-way, interactive compressed video technology within the project's six-site network, which includes Montana State Hospital in Warm Springs and Montana Developmental Center in Boulder. Collaboration with other existing networks has expanded access to 25 communities in Montana.

The Appal-Link Network (Virginia). The Appal-Link Network was created to improve access to psychiatric care in rural and remote areas of southwest Virginia. Funded as a three-year Rural Health Outreach demonstration project by the Federal Office of Rural Health Policy, Appal-Link began operations in 1995. Appal-Link is the first telepsychiatry network in Virginia and one of only six telemedicine networks in the nation dedicated exclusively to testing telecommunications technology to deliver mental health services at a distance.

Originally, the program served clients of the Cumberland Mountain Community Services Board in Cedar Bluff who were hospitalized at the Southwest Virginia Mental Health Institute in Marion. Within two years, all of the community service boards in the Institute's service area joined the network. The telemental health system uses compressed video and audio transmission over high-speed, enhanced telephone lines.

Increased Access to Mental Health Services

Though each telemental health project was developed to meet the specific needs of its area, they all were created to address a lack of mental health services, in general, and psychiatric care, in particular, to rural areas. Some, such as the Kansas University Medical Center and the Eastern Montana Telemedicine Network, offer a wide range of medical services, with telemental health being the primary application. Others, like Video-Link of St. Peter's and Appal-Link, are dedicated to mental health services and were developed to reach underserved populations.

A Full Range of Services. The range of mental health services provided to rural consumers over a telemental health network is virtually limitless and includes all of the same services that can be provided in-person. These include the following (see the next section for a more complete description):

- patient evaluations,

- case management,
- medication management,
- crisis response,
- pre-admission and pre-discharge planning,
- treatment planning,
- individual and group therapy,
- family therapy,
- mental status evaluations,
- court commitment hearings,
- case conferences,
- family visits,
- family and consumer support groups,
- staff training, and
- administrative activities.

Substantial Benefits. The benefits of telemental health programs are substantial. Many patients in remote regions, who are now being seen via a network, would otherwise have gone unserved, or they would have had to leave their home communities to receive care, often at great cost to themselves or their families.

In addition, telemental health networks provide continuity of care for rural clients by allowing the community treatment team to monitor their progress in the hospital and to be involved in discharge planning. Also, the same psychiatrist who treats the patient while hospitalized can more effectively monitor his or her medication in the community.

Telemental health networks have enabled family members to speak with and see their loved ones who are receiving treatment in distant locations and to participate in treatment planning. Families also provide valuable support to one another over a telemental health network, creating a "virtual support group."

A Wide Range of Applications

Telemental health networks have enormous potential to provide a wide range of mental health services, provider education, and administrative functions. The next section outlines services that are, or can be, provided to rural areas using interactive telecommunications technology.

SECTION II

Telemental Health Services

Telecommunication technologies have the potential not only to extend scarce mental health services into geographic areas of need, but also to improve existing service delivery and to create programs and services that meet unique needs. Telemental health also has broad application as an education and training tool and as a way to bring special interest groups together for information and support. This section highlights a broad array of services that are, or could be, delivered to rural areas using modern telecommunication and information tools.

Traditional Mental Health Services

The types of telemental health services most frequently provided are those that replicate traditional mental health care. When scarce mental health care is delivered into remote areas of need, telemental health is "the next best thing to being there." In some situations, telemental health may be superior to face-to-face contact.

For example, telemental health allows a psychiatrist to observe a patient close up, without invading his or her personal space. This makes it easier to examine a patient for side effects of psychotropic medications. Also, in clinical interventions that focus on confronting an individual's destructive behaviors, or on revealing past abuse, telemental health creates a comfort zone for some consumers.

There is no mental health service currently being offered face-to-face that can't be delivered via telemental health. Some specific examples follow. However, like traditional mental health services, telemental health services may not be effective for every consumer. For example, a consumer with serious mental illness such as paranoid delusions focused on electronic monitoring, will need to be observed closely for his/her reaction to the use of this new tool.

Intake and Assessment

Professional staff at distant service locations can use a telemental health network to take social histories, conduct mental status examinations, and determine an individual's eligibility for ongoing services. The individual need only travel to a local site connected to the network.

Psychotherapy and Counseling

Rural service sites that do not have local therapists available can offer individual, marital, family, and group psychotherapy and counseling over a telemental health network. This is especially useful when individuals need a therapist who serves special needs, such as those of adult survivors of childhood sexual abuse or Vietnam veterans.

Crisis Intervention

Telemental health can bring the psychiatric emergency room to the consumer. A rural mental health consumer in crisis can be examined by a distant psychiatrist over a telemental health network. The psychiatrist can assess the need for medication changes and inpatient care. Community mental health staff and family members can participate, as well.

Medication Management

Telemental health has enormous potential in the area of medication management. Most notably, the same psychiatrist who treats an individual as an inpatient, or initially on an in-person outpatient basis, can provide long-term follow-up in the client's home community. The ongoing psychiatrist/consumer bond, maintained through telemental health, can eliminate unnecessary medication changes, reduce the need for readmission, and shorten the length of inpatient stays. Also, the treating psychiatrist can monitor a client's use of a new atypical antipsychotic medication, thereby ensuring equal access in rural areas to the most effective treatments.

Finally, telemental health extends the service range of nurse practitioners, physician assistants, and psychiatric clinical nurse specialists who serve rural areas and practice in consultation with psychiatrists to provide medication review clinics and manage difficult cases.

Tele-EAP Services

The Eastern Montana Telemedicine Network at the Deaconess Billings Clinic has contracted to provide an Employee Assistance Program to personnel of one of the network's participating hospitals. Strict policies govern confidentiality for counseling sessions. Tele-EAP services to private businesses and industries may be a potential source of revenue for telemental health networks.

Enhanced Service Delivery

Telemental health applications can also improve existing service delivery by enhancing continuity of care for consumers in rural and remote areas. With telemental health, a "virtual treatment team" is formed between the community and inpatient psychiatric facility staffs. Community and hospital staffs meet more frequently, have a closer working relationship, and understand the resources and limitations of each system. Family members can be involved in every step of the treatment and discharge planning process.

In addition, such collateral services as vocational rehabilitation, social services, and health care can be provided as part of a consumer's overall case management plan. Community providers can begin working with consumers even while they are hospitalized.

