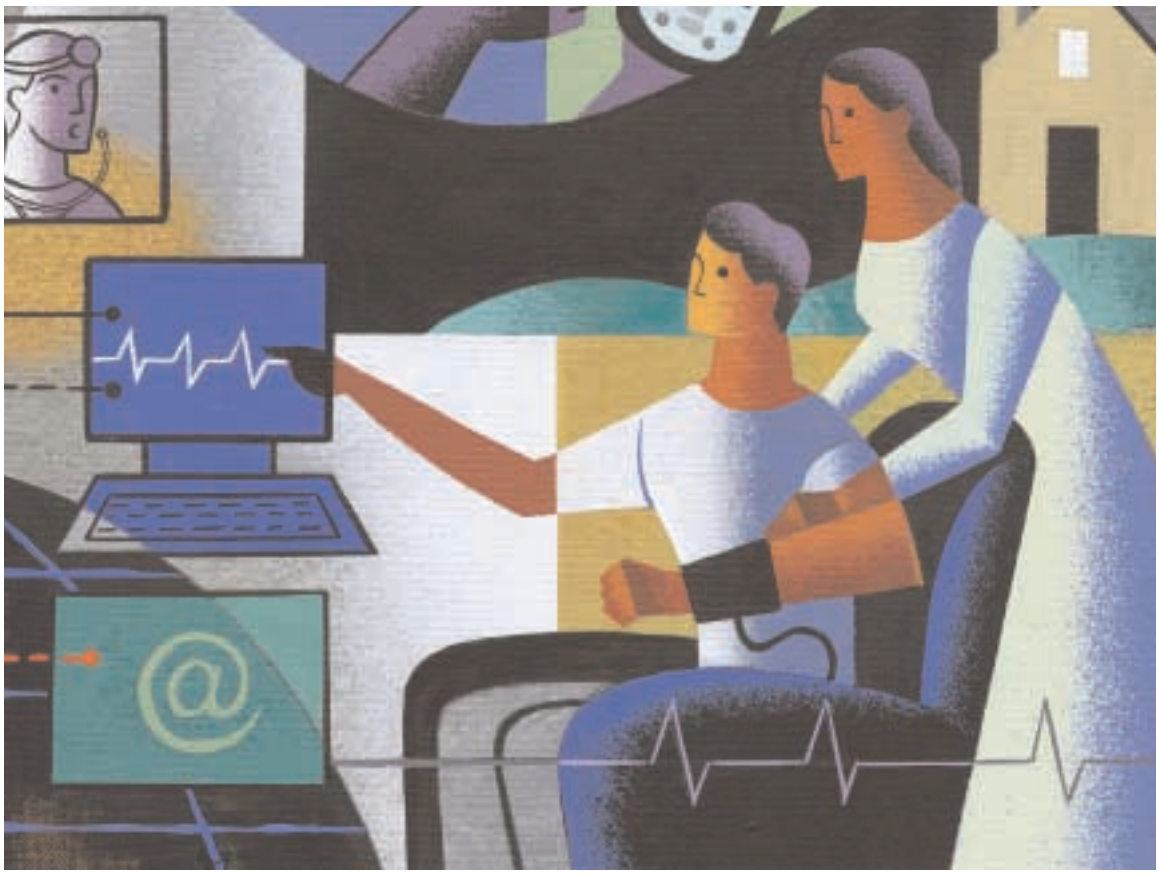
California HealthCare Foundation



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# Rural Health Care Delivery: Connecting Communities Through Technology

Prepared by First Consulting Group
December 2002

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This report was prepared by Jane Metzger and Fran Turisco of **First Consulting Group.** First Consulting Group is a leading provider of consulting, technology, and outsourcing services for health care, pharmaceutical, and other life sciences organizations in North America and Europe. More information about FCG is available at **www.fcg.com.**

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# Contents

# Executive Summary

FOR THE PAST 20 YEARS, HIGHLY PUBLICIZED telemedicine programs used video teleconferencing equipment to address the problems of distance and resource scarcity associated with rural areas. These grant-funded programs flourished during the demonstration period but then struggled after the initial funding ran out. Today, innovations in technology, connectivity, and financing are lowering the barriers for implementing technology solutions that improve care delivery in rural communities.

With the growing usage of PCs and the Internet by providers and patients, programs are increasingly being developed to support remote diagnosis, care delivery, and communication, as well as provider education. These technology tools are faster, smaller, and cheaper, with more effective connectivity options, than earlier products.

At the same time, the financial and organizational challenges of deploying and maintaining technology-based programs in rural health care are becoming more manageable. Advocacy groups, private companies, and federal, state, and local government programs have provided funding support for new technology programs. Tertiary care centers and other care delivery organizations have created a range of technology offerings that help improve information access, communications, and care services to rural areas. And Medicare and other payers are beginning to recognize the benefits from offering remote technology services and are easing some restrictions on reimbursement for professional services by specialists.

The solutions being applied in rural health settings today range from basic to advanced.

- The Internet and email allow providers to communicate with patients and consult with other providers.
- Web portals organize and provide access to general medical and patient-specific information from remote locations.
- Scanners and digital imaging technology capture and send images, EKGs, and other materials to remote locations for interpretation.

- Video teleconferencing, also known as "telemedicine," utilizes smaller, less expensive systems that can be more readily deployed in hospitals, practices, and patient homes.
- Remote patient-monitoring systems supported by regional tertiary care center professionals allow rural hospitals to keep intensive care (ICU) and cardiac services open.

As this report illustrates, the common denominator among successful rural technology programs is collaboration among institutional players and individual providers. New possibilities for collaborative models involve a wide variety of entities—including rural health associations, vendors, government agencies, federal and state associations, advocacy groups, hospitals, and existing telemedicine programs. Implementing successful technology solutions, nevertheless, is not easy. It requires creative use of grant funding, integration with work flow, and effective selection of supportive technologies.

# I. Purpose

*"Americans who live in the suburbs fare significantly better in many key health measures than those who live in the most rural and the most urban areas."*

— Tommy Thompson, HHS Secretary, CDC Media Relations press release, 9/10/01.

## Problems of Scarcity and Distance

Challenges facing rural health care include scarcity of local medical resources and distance between patients, physicians, and facilities. Many rural areas have insufficient numbers of primary care practitioners, including physicians, physician assistants, and nurse practitioners, while all rural areas have problems with access to specialty care.

For patients, the need to travel away from home and from local providers for medical care results in a range of difficulties: time away from work; additional expenses; and the complications of coordinating care in different locales. The likelihood that information will be missing or incomplete is greater and this may cause delayed or fragmented care.

Rural physicians and other care providers are likewise impacted by the problems of scarcity and distance, resulting in limitations on productivity, communications, and ongoing education. Rural providers have much more difficulty communicating with other providers and specialists. They have few opportunities for conferences and training without travel; and limited access to medical knowledge and research work. These factors result in much lower efficiency: more travel time to visit patients in hospitals and nursing homes, fewer face-to-face patient visits, and more time on the telephone with other providers and with patients.

## A New Range of Technologies

Technology solutions for rural health care have been discussed for decades, and early experiments with video teleconferencing (telemedicine), while demonstrating some real benefits, were economically unsustainable after initial grant funding ran out. Problems included high costs for infrastructure and software, immature technology, lack of reimbursement, and a focus on technology itself rather than on the health and business problems.