Telemental health can also support individuals living at home and in community residential programs. Some specific examples follow.

Family Visits

Telemental health removes cost and travel barriers for rural families. Family members can visit their loved ones who are hospitalized and make plans for their return home. These personal visits take place outside of more formal treatment and discharge planning conferences.

In-Home Services

The Menninger Center for Telepsychiatry in Kansas is using low-cost, "plain old telephone service" (POTS)-based video conferencing technology to provide medication management and case management services directly into the homes of people with serious mental illnesses. Daily "tele-home visits" help these individuals remain independent and avoid group home settings.

Programs of Assertive Community Treatment (PACT)

The PACT model of intensive, wrap-around community services for people with serious mental illnesses is in the forefront of many advanced mental health service systems. Central State Hospital in Petersburg, Virginia, and District 19 Community Services are experimenting with the use of telemental health to form a PACT team between community staff and the state psychiatric facility.

Support to Residential Programs/Group Homes

Individuals leaving state hospitals after many years may be difficult to place in private residential facilities. Locating telecommunications technology in a community home (e.g., a group home) provides round-the-clock support from staff at the inpatient facility and training and continuing education for the community-based staff. Ultimately, this allows the consumer to remain in the community.

Commitment Hearings

All states have involuntary commitment statutes that allow them to detain people with serious mental illnesses believed to be a danger to themselves or others. In rural areas, this often means that an individual has to be transported to a distant psychiatric facility for temporary detention pending a civil commitment hearing. The hearing may be held at the facility, or the patient may be returned to the local community for the commitment proceedings.

With the use of telemental health, a commitment hearing can take place over the network. The judge can either be at the distant facility, when there is no judge available in the community, or located in the community when state laws so require. Community staff, family members, and other necessary participants are able to participate in the commitment hearing.

Specialized Services

Specialized services are expensive to provide in rural areas to small numbers of individuals. However, using telemental health networks, providers can more economically offer a wide range of specialty services, such as forensic status evaluations, to rural clients. Programs for special needs include those featured below.

Services for Consumers Who Are Deaf and Hard-of-Hearing

The Appal-Link Network in Virginia provides interpreting services and case consultation to people with serious mental illnesses who are deaf and hard-of-hearing. Also, community staff receive training in how to work with these individuals. Previously, the specialist who provides these services covered an area of 15,000 square miles in her car.

Psychiatric Services to Rural Nursing Homes

By some estimates, as many as 70% of nursing home residents have a psychiatric disorder. Many of these patients are diagnosed with dementia, or with dementia concurrent with depression. By providing specialty psychiatric services via telemental health systems, the Menninger Center for Telepsychiatry in Kansas helps nursing home staff provide early intervention for behavioral problems, closer medication management, and continuity of care between inpatient and outpatient settings.

Services to Individuals with Mental Retardation

Many states still maintain residential institutions for long-term care of people with severe and profound mental retardation. As these facilities begin to downsize, telemental health systems can help facility staff, community providers, and family members plan for an individual's successful return home.

Substance Abuse Services

A regional substance abuse detoxification and residential treatment program (The Laurels of Southwest Virginia) screens potential individuals for admission over the Appal-Link Network. The program also uses the network to conduct treatment and discharge planning conferences, relapse prevention programs, and civil commitment hearings.

Services to Infants and Children with Special Needs

In rural and frontier areas, children with developmental delays and their parents have to travel great distances to consult with physical and occupational therapists, neurologists, and pediatricians. Telemedicine networks enable these services to be delivered to network sites closer to a family's home community. Programs in Iowa, Texas, Georgia and Missouri are currently providing services using such networks. Also, when a child has to be hospitalized

away from home, parents can visit by using a portable, video-conferencing system in the child's hospital room.

School-Based Telemental Health

Two telemedicine programs -- East Carolina University and the University of Kentucky -- have established rural school-based telehealth programs, and the University of Kansas Medical Center has established an inner-city school-based telehealth program. These programs enable children in medically underserved areas to access health and mental health services from the school nurse's office. In Kansas, Kansas Medicaid and Blue Cross/Blue Shield reimburse for services provided in the Tele-Kidcare program.

Education, Prevention, and Training

In addition to traditional and specialized mental health services, telemental health has broad application in the areas of education, prevention, and staff training. For example:

- Education and prevention programs on such topics as fetal alcohol syndrome, AIDS awareness, or parenting can be presented by an educator at a central location to one or more sites in the network. Interactive technology allows the audience to participate in the program.

- Graduate and specialized training courses, and continuing education programs, can be provided by distant universities or large medical centers. Often, universities are willing to pay the network usage expense in order to broaden their student market. In Montana, VideoLink of St. Peters provided a psychiatric nursing continuing education program to over 100 participants at 13 different sites simultaneously.

- Professionals preparing for state certification or licensure can be supervised by a distant clinician. The Eastern Montana Telemedicine Network provides supervision of Ph.D. candidates over the network. At the University of North Carolina, social work students living in distant rural communities receive field placement supervision.

Group Meetings and Support

Finally, in areas of the nation where population centers are separated by great distances and travel may be difficult, telemental health networks allow health and consumer interest groups to participate in regional and statewide planning meetings. For example, the Montana State Mental Health Association and the Montana Chapter of the National Alliance for the Mentally Ill hold their meetings via this technology.

Within the Appal-Link Network, 15 support groups have formed for individuals who have a family member with a mental illness. Some of the groups may have only a few members,

but telecommunications technology allows them to form a larger "virtual" group for mutual education, advocacy, and support. In the same way, consumer groups can become part of a larger, common interest community that eliminates geographic barriers.

Evaluating Outcomes

Consumers, providers, and family members all stand to benefit from the use of telecommunications technology to provide needed mental health services in rural areas. The next section examines some client and service system outcomes of this new and promising approach.

SECTION III

Selected System and Client Outcomes

This section highlights some of the key literature on telemental health outcomes, as well as surveys and reports compiled by the seven projects profiled in this summary. Most of these reports are from staff and consumers who are participating in the telemental health projects. The literature, although limited, addresses organizational changes, cost/benefit analyses, and changes in mental health service use as a result of telecommunications technology.

System Outcomes

Staff Relationships

The integration of interactive telecommunication technology into a mental health care system changes established roles and relationship styles among psychiatric hospital staff, community providers, consumers, and family members. These changes are common to most telemental health projects.