However, the situation today is different. Wide use of the Internet has spurred the diffusion of end-user devices and connectivity to most offices and many homes. A wide choice of tools provides better performance and lower costs, offering improved access to medical and patient information and effective substitutes for face-to-face visits. These technologies support improved health outcomes, workload and communication efficiencies, and satisfaction with the care experience for providers and patients.

Funding for the higher-end investments still comes mainly from grants. However, new business models and collaborative agreements with different associations, other medical centers, vendors, and government entities have created a range of opportunities for providers who want to use technology to connect to patients, clinical information, and other providers. In addition, changes in reimbursement (federal, state, and other payers) for technology-supported care delivery will help to make programs financially viable over time.

## Organization of This Report

The purpose of this report is to provide an overview of practical technology solutions for rural providers and to help them get started. In each chapter the discussion begins with the simpler options and moves to the more complex and/or costly. The information was gathered from many sources, including the published literature, Web sites, and interviews with rural health agencies, telemedicine associations and programs, health care networks, payers, hospitals, physicians, and technology vendors.

The second chapter provides a grounding in the possibilities for technology and connectivity and describes how to determine the equipment and connection requirements for a specific technology solution. Technology challenges such as broadband infrastructure connectivity and integration of devices and software are also reviewed.

The heart of the report is Chapter 3, which uses case examples to explore the wide range of technology solutions found in practice today. These are categorized by their supporting technology (email, Web site, portal, etc.). Chapter 4 introduces a spectrum of successful business models used in programs for rural providers and hospitals. Current financial, regulatory, and operational challenges are discussed, as well as lessons learned from other organizations.

Many public and private resources are now available to those desiring further information. The appendices provide a guide to those identified through this research, listing associations (Appendix A), interviewees (Appendix B), representative vendors (Appendix C), and additional sources of information (Appendix D).

This compilation of information about the latest technologies and real life experiences in the field is intended to help rural providers and organizations move ahead efficiently to achieve solutions to their own particular challenges.

# II. Understanding the Technology

*Researchers are working to make equipment that will fit in a small suitcase and include a computer, keyboard, and attached medical instruments for use in medically underserved communities.*

## Technological Developments

Practical technology options for rural health care are improving due to: (1) improvements in tools, (2) greater impact of the Internet, and (3) improvements in connectivity.

### Improvements in Tools

Tools are becoming more powerful, smaller, and less expensive. Work stations that cost $5,000 five years ago are now less than $1,000, as well as many times more powerful and much smaller. Advanced video teleconferencing workstations that filled a room and cost $80,000 per unit several years back now have a price tag around $40,000 and are becoming small enough to be truly portable. A base unit that includes a workstation with a camera costs about $10,000.

Taking advantage of these improvements, researchers at the University of Texas at El Paso have formed a partnership with NASA to adopt video teleconferencing equipment currently used on space missions for use in medically underserved communities. Researchers are working to make the equipment smaller and more efficient so it can be transported to communities where few residents visit physicians. The $35,000 solution, which will fit in a small metal suitcase, includes a computer, keyboard, and attached medical instruments to monitor vital signs and diagnose health problems.[1]

### Greater Impact of the Internet

Personal computer (PC) workstations with Internet access are now basic infrastructure for physician offices, hospitals, and even patients' homes, leading to the adoption of a variety of Internet-based applications such as email and Web portals for communicating and information-sharing among physicians and between patients and physicians.

### Federal Support for Rural Connectivity

The U.S. Senate approved an appropriations bill in November 2001 that was signed by President Bush in December to provide over $100 million in loans to increase the penetration of broadband and dial-up Internet access in rural areas. Included is some $80 million in direct loans for the establishment of high-speed Internet access as well as $22.5 million to be dispensed through an ongoing telemedicine and distance learning pilot program.

Source: *iHealthBeat*, 11/16/01, 12/3/01.

## Improvements in Connectivity

The physical connection infrastructure is becoming more widespread and offers a variety of options. Services range from low-capacity dial-up arrangements to increased penetration of broadband services that include DSL, cable, ISDN, and even satellite technology—many funded by grants and government loans.

Following is an overview of technology equipment and connectivity options. (For more detailed information, see the resource listings in the appendices.)

## Technology Equipment

Equipment and devices can be categorized into four groups of solutions—listed below from simple to complex—for rural health care applications.

### PC Workstation with Remote Connectivity Using the Internet

For rural health care providers and patients, the most common applications supported by this technology are:

- Secure email communications—patient to provider and provider to provider; and
- Web portal applications that give access to medical and patient information and provide educational services (see Case in Point 2).

### Image Capture and Transmission

Image capture and transmission (also known as "store-and-forward" technology) are done through direct interfacing with digital imaging equipment or use of scanners that digitize images and documents. Rural providers use this for:

- Remote image interpretation by radiology, pathology, and cardiology specialists located in tertiary care centers (see Case in Point 3);
- Medication order review by offsite or on-call pharmacists (see Case in Point 4);
- Scanned patient information (scanned photos, copied pages from the paper record) needed for provider-to-provider electronic consults.

### Video Teleconferencing

These solutions support the capture, transmission, and receipt of real-time video encounters. They are mostly used to replicate face-to-face encounters (see Case in Point 5). Common applications include:

- Specialist consults for dermatology, psychiatry, cardiology, and other specialties;
- Home health "virtual" visits between patient and care provider;
- Professional ongoing training and educational courses; and
- Remote interactive administrative meetings.

### Remote Real-Time Patient Monitoring

This technology enables video conferencing with the remote site and viewing additional patient information stored in the site's clinical information system. In the rural setting, this is often used for remote monitoring by specialists at tertiary care facilities for cardiac and ICU patients located in rural hospitals (see Case in Point 7).

## Levels of Connectivity

Connectivity refers to the physical connection between two sites that allows data, images, and text to be sent electronically, using shared or dedicated connections. The spectrum of the most common connectivity options, moving from low-speed to high-speed transmission, includes phone lines, Integrated Services Digital Network (ISDN), Digital Subscriber Line (DSL), and T1 (see Table 1).

In addition to the options described below, wireless and satellite connectivity technologies are starting to be used with limited, specific application to rural care delivery. The satellite-based telemedicine network in South Carolina, for example, supports remote eye screening.[2]

**Table 1. Connectivity Options in Order of Increasing Data Transmission Speeds**

| Options | Description |
|---|---|
| **POTS** | Plain Old Telephone Service. The worldwide voice telephone service. Once only analog, now mostly digital, except for lines from home and office to the central office. Transmission speeds range from 28.8 to 56 kilobits per second (kbps). |
| **ISDN** | Integrated Services Digital Network. Provides a digital service from the customer's premises to the dial-up telephone network. It turns one existing wire pair into two channels and four wire pairs into 23 channels for the delivery of voice, data, images, or video. ISDN's basic service is called Basic Rate Interface (BRI), which can support transport up to 128 kbps. The high-speed service is called Primary Rate Interface (PRI) and bonds six channels together for quality video teleconferencing at 384 kbps. |
| **DSL** | Digital Subscriber Line. Dramatically increases the digital capability of ordinary telephone lines into home or office. DSL speeds are tied to the distance between the customer and the telecommunications central office. There are two types: Asymmetric DSL is for Internet access where fast downstream is required, but slow upstream is acceptable; Symmetric DSL is designed for short-distance connections that require high speed in both directions. Unlike ISDN, which travels through a switched telephone network, DSL is always on. The speeds range from 144 kbps over a distance of 16,000 feet to 6.4 Mbps (megabits per second) over 1,000 feet. |
| **T1** | A 1.544 Mbps point-to-point dedicated digital circuit provided by the telephone companies. The monthly cost is typically based on distance. T1 lines are widely used for private networks as well as interconnections between an organization's local area network (LAN) and the telephone company. Similarly, T2 lines offer a total speed of 6.312 Mbps; T3 lines offer a speed of 44.735 Mbps. |

Source: Tech Web (www.techweb.com).

## Selecting the Right Equipment and Connectivity Option

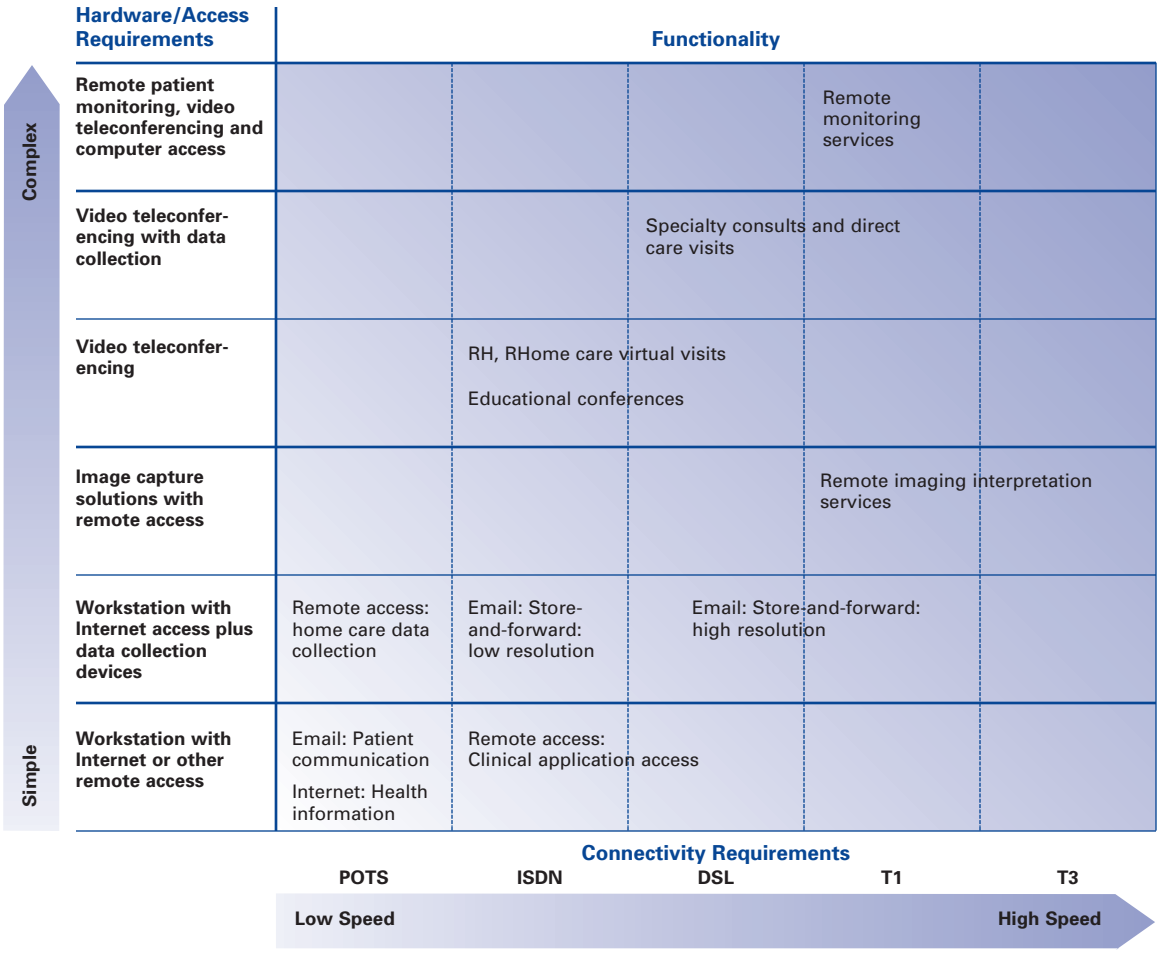
Different connectivity options support specific ranges of data transmission (measured in kilobits per second, or kbps), which in turn must be matched to the performance requirements and transmission loads of the desired solution. For instance, applications like email that send and receive small amounts of data can operate with acceptable response time using low-speed connections such as phone lines. Sending images or large amounts of data or conducting live video encounters requires much higher transmission speeds to be usable in care delivery. A critical demarcation for the connectivity options is the 384 kbps threshold—the minimum requirement for quality video teleconferencing. Because higher-speed connections are not always available in rural areas, an early part of program planning should be gaining an understanding of what options are actually available in the area.

Figure 1 maps the minimum equipment and connectivity requirements for each rural health care technology solution charted on this matrix. The intent of this figure is to provide a starting point for understanding the connectivity and equipment requirements for a given technology solution. Picking a technology solution on the grid and then scanning down and across on the corresponding X and Y axes will identify the hardware and connectivity requirements for that solution. For instance, email for patient communication requires low-speed connectivity (POTS, or phone line), as depicted on the X axis, and a workstation with Internet or other remote access capability, as listed on the Y axis. The case examples in Chapter 3 demonstrate why these represent the minimum requirements and provide details about specific implementations.

It is important to note that the Internet is not equally effective for all health care purposes. It is most useful for low-end applications such as email and Web portals. Using the Internet along with virtual private network (VPN) technology for security has worked very well for applications that send patient data between two locations. These can include remote interpretation of radiology images and secure email consults. Furthermore, this solution is typically much less expensive than dedicated lines.

However, video teleconferencing and other high-speed transmission services currently are not well supported by the Internet. Frequent transmission problems with speed consistency and quality of service occur when information crosses multiple Internet service providers (ISPs). However, many experts believe that the Internet will continue to evolve to meet the needs of these applications and to become the network of choice. Two current research projects—Internet2 and Next Generation Internet—are focused on upgrading the Internet's performance and security with new and refined protocols.[3]

**Figure 1. Rural Health Care Technology Functions Mapped to Hardware and Connectivity Requirements**




## Technology Challenges

Two big technology issues for rural health care are the availability of broadband infrastructure connectivity and the lack of technology integration. Some progress has been made with the infrastructure issue in the past year. Private companies are broadening their service options into rural areas, and government programs now offer funding and low-cost loans to spur further development. However, these efforts are not coordinated and the lack of a central focus on the connectivity issue leaves no clear path today to widespread success across rural areas. It will be several years before some remote rural areas will have connectivity options beyond phone lines.

Integration of devices and software is a problem with the more advanced technologies such as video teleconferencing. The lack of connectivity standards for devices and the incompatibility of devices with different server operating systems can make these implementations cumbersome and ultimately not usable for caregivers. Trade organizations are working toward standards that will minimize these issues. However, the results will take time to appear in practice. For the time being, organizations will be responsible for installation and testing of new data collection devices (e.g., camera, scanner, medical equipment) and the associated software to ensure adequate hardware resources, compatibility of the software, and acceptable response time.