In most public mental health systems, professional working relationships between community providers and hospital staff are courteous but superficial, and in some cases strained. Often, neither sector is aware of the other's resources, strengths, and limitations, which leads to duplication of effort, confusion for the consumer and gaps in care.

Telemental health brings staffs closer together. When hospital and community staffs work as colleagues over the network, they become more supportive of one another and more familiar with each other's roles. They are more willing and able to cooperate not only for the success of the telemental health network, but ultimately for the success of individual consumers. Improvements in the mental health service system, and in consumer outcomes, are likely to result.

Continuity of Care

Telemental health networks have clearly demonstrated improvements in continuity of care. Consumers have been followed by the same psychiatrist for more than three years in some projects. Hospital and community providers, as well as family members, are connected in an ongoing, coordinated treatment approach. Some specific examples follow.

Follow-Up Care. More than two thirds of nursing home patients have psychiatric disorders, particularly dementia, and admission to inpatient facilities is common. The Menninger Center for Telepsychiatry in Kansas is exploring the use of telepsychiatry to provide the follow-up care rural nursing home residents need following discharge from Menninger

Center. Preliminary results are promising. The same psychiatrist who cares for the patient in the hospital provides follow-up care in the nursing home via telepsychiatry. Follow-up visits, which may have been few and far between because of the distance involved, are now conducted as needed.

Also, the psychiatrist gets a more accurate picture of the patient's psychiatric condition, which can be negatively affected by the stress of travel between the nursing home and the hospital. Though no formal outcome studies have been done, nursing home staff and psychiatrists believe that telemental health has increased their patients' stability.

Continuity of Service. In rural Virginia, people with serious mental illnesses see general practitioners in the community and facility-based psychiatrists in the hospital. The Appal-Link Network has bridged this fragmented system of care.

More than 400 people with serious mental illnesses who were treated at the Southwestern Virginia Mental Health Institute have maintained contact with hospital psychiatrists over the network. Consumers involved in the telepsychiatry clinic show improved self-esteem, resulting in greater motivation to participate in treatment. They are more likely to keep appointments and take prescribed medication as a result.

Conversely, there are circumstances in which the locus of care is more effective if it remains with the community-based psychiatrist. The telemental health network can work "in reverse" to allow community practitioners to maintain involvement with clients who need to be hospitalized.

Increased Family and Consumer Involvement

Many families living in frontier and rural communities do not have the ability to travel to visit loved ones hospitalized hundreds of miles away. Telemental health services increase the likelihood that individuals will have their family's support during inpatient stays, and that family members will be included in commitment hearings, development of a treatment plan, and discharge planning.

Ongoing Support for Consumers and Families. Consumer and family groups, including local chapters of the National Alliance for the Mentally Ill and the National Mental Health Association, use telemental health services to support one another and to reach out to patients. For example, some consumer groups have used the Appal-Link Network to provide community outreach to hospitalized patients detained on forensic status.

In addition, with a grant from the Southwest Virginia Mental Health Board, the Appal-Link Network connects 15 family support groups in rural Appalachian communities. Family groups from two or more locations hold interactive support group meetings. Seventy-one percent of group members surveyed believe the support they received helped them keep their loved ones out of the hospital.

Client Outcomes

More research needs to be done in the area of client outcomes as a result of telemental health services. However, some earlier studies and current observations indicate that interactive telecommunication technologies can be a reliable assessment tool, have a positive impact on service use, and are well accepted by both consumers and providers.

Validity of Assessment Tools

Two efforts to empirically validate the use of telemental health systems found that these technologies can be reliably used to administer certain psychiatric assessment tools. These studies are reported in the chapter titled "Telepsychiatry: Application of Telemedicine to Psychiatry" by Baer, Cukor and Coyle (1997).

In one of these studies, English investigators administering the Mini-Mental Status Exam to 11 psychiatric patients found a correlation of .89 between video-based and face-to-face conditions. This result was identical to the test-retest reliability for the instrument in the original normative sample.

In the second study, the chapter's authors tested the reliability of two raters in both video-conferencing and live interview sessions (Baer, Cukor, Jenike, Leahy, O'Laughlen and Coyle, 1995). Twenty-six patients with obsessive-compulsive disorder were divided into two groups: 16 participated in face-to-face interviews and 10 took part in video-mediated interviews. Investigators found near perfect reliability in the video sessions on three scales -- the Yale-Brown Obsessive-Compulsive Scale, the Hamilton Depression Scale, and the Hamilton Anxiety Scale.

Reliability as a Function of Bandwidth. An important study of video assessment reliability conducted in the mid-1990s by Zarate addressed two major research questions: whether video assessments of patients with schizophrenia are comparable to live assessments, and whether video quality effects the ability to assess subtle negative symptoms.

Forty-five individuals with schizophrenia were divided into three groups. Fifteen were used to establish reliability for the Brief Psychiatric Rating Scale (BPRS), the Scale for the Assessment of Positive Symptoms (SAPS), and the Scale for the Assessment of Negative Symptoms (SANS). Fifteen individuals were tested at the two different transmission bandwidths. [Bandwidth refers to the size of the pipeline that carries the video and audio signals and at higher bandwidths, picture and sound are transmitted more quickly and with better quality.]

Results of Zarate's study established equal reliability for global severity of schizophrenia and a summary score of positive symptoms among the three assessment methods: in-person, remote 128 kbps video, and remote 384 kbps video. Because positive symptoms of schizophrenia are more tied to verbal cues, they can be more reliably assessed at the slower speeds. However, at the lower bandwidth, negative symptoms of schizophrenia were more difficult to assess.

In a similar vein, an unpublished 1997 study by the Southeastern Rural Mental Health Research Center and the Appal-Link Network addressed reliability of psychiatric assessments at different bandwidths. A high visual dependency measure, the Abnormal Involuntary Movement Scale (AIMS), and a low visual dependency measure, the Brief Symptom Inventory (BSI), were administered to 84 people with serious mental illness, both in-person and using video conferencing. Video-conferencing was done using three different transmission rates (112 kbps, 384 kbps, and 762 kbps).

Results indicate high reliability for the low visual dependency test (BSI) at all transmission rates, but greater reliability for the high visual dependency assessment (AIMS) at higher transmission rates. In fact, the AIMS assessment was actually most reliable when conducted at a distance using the highest bandwidth. That is, it was more reliable when conducted using video-conferencing at 762 kbps than when conducted in-person. This may be explained by the fact that facial and tongue movements can be examined more closely over the video system without violating social space.