# III. Case Examples of Technology Solutions

THE EXTENSIVE LITERATURE SEARCH AND INTERviews conducted for this project revealed broad activity in the area of rural health-care-related technology. This chapter presents the range of solutions from the most basic to the most complex, in terms of technology and connectivity, as shown in Table 2 (see next page).

## Email-Based Applications

Email-based solutions securely link patients and providers for purposes of communicating and accessing information (text, data, images, and video clips). They require a PC workstation, Internet access, and a low-speed connectivity option.

Email supports both patient-to-physician and physician-to-physician communications. For physician and patient email communications, physicians can use secure messaging offered by a number of commercial vendors. Some medical societies also offer secure email as a value-added service for membership. These solutions supply the communication infrastructure for patients to ask health-related questions, request appointments and prescription renewals, and obtain referral authorization using email instead of phone communications or coming into the office.

Rural care providers can use secure email to collaborate with specialists. They can also attach patient-specific data to the message as a preliminary screening for a possible referral, to ask questions about a specific disease, or to provide referral paperwork for a specialist consult. Typically, electronic consults include structured forms for the specialist to document the clinical analysis and recommended plan for care, and then send back to the referring primary care physician.

**Table 2. Technology Solutions and Requirements**

| Application | Technology Requirements: Basic to Complex |
|---|---|
| Email for communications and consults<br>Web portals for medical information, patient data access, and education | Internet-accessible PC workstation; low-speed connectivity |
| Image capture applications for remote consults and interpretations | Internet-accessible PC workstation/server—interfaced to image capture technology; low- to medium-speed connectivity |
| Real-time remote video consults | Video teleconferencing stations; high-speed connectivity |
| Remote patient monitoring | Remote patient monitoring stations, including live video capabilities; high-speed connectivity |

**Percent of Physicians Who Use Email to Communicate with:**

| | |
|---|---|
| Professional colleagues | 55% |
| Support staff | 34% |
| Patients | 13% |
| Health plans | 9% |

Source: "Physicians expand use of Web, email" in *Internet Health Care,* April 2002.

## Case in Point 1

### ACCESS TO SPECIALISTS THROUGH CLINICAL MESSAGING

A primary care physician in Watsonville, California, uses a clinical messaging system for physician-to-physician email, patient-to-physician email, laboratory test results, x-ray data, consultations, referrals, and authorizations. The biggest benefit that the system has provided is access to specialists. There are no rheumatologists in Watsonville, for example, so the physician's practice has developed a relationship with rheumatology specialists in Santa Cruz.

Source: Personal communication with Dr. Robert Webber, Family Doctors, Watsonville, CA, April 2002.

These solutions overcome the problem of geographic distances and allow for more effective patient-physician communications through the use of structured templates for requests, referrals, consults, and questions. Given the busy schedules of most physicians, one of the biggest benefits of email is the ability of providers to respond at their own convenience, avoiding constant interruptions to answer phone calls, find faxes, and sort through paper mail.

Finally, clinical email messaging systems can provide a record of the information exchange, which can potentially reduce liability. Email-based applications are increasingly being adopted as a means to enhance communication and provide better service. (For detailed information about patient-physician email, see *E-encounters*, published by the California HealthCare Foundation.)

## Web Portal Applications

Applications based on Web portals connect rural providers and patients with patient-specific data, medical information, and remote educational opportunities. They require only a PC workstation with Internet access and low-speed connectivity. These portals offer a broad range of applications and are typically sponsored by hospitals, academic medical centers, library service providers, and training centers.

### Patient Access to Medical Information

Of patients already on the Internet, 45 percent rate retrieval of health-related information for themselves and family members as a top activity.[4] Given the huge amount of information available on the Internet and the challenge of differentiating what is reliable, some hospitals and physician practices offer focused information from vetted sources as a service to their patients and the community. Visitors to the Web site can learn about specific medical conditions and see detailed information about the organization's resources for the given condition. In one example, Sharpe Medical Center's eSharpe site had nearly 3 million visits in 2000, which resulted in 75,000 physician referral transactions.[5]

### Provider Access to Medical Information

Physicians can locate and print out medical information to answer practice-related clinical questions using library service functions, Web sites (e.g., Medline, Intelihealth), and a number of commercial vendors (e.g., UpToDate, Cline-Guide). However, the key to successful use of these medical services is to integrate health reference links with the provider's other applications such as prescription writing tools, electronic medical records, or email communication vehicles. One study reported that there was "limited use" of stand-alone access to full-text journals, textbooks, and decision-support tools made available through a Web portal.[6]

### Medical Education and Training

Using the Internet to provide professional conferences and training sessions for continuing medical education has started to take hold. These eliminate the need for rural physicians and allied health care professionals to travel long distances for training and education. Most Web-based programs are still heavily weighted toward text versions of journal articles, with only 20 percent providing interactive learning, leveraging videos, audio, and immediate feedback. However, although only 4 percent of CME credits are earned via Internet connections with programs, significant growth can be anticipated with increased deployment of higher-speed connectivity options.[7]

### Access to Patient Information

For rural providers who need to review their patients' hospital or specialist information, the problem of access to paper records can be aggravated by distance and transportation costs for records. One solution is a centralized Web-based health record to which both the hospital and patients contribute information that can be accessed by physicians (see Case in Point 2).

### Case in Point 2

#### WEB-BASED SYSTEM COVERS WIDE DISTANCES IN MAINE

The results of a study done in 2000 to understand spiraling health care costs showed that many citizens of Maine are unable to access needed health care services and information.

In response to the study, Eastern Maine Healthcare (EMH) created a Web-based solution called MyOnlineHealth that allows participating Maine residents to engage in secure communication with their health care providers, take risk assessments and receive feedback, and use the personal health record. EMH, which covers two-thirds of the state geographically but only one-third of the population, has many patients who are more than 30 miles away from their provider.

Patients can use the system to communicate with their physicians, request an appointment, view laboratory test results, or obtain a prescription refill. In addition, they can complete online health risk assessments and receive feedback both on healthy behaviors and areas for attention. The risk assessments link to health content; in addition, physicians can push health information tailored to the particular patient's needs.

The primary benefits for patients include:

- Better access to health information;
- Avoiding appointments and the hassle of travel;
- Avoiding the anxiety of waiting for test results; and
- Keeping their health information from multiple sources (primary care physician, hospital, dentist, herbalist, etc.) in one place.

Source: Personal communication with Mike Peterson, E-Business Director, Eastern Maine Healthcare, April 2002.

## Image Capture and Interpretation Applications

Providing access to remote specialist services is one of the most successful uses of technology to support rural health delivery. With up to 90 percent of specialty physicians practicing in urban areas, diagnostic specialists such as radiologists, pathologists and cardiologists are in short supply in rural areas.[8] This shortage is particularly difficult for radiologists, who must rotate through on-call times for after-hours coverage for the emergency department and emergency surgeries.

Fortunately, many academic medical centers and independent radiology practices in urban areas have extra capacity for reading images. Technology can play an important role in connecting the demand to the supply with several business models. Using digital diagnostic equipment or digitized scanned images, diagnostic specialists can read images from multiple sites and send back interpretations electronically in a matter of hours.

One example is the Cleveland Clinic's e-Radiology Service Department established within the Division of Radiology. To connect with Cleveland, a physician group or hospital needs only an acquisition device such as a CT scanner, x-ray, or MRI. The e-Radiology Service provides all other equipment and infrastructure. Besides supplying off-hours radiology coverage, services like this can provide subspecialty expertise that rural hospitals can't attract.[9]

In another example, University of Iowa Hospitals is trying to assist the many Iowa communities whose radiologists are retiring or leaving the area. In 2001, some 6,000 of the 170,000 diagnostic radiology services performed were teleradiology services sent from six small community hospitals around Iowa.[10] The university also has a pediatric echocardiogram network that supports rural areas. Findings from a research study of the effort indicated that diagnostic quality of interpretations was excellent and the speed to diagnosis was enhanced.[11]

Besides connecting to a regional tertiary hospital, another avenue for obtaining radiologist services is to connect to an independent radiology practice, which could be located anywhere in the world. The case example below describes a unique benefit due to the significant time difference between Australia and the United States.

Besides using this technology for radiology and pathology services, rural hospitals are also turning to imaging to maintain 24-hour coverage of pharmacy services (see Case in Point 4).

### Case in Point 3

#### REMOTE RADIOLOGY READING EXPLOITS 12-HOUR TIME DIFFERENCE

NightHawk Radiology Services in Sydney, Australia, provides night coverage for rural hospitals and physician practices in the United States. Images, compressed by an application at the rural site where the images are obtained, are sent to Sydney using virtual private networks (VPNs) supported by the Internet. If the radiology equipment at the rural site is not digital, the images are digitized on a scanner first. Within 30 minutes of receipt of the complete exam, the preliminary report is sent back to the originating hospital or practice. For significant positive findings, the service has a policy of providing a verbal report to the ordering physician in addition to the written report.

Source: Personal communication with John Berger, Vice President, NightHawk Radiology Services, Coeur d'Alene, ID, March 2002.

### Case in Point 4

#### PHARMACY SERVICES AROUND THE CLOCK

Sacred Heart Medical Center in Spokane, Washington, has built a technology infrastructure of standard computer applications and many programs supporting a network of about two dozen hospitals serving the small farming communities east of the Cascade Mountains. Using this foundation, Sacred Heart has developed a program to provide remote pharmacist coverage to these hospitals to support 24-hour review of medication orders to identify potential contraindications, improper dosing, and duplications.

Although the process started by using a standard fax, Sacred Heart will soon use an image scanning product to capture the handwritten order electronically. Nurses at the rural hospitals transmit a copy of the handwritten order to the remote pharmacist at Sacred Heart. The pharmacist compares the order image with the electronic order entered by the nurse or pharmacy technician to identify possible issues. As in any pharmacy department, policy and standard procedures govern the pharmacist's response when a problem is identified. Sometimes it is appropriate to telephone the physician or nurse; in other cases the pharmacist modifies the electronic order, sending a handwritten order sheet back for inclusion in the patient's medical record. Teleconferencing via cameras at the top of each workstation can also support conversations between pharmacists and nurses at the rural hospitals.

Source: Personal communication with Dr. Larry Bettesworth, Sacred Heart Medical Center, Spokane, WA, July 2002.

## Real-Time Remote Video Consults

Video teleconferencing for specialist consults (telemedicine) is the most commonly known use of technology to support rural health delivery. For these visits—both initial consults and follow-up visits—the patient and specialist communicate in real time using interactive video equipment; they can also use diagnostic equipment such as stethoscopes, blood pressure monitors, digital cameras, and dermascopes. The patient is typically seen with a clinical assistant who controls the equipment and assists with patient care. In some situations, the primary care physician also participates.

Telemedicine consults are most common for dermatology, mental health, cardiology, emergency triage, and orthopedics.[12] For example, the Blue Cross of California Telemedicine Program reports that 40 percent of their consults are in dermatology.[13] The University of Missouri-Columbia School of Medicine's telemedicine program reported that the top three patient encounter specialties during 1995-1999 were psychiatry, dermatology, and cardiology. Together these made up almost 90 percent of all encounters, with psychiatry contributing more than 50 percent.[14]

Electronic psychiatric and mental health consults have proven to be a particularly effective solution in rural areas, where the shortage of behavioral health specialists is severe. Many patients like this type of care because the program maintains patient confidentiality in small towns. Interestingly, a professional at one site noticed that children appear to be more honest with behavioral health professionals using video teleconferencing services than in face-to-face visits.[15]

*Robotically controlled microscopes allow pathologists to render diagnoses with the same accuracy they would if they were actually on site.*

The major benefactor for electronic consults is the patient, who does not have to travel to get specialist care. Numerous studies have quantified the time and money savings from these visits and have also concluded that the technology does not artificially increase the number of consults—a major concern of some payers.[16]

Telemedicine consults have direct benefits for local providers, too. For some specialties and medical conditions, these consults, when attended by the rural primary care physician, provide "on the job" education and training that decrease the need for future consults.[17] A University of Washington study showed that local providers were able to treat 72 percent of the patients themselves after the telemedicine consult. These providers indicated that at least 47 percent of the patients would have been referred to non-local consults if the technology solution had not been in place.[18]

Although there is a lot of attention given to telemedicine in the press, studies have shown that growth in telemedicine programs has recently slowed. In fact, growth did occur from 1999 to 2000 but cooled off in 2001, with fewer consults and fewer patients seen. Reasons cited for the slowdown include reimbursement and operational issues that are discussed in Chapter 4.[19]

### Case in Point 5

#### REMOTE DIAGNOSTIC SERVICES AND REAL-TIME SPECIALIST VISITS

The Department of Veterans Affairs (VA) Medical Center in Iron Mountain, Michigan, has combined remote diagnostic services with real-time remote specialist visits. With the retirement of local pathologists, there was a critical shortage of expertise for Michigan's Upper Peninsula and northeastern Wisconsin. Supported by the VA's wide area network (WAN), patients at the Iron Mountain facility can be examined in real time by medical experts located in the Milwaukee or Chicago clinics. "Robotically controlled microscopes allow pathologists to render diagnoses with the same accuracy they would if they were actually onsite." X-rays, CT, fluoroscopy, and ultrasound images can also be sent over the network, enabling specialists to capture images and consult in real time.

The key to making the system work well is providing sufficient connectivity bandwidth. In addition to the equipment and infrastructure at their own facility, the medical center also supports several satellite clinics in even more rural areas. Originally funded through a grant, the system is maintained by sharing the costs for major capital expenditures on equipment and infrastructure with other facilities in the service network.

Early concerns about patients not wanting to use the technology did not materialize. Patients adapted to the new technology with ease—they save driving time of at least four to five hours, receive high-quality care more quickly, and are able to have their family members with them.

Sources: Customer Profile: *Providing Real-Time Virtual Medicine*, U.S. Veteran's Administration, May 2001; personal communication with Dr. Joseph Larschen, Chief of Clinical Support Services, Iron Mountain VA Medical Center, Iron Mountain, MI, April 2002.

## Remote Patient Monitoring

Intensive care services in rural hospitals are at risk of being closed down when qualified specialists (physicians and/or technicians) are not available for 24-hour patient care monitoring and services. For some rural hospitals, this can represent the difference between staying in business and closing the doors.