Service Use Patterns

Changes in service use by consumers using telemental health care can be measured by frequency of services, types of services received, and the quality or clinical value of these telemental health services as compared to traditional face-to-face services. Though little rigorous research has been done, there are some emerging studies in this area.

VideoLink of St. Peter's in southwest Montana attempted to determine whether telemental health services such as family visits and discharge planning, provided while the individual was hospitalized, reduced lengths of stay at the state psychiatric hospital. Fifteen psychiatric patients with a history of multiple inpatient admissions who participated in interactive sessions were matched with a comparison group of 30 individuals of similar ages, sex, diagnoses, and number of admissions.

The mean length of stay for the telemental health group was shorter than that of the comparison group (58 days compared to 74 days). Though the results were not statistically significant, in part because the experimental group was too small, investigators feel this question warrants further research.

In 1996, the Appal-Link Network of southwest Virginia conducted a retrospective records review of 54 cases to compare service use six months prior to participation in telemental health services to service use during the six months after participation. Results indicate that telemental health clients have more frequent and lengthier contacts with their psychiatrist, which leads to greater stability and medication compliance.

Reviewers looked for possible service changes in five areas: psychosocial rehabilitation, outpatient therapy, case management, medication management, and medication compliance. Psychosocial rehabilitation, outpatient therapy, and case management were all provided face-to-face in the community, while medication management was offered via the network.

Reviewers found a significant increase in the frequency of medication management sessions and a corresponding decrease in face-to-face case management contacts. Consumers took part in fewer than two medication consultations, on average, in the six months prior to using the Appal-Link Network. In the six months after they began using the network, the mean number of medication consultations rose to 7.5.

A separate analysis revealed that the average length of the tele-medication review session is 24 minutes, with a range of 12 to 45 minutes. This compares to 15-to-20-minute sessions conducted face-to-face. Investigators speculate that the hospital-based psychiatrists, who have worked with consumers as in-patients, develop a closer therapeutic relationship that carries over into the telemental health setting. In addition, a hospital-based psychiatrist using video-conferencing may have a smaller number of patients to see than does a traveling community psychiatrist, and is therefore able to participate in lengthier sessions.

Consumer and Provider Satisfaction

There are many reports in the literature of surveys assessing consumer and provider satisfaction with interactive telecommunications approaches. Though such surveys are often seen as questionable research instruments, it is worthwhile to note that every telemental health participant satisfaction survey available reports that consumers perceive these services as beneficial, of high quality, and worth continuing. There appears to be a universally high level of acceptance by both providers and consumers.

For example, VideoLink of St. Peter's asked 878 consumers to rate the project on a scale of 1 to 5, with 5 indicating complete satisfaction. Survey participants gave the system a 4.5 rating for successfully meeting their individual service needs. They rated overall satisfaction of the technology at 4.3.

A sample of 81 consumer satisfaction surveys completed by individuals who use the Appal-Link Network for medication review sessions reveals that all consumers report being "very satisfied" with the service.

The Northern Arizona Regional Behavioral Health Authority (NARBHA) also has conducted client, staff, and family satisfaction surveys, as well as a cost/benefit analysis of the technology. Some of the results are shown below in Table 1.

Table 1
SATISFACTION WITH THE NARBHA NET PROGRAM

Percent of clients who: (n=284)	
Were comfortable with the technology	92%
Believed the treatment they received via the network was as good or better than face-to-face contact	70%
Would use the system again	88%
Believed they would not have received services without the system	76%
Percent of staff who: (n=286)	
Were comfortable with the technology	91%
Would not have been able to attend a meeting without the network	49%
Believed the equipment saved time	83%
Net savings	
Compared to projected staff time and travel costs for the second quarter of 1997	$14,324

Future Research Needs

A growing number of studies and reports validate the usefulness of interactive telecommunication technologies as an important mental health service tool. However, funding is needed to support rigorous research studies.

Some of the questions worth examining include the effect of telemental health services on the average length of inpatient stays, recidivism rates, and length of time in the community between hospitalizations. Though it is clear that consumers are satisfied with this service, research needs to examine what difference telemental health makes in their lives.

Fitting the Pieces Together

Establishing an effective telemental health system requires an understanding of clinical and organizational factors, the technology and costs involved, and how staff are likely to respond. These issues are explored in the final section.

SECTION IV

Establishing a Telemental Health System

The usefulness of telecommunications technology to enhance a mental health care system is in direct relationship to the extent that it is integrated as another tool within the array of service approaches. Ideally, the goal of an effective telemental health network is to have a transparent vehicle--the technology--to carry out the established mental health services mission. This section explores personnel considerations, organizational and clinical characteristics, technology needs, and financing strategies for establishing a successful telemental health care program.

Personnel Considerations

The introduction of telemedicine into a rural mental health care program requires leadership, vision, and authority. Though most mental health professionals already know everything necessary to use telemental health effectively--including the use of television, computer, and telephone technologies--there may be some initial resistance on the part of staff.

In particular, some staff may be anxious about being "on television." Also, because broadcast television is a passive medium, the interactive nature of telecommunications technology may be unfamiliar and uncomfortable at the outset. Allowing staff, consumers, and family members time to experiment with the new technology increases their level of comfort with seeing their image on the screen and participating in a two-way dialogue.

Other staff may fear either increased workloads or staff reductions as a result of the new technology. Their fears can be allayed with the knowledge that this is a new tool to provide established services, not a new field of practice. The equipment enhances staff effectiveness, but it does not replace the need for their involvement.

Fear of outsiders may cause some rural providers to resist, initially, formation of a telemental health network. In particular, they may be apprehensive that the consulting specialists at a large hospital or medical center may be critical of their work, training, and lack of resources. Preliminary face-to-face meetings between local providers and the distant consultants can be used to establish protocols and develop working relationships. In general, rural providers respond to the fact that telecommunication technologies can help them support people with serious mental illnesses in their home communities.

Programs that initiate a telemental health network need telehealth proponents in key positions, including technical, service, and administrative staff. Support from the highest levels in the organization is critical. The level of success of remote sites is a direct reflection of the degree of leadership and enthusiasm of the person responsible for that site's inclusion in the network.

Organizational and Clinical Characteristics

The Start-Up Phase

Successful telemental health networks have strong organizational characteristics. In many ways the development of the network is like starting a small business, with the same types of issues involved.

Leadership Consortium. To be successful at this venture, there must be some ongoing, collective group process that oversees the development, management, and growth of the network. For example, many projects establish a consortium, comprised of decision-making personnel from member sites, which meets on a regular basis.

The consortium addresses network management issues, funding, public relations and marketing, service applications, time usage, scheduling conflicts, staff assignments, and troubleshooting of technical or human resource problems. In addition, it monitors the progress of new sites that join the network.

Staff Work Group. A second type of ongoing work group consists of front-line service staff who meet to share practical knowledge and suggestions. In some telemental health networks, this group stimulates development of service applications.

For example, at the Appal-Link Network in southwest Virginia, staff involved in discharge planning meet to discuss scheduling, telepsychiatry clinic referrals, and network usage. This group also trains staff at new sites as they join the network.

Joint Meetings. The consortium and the service groups can hold their meetings over the network. However, for large networks with numerous sites, a so-called "bridged meeting" over the network may be very expensive if every site is included in the teleconference. It may be more economical in some networks, where distances are not too great, for staff to travel to two or three sites that rotate holding the teleconferences.

Schedule Coordinator. A successful telemental health network needs one person responsible for scheduling all activities across the network. Many telemental health programs are part of a larger telemedicine project where medical applications compete with each other, and with remote telemental health sites, for network access. Even within a dedicated mental health network, multiple sites pose scheduling difficulties. Scheduling software programs are now available, some which allow the coordinator to manage a single calendar to which each site has access.

Identifying Consumers

Before the telepsychiatry clinic begins services, the network consortium should identify the specific target population(s). Typically, telemental health services are focused on groups that have no access, or restricted access, to traditional mental health services or for whom travel to

such services is difficult, including children, adults with serious mental illnesses, and elderly individuals.

Some programs restrict services to individuals who are known to them. For example, only consumers who have been treated at the Southwest Virginia Mental Health Institute are followed in the Appal-Link Network's telepsychiatry clinic, and crisis intervention services are restricted to established telepsychiatry consumers. Other networks, such as the Northern Arizona Regional Behavioral Health Authority, work with consumers who may never be seen in person.

The consortium should also develop referral criteria and train staff at all sites to make appropriate admissions to the clinic. These guidelines should be consolidated within the network's telepsychiatry clinic protocol.

System Design

In most telemental health projects, the system design resembles a hub-and-spoke model, often with a regional medical center or state psychiatric hospital serving as the hub and community-based programs as the system's spokes. Much of the information is transmitted from the central site or hub to the community providers. In some projects, spoke sites are also able to directly connect to each other. There is a developing trend toward free-standing sites, capable of connecting to any site within a network or alliance of networks.

Staffing Issues

In addition to the psychiatrist at the hub site, telepsychiatry clinic sessions typically include, at the spoke site, a community mental health staff member who provides case management, information, and support. For example, at the Appal-Link Network, a registered nurse is always present with the consumer to arrange medication orders and to provide vital signs, if warranted. In addition to the nurse, a case manager or mental health therapist may attend the session as needed. This is the same arrangement as traditional face-to-face care.

Although it is technically possible for the psychiatrist to conduct the session with no staff support at the community site, this is not desirable for several reasons. Unpredictable consumer reactions place the equipment at risk. Unknown stresses, which may be revealed during the session, place the consumer at risk. Equipment or transmission failures, though infrequent, can leave the consumer literally cut off from support and in a high state of anxiety. The presence of the community staff provides emotional support to the consumer and essential treatment information.

Informed Consent and Confidentiality

An informed consent process provides information to the potential consumer, and explains the limitations and alternatives to the telepsychiatry service. If the consumer is opposed to the telepsychiatry service, he or she should be offered optional services, even though these

may be less accessible. A consumer satisfaction survey form, to be completed after each session, should also be reviewed with the consumer.

Consumers who are inpatients can be introduced to the technology before they are discharged. This allows them to gain a level of comfort with the technology and to meet community staff who will be part of their treatment team after discharge.

Resolving Confidentiality Concerns. Depending upon the type of video-conferencing transmission technology used, a video-conference may be more private and secure than a telephone call. For example, the coding and compression of analog signals by a codec for transmission as digital data adds a measure of security, as does the use of transmission technologies such as ISDN. Encrypting the signals provides the highest level of security.

To protect confidentiality within a telepsychiatry clinic, rooms should be sound proofed and doors kept closed. Windows, which can expose service participants, should be covered. The audio on the monitor should be adjusted so that speakers at the distant site cannot be heard outside the room. These needs are no different than a face-to-face session.

One area of possible concern is at the "bridge service," which connects multiple meeting sites, typically for administration and training sessions. Some networks may purchase this service from a national telephone company or a contracted systems integrator. The company providing the bridge service can see and record all activity on the network. Providers can require the company that provides the bridge service to sign a written agreement demonstrating their efforts to protect confidentiality.

Network Structure and Alliances

Initially, most telemedicine and telemental health networks have been stand-alone networks, and configured in a hub-and-spoke design. Other networks have been designed to enable connections to a variety of sites within the network, with no one particular site serving as the primary service provider or hub. At some point however, most telemedicine and telemental health networks encounter situations in which they want to connect to specialized providers not in their respective network. When compatibility of equipment and transmission systems permit, these needs can be met by entering into agreements with other established networks or telemedicine sites.

An example of progressive networking, whereby various independent networks collaborate to enhance access to services in a broad region, is the Montana Healthcare Telecommunications Alliance. Members include VideoLink of St. Peter's, the Eastern Montana Telemedicine Network, and METNET, the state's educational network. Currently, 28 communities in Montana are able to connect with one another to support the delivery of mental health care statewide.

Given the high costs of sustaining networks, projects generally seek innovative ways to remain viable, such as forming agreements or alliances to share scarce resources, extend service boundaries, and reduce costs. Some telemental health projects have found that sharing their

telecommunications network with the general medical, educational, human services, and business communities helps sustain the network by creating a broad base of support. This concept has been referred to as creating a "televillage."

Technology Needs

There are as many possible variations of video-conferencing equipment and transmission systems as there are telemental health applications. Telemental health technologies vary based on available resources and technical expertise, as well as on the services to be provided. Some general considerations for all telemental health projects are highlighted below.