Technology can connect the monitoring equipment from the rural hospital to remote specialists who can provide the continuous monitoring needed. Telecommunications options such as dedicated telephone lines and pagers allow nurses to be alerted to problems within seconds of a monitor alarm sounding. When a physician is involved in the remote monitoring, video teleconferencing may also be used to support communication between the intensivist and the caregivers in the local ICU.

The two case examples that follow demonstrate how remote monitoring technology can support a sustainable business relationship in which both parties benefit from the collaboration.

## Case in Point 6

### COLLABORATION ENABLES REMOTE TELEMETRY AT SMALL HOSPITAL

For Allen Memorial Hospital in Moab, Utah, the lack of skilled technicians to support patient monitoring resulted in a majority of cardiac patients being transferred to other facilities. This caused hardship for the patients, who had to travel at least 100 miles to the closest tertiary hospital, as well as for the 38-bed hospital, which was losing patient revenue.

A solution was to collaborate with St. Mark Hospital in Salt Lake City. Monitoring equipment in the ICU transmits data to a centralized telemetry center at St. Mark, where technicians watch the data streams, validate alerts, and contact Allen Memorial ICU nurses immediately via pager or phone. The transmission of real-time continuous data enables physicians and technicians at St. Mark to provide 24-hour, seven-day surveillance.

Source: Davis, C. "Heart Link: Real-Time Telemedicine Helps Keep Small Utah Community Hospital Open," Healthcare Informatics, February 1999.

## Case in Point 7

### LOCAL AND REMOTE CARDIAC MONITORING

Mid America Heart Institute of Saint Luke's Hospital of Kansas City is part of the Saint Luke–Shawnee Mission Health System. A dedicated staff of technicians supports both local monitoring at Mid America Heart Institute and remote monitoring for the system's rural facilities. Before installing the centralized monitoring program, technicians located on the units conducted a variety of patient care and administrative duties such as greeting patient families and looking up information for other staff—tasks that could be performed by other employees. With a centralized monitoring program for remote hospitals now in place, technicians have more focus to their work, have each other for consultation, and see a broader mix of cases. The remote facilities also reap the benefit of cost-effective coverage by experienced technicians.

At each care location, a nurse connects the patient to a portable monitor that is slightly bigger than a deck of cards and gets patient information and the monitor number. Technicians continually monitor telemetry information and communicate with local sites through alphanumeric pagers and with remote sites through telephone systems. If there is a problem with the signal, for example, they page/call the patient care technician to fix the lead on the monitor. If there is an unusual—but not life-threatening—signal, the technicians page or phone the nurse. When the system identifies a potentially lethal arrhythmia, technicians review the data to decide if it is a real problem. If so, they page nurses on a dedicated pager so they can immediately assess the patient's condition. Throughout the entire process, data are continuously documented and can be printed immediately for physician review. Physicians can access the system online from the office or home using a clinical browser application.

In addition to the positive effects that the centralized telemetry system has had on cardiac monitoring, physicians are beginning to realize that they can benefit from increased access to data. With the clinical browser application, physicians can get diagnostic information by accessing the system online from the office, home, or while traveling.

Source: Personal communication with Andrea Ernst, Manager of Marketing, and Beth Lee, Director of Patient Care Services, Cardiovascular Surgery, Mid America Heart Institute of Saint Luke's Hospital, St. Luke's–Shawnee Mission Health System, April 2000.

*At each location, a nurse connects the patient to a portable monitor that is slightly bigger than a deck of cards.*

Connecting rural physicians with physicians in tertiary medical centers has been equally successful. For instance, UC Davis has IT links to Mercy Medical Center-Redding to provide 24-hour, seven-day pediatric intensivist services. For specific questions about dosing and other pediatric questions, Redding pediatricians and adult intensivists can communicate using real-time audio and video with the university's pediatric intensivists.[20]

Similarly, Sentara Health System in Norfolk, Virginia, has started a remote IT-supported intensivist program using computers and telemonitoring equipment to support three hospitals; it is considering adding more hospitals in rural Virginia. A study done before and after the implementation showed a decline in the average length of stay for the ICU from 5.19 to 4.36 days and a similar decline in vascular ICU from 2.92 to 2.43 days. Overall, Sentara had a positive per-case savings from the reduction in stay and from fewer tests and supplies.[21]

### Key Statistics on the Elderly

- People 65 and older account for nearly 13 percent of the total population, but 69 percent of home health care patients.
- In rural areas, the elderly account for 22.5 percent of the population.
- The size of the elderly population will double in the next 30 years.

## Supporting Rural Home Care

Patient homes will become an important venue for technology-supported services as technology advances, prices for equipment and connections drop, adoption of PC/Internet services increases, and technology-friendly reimbursement schemes become available. All these factors are making a strong business case for using technology to supplement face-to-face home visits. With a growing aging population, home care is expected to play an important role in care delivery. Using technology to support home care could be particularly helpful for overstretched rural providers, who must travel in order to assess the patient's condition as well as to collect data. For patients deemed appropriate, equipment is set up in the home for one or both of the following types of applications.

### Data Collection

These applications can include medical devices such as a blood pressure cuff connected to a workstation. Patient measurements from the devices and other clinical data entered by the patient are sent to the provider using a modem over phone lines or other connection. These solutions work well for diabetes and pain management.

### Video Teleconferencing

These solutions build on the data collection application by adding video teleconferencing. Most often, virtual visits are scheduled—particularly for visits using video-conferencing; but patients may also upload physiological data at various times, as well as access the system whenever they feel there is a problem.

The patient data can connect the home, provider, and tertiary care center or home health agency. In all cases, the technology-supported services reduce but do not totally replace the need for face-to-face visits.

These applications offer a number of benefits for providers, potentially impacting productivity and satisfaction. For example:

- Care providers can increase the number of patients they see, since time spent traveling is reduced.
- Costs are reduced, which is why home health care agencies often pay for the equipment and connectivity.
- Length of visits is reduced, increasing productivity. According to a study at Kaiser Permanente, the average tele-homecare visit was 60 percent shorter than a traditional visit.[22]
- Visits to the emergency room and hospitalizations are reduced.[23]

Benefits from an outcomes and patient perspective include:

- No need for patients to wait until the next scheduled visit. (Even if patients don't need to call the home care nurse at 2 a.m., they like to know that they could.)[24]
- More continuous monitoring capabilities and more immediate response to changes in patient condition.
- Increased compliance with treatment and medication regimens.[25]
- Greater patient involvement in care and greater patient satisfaction.[26]
- Improved outcomes. (For example, an Illinois wound care telemedicine program generated a 100-percent healing rate for Stage II wounds, compared to 41 percent prior to the program.)[27]

## Case in Point 8

### LOW-TECH, LOW-COST HOME CARE

Connectivity is an issue for home health providers using technology for "virtual visits." The 2000 Census showed that rural households were less likely to have Internet access than the rest of the country (32 percent of rural households compared to 42 percent nationally). Additionally, according to census figures, 6 percent of households did not have telephone service in 1999. An in-home monitoring device made by HomMed LLC is sensitive to these realities and sends data over a telephone modem or by digital two-way pager.

The home tele-monitoring system measures a range of vital signs, and then communicates this clinical data trended over time for review by medical personnel. The system also collects subjective data—how the patient feels, fatigue levels, etc. The monitor and its peripheral devices can gather data for many different patient conditions, including congestive heart failure, pulmonary disease, diabetes, and other chronic conditions. If any of a patient's vital signs falls outside of the parameters set by the physician, or if any of the patient's answers to the subjective questions indicate a problem, the monitoring nurse can immediately respond. The system is easy to use and promotes patient self-management, resulting in a 98.2 percent compliance rate.