The Concept of Presence

The concept of "presence"--the illusion that a mediated experience is real--is at the heart of an interactive telecommunications exchange. Unlike earlier one-way, closed-circuit systems, two-way interaction enhances the concept of presence, making participants feel they are experiencing an in-person encounter. The degree of presence required for a particular service or interaction will help determine the type of equipment and transmission service a program needs.

For example, lower bandwidth systems create noticeable lags in video and audio transmission, causing jerky or blurred video and poor audio which may make participants feel disconnected from one another. However, lower bandwidth systems may still produce an acceptable level of presence for simple conversations between two individuals, particularly when the participants limit their movements.

Higher bandwidth systems, which create a greater degree of presence by responding in "real time" to participants' input, are better suited to applications that include motion or that require close and accurate observation of neurological indicators or subtle changes in affect. Assessing an involuntary movement disorder, for example, requires a higher bandwidth system.

Telecommunications Equipment

Equipment used by telemental health projects varies from inexpensive, low bandwidth desktop systems to large boardroom setups that feature dual monitors. Boardroom systems allow a group of participants to comfortably see and be seen in an interactive meeting.

The cost of these systems also varies from less than $2,000 at the low end to nearly $50,000 at the high end. However, equipment prices have been declining, making it possible to purchase a large monitor desktop system, capable of transmitting at 384 kbps, for about $8000-$10,000.

Indeed, in many cases, a mental health service provider may find it more cost-effective to join a telemental health network than to purchase an automobile to transport mental health consumers to distant service providers. However, like an automobile, telemental health costs go

beyond the initial purchase price. By far, the single biggest limitation on the use and expansion of telemental health is the transmission costs (see below).

Transmission: Being in Two Places at Once

Telecommunications signals are transmitted using a variety of tranmission technologies, including telephone lines (both POTS and fiber optic), microwave, cable and wireless. The type of transmission service available from telephone, cable and cellular phone companies will dictate the network design and cost. The advances in transmission technologies have made the current growth in telemental health networks possible.

More advanced transmission technologies typically have greater bandwidth available and are able to transmit digital signals. For example, an Integrated Services Digital Network (ISDN) is an advanced telephone line-based transmission system that, because it is digital, allows voice, data, and video to be sent over the same line simultaneously. An ISDN circuit is 128 kbps (referred to as a Basic Rate Interface). The greater the number of ISDN circuits available, the higher the bandwidth. ISDN service at 1.544 Mbps is referred to as a Primary Rate Interface (PRI).

A T-1 telephone line circuit carries 24 64-kbps channels [23 for audio, video and data; 1 for signaling and 8kbps for framing] for a total of 1,544 kbps (1.544 Mbps). Generally, high-end boardroom systems are capable of transmitting at a full T-1 bandwidth. A T-1 circuit can either be dedicated, i.e., fixed between two points for full-time operation, or provided as a dial-up service. Although many of the current telemedicine systems in the United States are capable of transmitting at T-1 rates, many transmit at less than a full T-1 (e.g., at 384kbps) for telemedicine sessions.

In many rural areas, advanced transmission technologies such as ISDN services are not yet available. Also, long-distance telephone rates and network transmission charges vary greatly across the country and are frequently more expensive in rural, less populated areas.

Transmission Costs. There are three types of ongoing costs associated with network transmission: the monthly cost of long-distance service access, the varying cost of long-distance service usage, and the cost of bridging service.

For ISDN, monthly access costs can range from $30 per ISDN circuit to as much as $100 per circuit. With ISDN, networks must also pay usage charges, which are typically based on distance and the type of connection. For example, at 384 kbps, rates can vary from $35 to $60 per hour.

For a dedicated long-distance T-1 line, costs can range from $400 to $8,000 a month. However, with this type of service, there is often no usage charge.

Bridging service is necessary to connect three or more sites in a multi-site meeting. Bridging services can be obtained from long-distance telephone companies and private providers, with costs ranging from $45 to $60 per hour per site connected.

Some networks with frequent needs for multi-site conferences choose to purchase their own bridge. However, equipment costs range from $50,000 to $100,000, and staff are required to operate the bridge service during meetings. Networks with only a few monthly multi-site meetings are better off purchasing bridging services.

Bandwidth: More or Less

In telemental health debates, the question frequently arises as to whether it is better to provide services at a lower bandwidth, which some may consider "poorer quality" telemental health care, or to offer no care at all. The advantage of low bandwidth systems is that they can be installed in areas of low technology at affordable cost, thereby providing much needed care to people who had no previous access to services.

Most current telemental health projects have resolved the dilemma of low cost/lower quality versus high cost/higher quality by compromising at a bandwideth mid-point of 384 kbps. In a 1997 survey conducted by the Association of Telemedicine Service Providers, 384 kbps or higher was the bandwidth used for mental health specialties at 11 of 15 projects surveyed.

Interestingly, participants tend to notice a difference in quality between 128 kbps and 384 kbps, but there is a less noticeable difference in quality between 384 kbps and 762 kbps. The cost difference between these three transmission rates is significant, however.

Also, because participants first exposed to video-conferences are used to the full motion transmission of broadcast television, they tend to complain about the poor image quality, even if the transmission is at a moderately high bandwidth of 384 kbps or more. However, continued exposure to video-conferences at any consistent bandwidth tends to train the "mind's eye" to be less aware of distractions.

Technical Support

Most mental health service organizations have little technical experience with the equipment and transmission systems needed to maintain an interactive telecommunications network. Larger medical centers and university-based projects may have staff support to integrate the technology, but smaller rural organizations will need to go outside their agency for equipment and system integration support.

Often, the equipment manufacturer can provide ongoing support; this may be part of the first year's warranty on the equipment. For example, the Appal-Link Network contracts with a "Help Desk" service, provided by a telecommunications systems integrator. The service permits staff from any site to receive immediate technical support. Most importantly, the system integrator can troubleshoot network transmission difficulties. Most often, failure of the network is a telephone company transmission problem rather than an equipment failure.

Beyond the first year, extended warranties can be expensive. To help reduce these costs, the Eastern Montana Telemedicine Network paid a one-time fee to the equipment manufacturer

to train a staff member as a "certified technician." This individual provides technical support for all network sites.

Also, rather than a full-service extended warranty, some networks choose a lower cost "parts replacement, fix it yourself" option. The system integrator for the Appal-Link Network helps network technical staff repair hardware and fix software problems. The Help Desk can dial into the malfunctioning system to troubleshoot problems at a distance.

Financing Strategies

As with the early telemental health efforts described in Section I, ongoing costs continue to be a problem for the current projects profiled in this report. In response to their concerns, a number of projects have developed some innovative funding strategies.

Sharing Resources

The greater the number of users a telemental health system has, the more financially viable it will be. However, less populated areas have fewer potential providers and consumers. In these areas, telemental health networks can increase usage and realize economies of scale by creating alliances that broaden the base of participating organizations and applications.

Sharing network expenses is another common way to sustain a telemental health network. Network members have greater purchasing power when they share costs for equipment, maintenance, personnel, and network transmission. Transmission expenses for monthly recurring access, usage, and bridging service can be prorated based on each site's monthly activity. Even smaller agencies with infrequent needs may be willing to share in the network's operating expenses to obtain needed services.

Federal and State Support

Federal and State funds have been critical in initiating telemental health networks and State funds have been critical in sustaining them. Almost all telemental health networks were developed with Federal grant funding. Between 1994 and 1997, a total of 191 telemedicine projects received $110.5 million from seven agencies. Three of these--the Office of Rural Health Policy, HRSA, DHHS, the National Library of Medicine, NIH, DHHS, and the Rural Utilities Service, USDA--provided $70 million to 163 projects, many of which included mental health services as a primary application.

A new telecommunications subsidy program, the Universal Service Program for Rural Health Providers, will be critical to sustaining telemental health networks. Under the Telecommunications Act of 1996, Universal Service telecommunication provisions were extended to include advanced telecommunication services, and special provisions were made for public and non-profit rural health providers. Under these latter provisions, public and non-profit rural health providers are eligible for subsidized telecommunication services up to 1.544 Mbps.

The subsidy or discount a rural provider receives is the difference between what it must pay for a telecommunication service and the cost of the service in the nearest urban areas.

Once a network has been established and demonstrates successful outcomes and benefits, state departments of mental health may be willing to help support and expand the telemental health network. In addition, special taxes or awards from state lotteries or other programs may be available. For example, the Northern Arizona Regional Behavioral Health Authority's (NARBHA) telepsychiatry project is funded in large part through an allocation of state tobacco tax revenues. Other telemedicine projects, such as in Georgia, were funded by a return of telephone company overcharges.

Third-Party Payments

In some states, such as Montana, Virginia, and Kansas, Medicaid reimburses for telepsychiatry services. This may be a significant source of revenue depending on the number of Medicaid consumers served and the specific types of services covered.

Managed care systems also provide opportunities for coverage of services or third-party payments. For example, in the mid-1990s, RODEO NET of Oregon entered into contracts with Greater Oregon Behavioral Health, Inc. (GOBHI), a private, nonprofit managed behavioral health care organization, and with the Eastern Oregon Human Services Consortium. Under these arrangements, mental health providers may pay for services rendered to GOBHI or consortium clients via the network from the previously established capitation rate. Both GOBHI and the consortium pay for the transmission costs associated with the delivery of these services. Network costs associated with service provision are also part of the negotiated capitation rate for NARBHA NET providers.

Combined Funding Sources

Telemental health projects often must rely on multiple funding streams. For example, multi-source funding has allowed the Eastern Montana Telemedicine Network (EMTN) to plan for organized growth. In addition to two Federal grants, a private foundation funded the site that serves as the project hub. By working collaboratively with third-party payers in Montana, EMTN was one of the first telemedicine networks in the nation to receive reimbursement from both public and private payers.

Meeting the Challenges

The challenges, and the rewards, of establishing a telemental health system are great. When rural health care providers come together--sharing ideas, resources, and needs--consumers reap significant benefits. Some of the key points discussed throughout this report are highlighted in the conclusion.

CONCLUSION

The future of mental health care is now in rural and frontier America. Interactive telecommunication technologies make it possible for mental health providers to literally be in two places at once, extending scarce resources to individuals, and to entire regions, that are medically underserved. Without these technologies, mental health consumers in rural communities would have to leave home to receive care, or they might not receive services at all.

The range of mental health services provided to rural consumers over a telemental health network is virtually limitless and includes all of the same services that can be provided in person. Telemental health also has broad application as an education and training tool for mental health staff, and as a way to bring special interest groups, including consumers and family members, together for information and support.

Though no rigorous outcome studies have been done to date, practitioner experience and findings from program evaluations suggest that telemental health improves continuity of care for rural consumers, increases family and consumer involvement in treatment, and reduces lengths of stays and re-admission rates to state psychiatric facilities. Participant satisfaction surveys reveal that consumers perceive telemental health services as worthwhile, of high quality, and worth continuing.

Initial start-up costs of a telemental health network are becoming within reach of more programs, but ongoing expenses, such as telecommunication costs, often prove to be a barrier to long-term network sustainability. To enhance sustainability, programs form alliances to gain a broader base of support, and network members share the costs for equipment, maintenance, personnel, and transmission systems. Federal, State, and private funds, and third-party reimbursement and mental health service contracts, help sustain these vital efforts.

Telemedicine, and in particular, telemental health networks, have the potential to diminish the disparity of mental health care based on population density characteristics. Sound telehealth policies are needed at the Federal, State, and local level to foster the deployment of these technologies and ensure the quality of care provided using them. In addition, more funding is needed to support research into the effectiveness of telemental health programs and to enable underserved areas of the country to benefit from this new tool for mental health service provision.

FULL REPORT: The full text of the report from which this summary is drawn - *Telemental Health: Delivering Mental Health Care at a Distance – A Guide for Rural Communities*, includes additional details and examples from the seven participating telemental health projects. It is available from the Center for Mental Health Services, SAMHSA and the Office for the Advancement of Telehealth, HRSA.

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GLOSSARY

The following is a list of terms with which individuals involved in an interactive telecommunications network should be familiar, whether they are involved in telemedicine, telemental health or distance education.

Algorithm
A mathematically based software program used to compress large volumes of video and audio data, in order to maximize the effectiveness of lower bandwidth telecommunication systems. These have made modern telephone-line based interactive telemedicine networks possible. Within the past five years, telecommunication equipment manufacturers have standardized algorithms, thereby enabling different telemedicine systems to "talk to each other" or engage in videoconferencing.

Analog
A means of transmitting sound or pictures as an electrical wave of the original signal. It is represented by continuous wave forms that vary in size and number as the source of information varies.