Source: Personal communication with Herschel "Buzz" Pedicord, President and CEO of HomeMed, LLC, April 2002.

# IV. Practical Issues in Getting Started

Providers and patient advocacy groups have a growing interest in technology initiatives designed to meet rural health care needs. In addition to technology advances, there is now a better understanding of how to fashion sustainable operational models. Reimbursement, a long-standing barrier, is improving—but there is still a long way to go. Health care organizations with technology programs in place are increasingly business-savvy and have found other uses for the technology to cover costs. Today's models differ from those of the past 20 years in that they are based on practical, collaborative solutions that are designed to serve all parties' interests over time.

## Collaboration Is a Necessity

As many of the case examples in this report illustrate, collaboration is fundamental to the success of technology solutions in the rural health care sector. Programs underway around the country reflect every possible mix of participants, ranging from a simple partnership between a hospital and local physicians to regional or statewide efforts with an umbrella organization providing infrastructure and support. For those interested in exploring collaborative possibilities, partners can be found in a wide array of organizations: rural health associations, vendors, government agencies, federal and state associations, advocacy groups, hospitals, other health care organizations, funding groups, existing networks, and telemedicine programs.

The starting place for building a partnership is to identify organizations with common interests and goals for solving a particular health delivery problem. These could be organizations in the region that could benefit from cost sharing; vendors who offer products and services that meet your organization's requirement; or groups involved in statewide initiatives to deploy technology on a large scale.

California has a number of programs that are already up and running. One of the most well known and one of the country's largest is the Center for Health and Technology (CHT) at UC Davis, started more than ten years ago. Initially 100-percent internally funded by UC Davis to extend the reach of medical research and education, the center has branched out to provide a variety of education, information access, and medical care services, and is now supported 50 percent internally and 50 percent from external funding. Diversification has been the key to sustainability, as the center has learned to leverage different funding sources and a single technical support staff in support of the following programs:

- ***Distance education.*** Web-based training, streaming and interactive video for physician and nursing continuing education and patient education.
- ***Medical resources for physicians.*** Medical informatics consulting, Web hosting, application development, access to medical information, links to other Internet resources.
- ***Telemedicine.*** Critical care and outpatient medical care for patients at more than 80 sites, supporting 30 medical specialties.
- ***Telemedicine Learning Center.*** One of the few comprehensive telemedicine training programs, the center offers a multidisciplinary hands-on approach to the clinical, technical, and operational aspects of technology-supported care services. To date, more than 500 people have attended the program.

The following case example shows how one community health network collaborates with multiple partners, including UC Davis, to solve a patient care issue unique to the Central Valley region.

### Case in Point 9

#### CONTINUITY OF CARE FOR MIGRANT WORKERS THROUGH COLLABORATION

Central Valley Health Network (CVHN) comprises 12 community health centers and 81 licensed community clinics in California's Sacramento and San Joaquin Valleys. Together they service 400,000 patients, primarily migrant workers who travel throughout the area and are seen at multiple health centers and clinics. More than 1.5 million visits are conducted by CVHN each year.

To enable care continuity, CVHN implemented an electronic medical record application and infrastructure to store and access patient data as well as conduct telemedicine encounters from any site. A large initial investment was needed for the IT infrastructure, equipment, software, training, and implementation. In addition, expertise was needed for the infrastructure and site equipment as well as ongoing maintenance. To support the initiative, CVHN partnered with a number of organizations:

- The Bureau of Primary Health Care and the Tides Foundation are the primary funding partners.
- Blue Cross of California is funding some connections to support its members in the region.
- UC Davis Telemedicine program is the connector for the sites.

Three sites are piloting the EMR application, which will be followed by a full rollout. The goals for the system are to track and manage patient primary care information and to improve health status.

Source: Personal communication with Yvonne Bice, Executive Director of Central Valley Regional Health Network, March 2002.

To build an effective collaborative model, the parties must address the health and technology needs, as well as the human factors: roles and responsibilities, relationships, communications, and ongoing support. For many organizations putting together a program, the biggest challenges are around organizational issues, not technology. In fact, nontechnology barriers such as inadequate leadership, lack of buy-in, resistance to change, and lack of technical expertise can be overwhelming.

### Building Success

*"Successful programs need to have both the relationship infrastructure and the technology knowledge. The former is a greater stumbling block, since you can buy the latter."*

—Ellen Friedman, Tides Organization

Source: Personal communication with Ellen Friedman, Vice President, Tides Foundation, April 2002.

Lessons learned from some of the pioneering organizations to overcome many of the nontechnology issues include:

- Spend enough time in the early planning phases to understand how the technology will impact care practices. Mapping out the new processes and clearly identifying the roles and responsibilities for physicians, nurses, and administrative staff will solidify expectations and increase adoption once the technology has been installed.

### Easing into Hi-Tech Solutions

For one community network implementing video teleconferencing for specialist consults, the key to success was to have a dedicated site coordinator who would look at each referral request and determine if it could be done using technology or required a face-to-face visit. This practice eased the adoption of technology until it became routine for all practitioners.

Source: Personal communication with Bridget Cole, Blue Cross of California Telemedicine Program, March 2002.

- Understand the benefits of implementing the solution for all parties—the rural provider, the patient, and the specialist. Ask "How will technology improve the services we can already deliver or improve a relationship we already enjoy?"[28]
- Emphasize the delivery of care or connecting with patients and providers, not technology. Organizations are much more likely to be successful in technology implementation when there is a clear understanding of why and how the solution benefits the physicians, the patients, and the organizations.
- Be prepared for technical difficulties and delays. Typical issues cited: nonfunctioning software, lack of skilled technical support staff, loss of a technology collaborative partner, delays in getting new equipment, problems with connectivity, and trouble integrating devices with the technology. It is useful to schedule time for some technology delays and work closely with technology providers to secure contracts that have firm due dates and include a substantial commitment to technical assistance during the projects' early stages.[29]

- Take small steps before big ones when introducing technology. Document successes and failures to develop better strategies for future projects.[30]
- Realize that training never stops. Typically, users are trained prior to the implementation, with some on-site support during the first week or two. Because help may be miles away, training must be ongoing for use of the application and for support of the technology. This training may be in the form of classes or scheduled times when trainers will come to the site.

The lessons learned and best practices from many grant-funded programs are a rich source of information for anyone considering rural technology solutions (see NLM Final Reports at www.nlm.nih.gov).

Familiarity with a variety of practical considerations, including regulatory and financial issues, is important for organizations and individuals embarking on technology programs geared to rural health care. They are briefly reviewed in the following sections.

## Regulations

Since the basic premise of providing health care to rural locations begins with care delivery over distances, there are many examples where the patient and the care provider are in different states. Although the technology can bridge this gap, interstate care delivery has been the subject of longstanding debate concerning legal and reimbursement issues. The current requirements stipulate that physicians rendering care for patients in a state must be licensed in that state, with a few exceptions, whether or not they practice in that state. Several states have enacted legislation that allows out-of-state physicians to receive a special-purpose license or certificate to perform telemedicine consultations without requiring a full license. (Refer to the Telemedicine Information Exchange Web site or individual state government sites for specific requirements.) For hospital-based services such as radiology interpretations, the remote physician must also be credentialed at the remote hospital sending the images for interpretation. The lack of universal licensure in the United States adds administrative overhead to the process of providing care across states.