Analog Communication
An older form of information transmission in which information is transmitted by modulating a continuous signal, such as a sound wave. Current TV and radio signals are analog-based, as are most video cameras and telephones. These require some type of conversion device to communicate with digital-based systems, such as computers.

Bandwidth
A measure of the information carrying capacity of a communications channel. The higher the bandwidth (i.e., the larger the pipe), the greater the amount of information or data which can be transmitted in a measured time period. Bandwidth is usually measured in kilobits or megabits per second (kbps or Mbps). Higher levels of bandwidth allow more video and audio data to be transmitted quickly enough to capture movement with less "jerkiness."

Basic Rate Interface (BRI ISDN circuits)
A 128 kbps digital telephone line circuit, using two 64 kbps channels. A 384 kbps bandwidth can be obtained by combining three BRI circuits. See also ISDN and PRI.

Bit
Stands for binary digit. A bit is the smallest unit of information making up a character or a word in digital code and is represented as either "on" or "off" ("0" or "1"). It is the smallest unit of information a computer can use. A group of eight bits is a byte. Bits are often used to measure the speed of digital transmission systems.

Boardroom Videoconferencing System
A full feature system with large, usually dual monitors and multiple microphones, allowing groups to comfortably engage in a videoconference. These are the "Cadillac" of

videoconferencing systems, and maybe either built into the room, or mounted in large cabinets to roll (with difficulty) to other rooms. These are the most experience systems. See Desk Top System.

Bridge
A multi-point control device that is used to interconnect three or more telecommunication channels such as telephone lines, to permit simultaneous, two-way audio or two-way audio and video communication among all points which have been interconnected. Usually too expensive for a small network to operate, bridging services can be obtained through long distance telephone companies and system integrators. Every network will have a need for multipoint meetings at some time.

CODEC (also referred to as Coder/Decoder)
An electrical device consisting of a computer and software which converts an analog electrical signal into a digital format for compression and transmission. The compressed digital signal can be transmitted over telephone lines at lower bandwidths with less loss of information. A similar CODEC at the receiving site decompresses the signal and converts it back to analog format.

Dedicated Network
A network that uses telephone lines reserved exclusively for the network and which are available 24 hours a day. The lines may range from a fraction of a T-1 to a full T-1. There is a monthly access charge, which may range from $400 to $8,000/month, but generally no usage charge. Some telemedicine networks must utilize such lines because dial-up telephone technology, such as ISDN, is not available in their area.

Desktop Videoconferencing System
Using a desktop personal computer and video-conferencing software, these systems use computer monitors to provide high quality video-conferencing. These systems are now capable of 384 Kbps transmission and are "best buys" for the money. Like automobiles, video-conferencing systems run from the ornate to the basic. The service needs and financial support of the network dictate the equipment needed.

Dial-Up Network
Sometimes referred to as a switched access dial-up network. Charges for usage are like a long distance telephone call, with only the time used charged. Charges are based on the length of the connection and the number of channels used, in contrast to a dedicated network where there is a fixed monthly cost, but no usage charges. ISDN connections are dial-up.

Digital
Discrete signals such as those represented by means of bits (which are either "on" or "off"), as opposed to continuously variable analog signals. Used in both electronic and light-based systems, digital signals transmit audio, video and data as bits.

Digital Communication and Technology
Digital communication is a communications format, used with electronic and light-based systems, that transmits audio, video, and data as bits ("1's" and "0's") of information. Digital

technology mathematically manipulates, compresses and packages these bits or communication signals for more efficient, faster transmission. The packaging enables the signals to be transmitted with other digital signals over the same data stream and then software programs detect and sort out the coded bundles at the receiving end for display.

IMUX or Inverse Multiplexer
A device which receives and combines a stream of data coming in from multiple telephone circuits into a single channel of data. The opposite of a MUX or Multiplexer. Usually these devices are combined into one unit to accomplish either task as needed.

ISDN
Integrated Services Digital Network. A digital telecommunications channel that allows voice, video and data to be sent over the same line simultaneously and allows for higher bandwidth transmission that plain old telephone service (POTS). ISDN uses existing phone lines, but requires specialized equipment at both ends. A typical ISDN telephone circuit, referred to as a Basic Rate Interface (BRI) provides 128 Kbps, using two 64 Kbps channels. A Primary Rate Interface (PRI) using 12 circuits can deliver 1,544 Kbps, the equivalent of a T-1 circuit.

ITV
Interactive Television or also may refer to Interactive Telecommunications.

Kbps
Kilobits per second. A measure of bandwidth in thousands of bits per second. The most frequently used bandwidth in telemental health networks is 384 Kbps.

LATA
Local Access and Transport Area. The local access telephone exchange area, within which telephone calls are not long distance. Once an ITV network has to cross LATA's to connect to a desired site the usage rates for these connections increases significantly.

Mbps
Megabits per second. A measure of bandwidth in millions of bits per second. In the case of telemental health networks, which involves what is commonly referred to as "talking heads" any transmission rate higher than 384 Kbps is considered high. Network transmission expenses are exponentially directly related to bandwidth

Multi-point Control Unit or MCU
Commonly referred to as a "Bridge." This devise allows more than two sites to be electronically connected in a "multi-point meeting." See
Bridge.

Multi-point Videoconference
An interactive videoconference of three or more sites, usually arranged by a bridging service. These meetings are often audio switched – i.e., the site with the speaking person is seen by all participating sites. Switching is very quickly performed. Multi-point video-conference meetings can be very productive and save travel time.

POTS Plain Old Telephone Service. The common analog based public telephone system, which allows slow speed data transmission up 33.6 kbps.

Telemedicine Network
Typically, an integrated regional health care system or network, providing an array of health services at a distance using advanced telecommunication technologies.

Telemental Health Network
An integrated regional mental health care system, aligned through interactive telecommunications technology. These networks distribute scarce mental health resources into areas of personnel shortage, while integrating service components into a more connected system of care.

Telepsychiatry
The application of telemedicine to psychiatry. In this report, telepsychiatry refers to clinical applications and interventions, such as "the telepsychiatry clinic" which reviews the patient's mental status and medication needs. Telemental health refers to broader mental health system applications. Other terms being used for telecommunications applications within the field include "telebehavioral health" and "telehealth." Generally, the preferred term depends on the setting and the professional involved. The processes and effects are the same, regardless of the name.