Other than state and federal regulatory requirements, there are other external factors that affect technology-supported care. One example of this is the work of the Leapfrog Group, a consortium of private employers and other large public and private sector health care purchasers working to mobilize employer purchasing power to improve the safety and overall value of health care. One of the practices they are promoting is the presence of an intensivist physician to cover hospital ICUs every shift (www.leapfroggroup.org). They created guidelines (see box) that allow for the standard to be met using technology and remote providers.

### Leapfrog Group Requirements for Remote Monitoring

- An intensivist who is physically present in the ICU performs a daily comprehensive review of each patient and establishes or revises a care plan.
- A tele-intensivist is available whenever an on-site intensivist is not.
- A tele-intensivist has immediate access to key patient data, including medications, bedside monitor data, and lab orders and results.
- Data links between tele-intensivists and the ICU are reliable and secure.
- Audiovisual support is clear enough for tele-intensivists to assess a patient's breathing pattern and communicates with on-site personnel at bedside.
- Written standards for remote care are established, including credentials and certification in critical-care medicine as well as explicit policies on roles and responsibilities.
- Tele-ICU care is proactive, with routine review of all patients at a frequency appropriate to the severity of illness.
- A tele-intensivist's workload permits completion of a comprehensive patient assessment within five minutes of a request for assistance.
- A written process of communication is established between a tele-intensivist and an on-site care team.
- A tele-intensivist documents patient care activities, and documentation is incorporated in the medical record.

Source: C. Becker, "Remote Control," *Modern Healthcare*, February 25, 2002.

## Funding and Reimbursement

### Initial Funding

Capital funding gets programs started and reimbursement for services maintains them. Generally, both are required to make today's business models work. The availability of funding sources, changes in regulations for professional services reimbursement, and other payment options have opened the doors for many rural organizations and providers eager to use technology.

Initial capital purchases can include the network infrastructure, computer equipment, software, medical devices, and teleconferencing equipment. Funding to cover or offset some of the cost is available from a number of sources: research projects, federal and state governments, trade associations, statewide initiatives, and private funding groups.

For rural practices and hospitals in California, a good place to start is the California Telehealth and Telemedicine Center (CTTC). Founded in 1997, its mission is to make California a "state where location is not a barrier to receiving the commonly accepted standard of care," and to that end it has funded programs across the patient care continuum. Key activities for CTTC include:

- Assist in the development of new technology (telehealth and telemedicine) projects;
- Educate health care providers and government officials;
- Monitor legislation and public policy;
- Expand funding for programs;
- Serve as an information resource through their Web site; and
- Disseminate information to local, state, and national media.

CTTC funded five demonstration projects in 1998, and, as the result of a grant from The California Endowment, has awarded $6 million for 91 demonstration projects in its current grant cycle. Programs supported by these projects include remote cardiac and fetal monitoring, tele-ophthalmology screening for Indian health clinics, telemedicine dental consults, community health Web sites, video teleconferencing behavioral health consults, access to the Internet for educational materials, and home care monitoring and remote care delivery. In partnership with the University of California, Davis Medical Center, the CTTC has established the Telemedicine Learning Center, which opened in 1999.

The Tides Foundation's Community Clinics Initiative is another California resource that funds information technology and infrastructure. This program is focused on "bridging the cultural transition" to successfully integrate the use of information technology into clinic operations and to transform how they do business.

Funding for technology-supported health initiatives can come from a variety of sources. Listed here are a few recent funding announcements:

- The National Library of Medicine announced in March 2002 that it is awarding $40 million for building health information networks over the next three years to improve the transfer of medical and patient information among hospitals, clinics, and physicians during a crisis (www.nlm.nih.gov).
- The Southern Governors' Association is calling for the creation of a 16-state telemedicine network that would serve as a model for a national system. The proposal, sent to the Health and Human Services (HHS) Secretary and the Homeland Security Director, calls for establishing standards for capturing medical data so all the participating organizations would have a common platform for sharing data.[31]
- Idaho State University's Institute for Rural Health is awarding $1.7 million in grants to fund technology projects aimed at improving recruitment and retention of rural care providers.[32]
- Funding can be found for smaller projects. For example, Virginia's Bland County Medical Clinic received $25,000 from HHS' Office for the Advancement of Telehealth to establish a telemedicine service connecting the clinic with the University of Virginia Hospital in Charlottesville. It is one of 16 telemedicine facilities in southwest Virginia, all of which were supported by federal funds.[33]

Appendix A includes potential funding sources.

## Ongoing Operational Support

Funding the ongoing operation of technology to support rural health care has been more problematic than funding the initial capital required. Some programs, such as remote radiology reading and remote monitoring generate revenue to cover costs. Technologies such as email communications or email consults require a small technology and communications investment. These can be absorbed into the operating budgets for most practices.

One area that remains a financial challenge is fair reimbursement for video teleconferencing for specialist services. A disincentive exists in today's reimbursement structure because the costs are borne by the provider while the patients enjoy the benefit of not traveling for the specialty consult. To cover the ongoing costs there are several options that can be used alone or in combination. These include Medicare reimbursement for professional services, Federal Communications Commission (FCC) program for connection costs, and other uses of the technology to defray costs. Only in a few instances have payers recognized that these services have differentiating value in the marketplace and are starting to pay for both the professional service and the technology.

Current provisions from Medicare, the largest source of reimbursement for these services, eased some restrictions on geography and the need for a physician to be present at the remote site. However, except for a $20 facility fee, Medicare's reimbursement is for the specialist's professional fee. It does not include ongoing costs for infrastructure connectivity, usage, equipment replacement, technical support, or ongoing training.

***Help with connectivity fees.*** Typically the biggest ongoing technology-related expense is line connections. To help with these costs, the FCC earmarked $400 million annually to support access for rural health care providers under the Telecommunication Acts of 1996. Under these rules, eligible nonprofit and/or public rural health care providers are able to purchase certain high-speed telecommunications services at rates comparable to similar services in the nearest urban area of the state.[34]

But the program has not been well used. In the first 18 months, rural health providers received only $3.4 million in long-distance subsidies. Following some reforms, the next 12 months provided funding for $6.1 million and up to $10 million in the following year.[35] Factors in the slow adoption include:

- Connecting the high-speed telecommunication fiber network to the rural site—the "last mile": There is little incentive for local telecommunications companies to invest in these connections since the lines will have low volume utilization, resulting in little revenue.
- There is a heavy burden of paperwork to apply for reimbursement and yearly reapplication is required.
- There is a one-year delay in getting the reimbursement.
- Service does not cover ISDN lines.
- There is a lack of reimbursement for some care settings, such as nursing homes.

The Northern Sierra Rural Health Network, a nonprofit organization serving rural health care providers in Northern California, has successfully used the program to fund the T1 connections between ten provider sites to support their video teleconferencing/telemedicine services. Even though the Network completes a large amount of the paperwork on behalf of each provider site, the efforts are well rewarded since the reimbursement covers over 80 percent of the cost of the telecommunications lines. Northern Sierra's reimbursement represents 90 percent of the funds disbursed to California sites for the past three years.[36]

***Creative payment solutions.*** Organizations that have video teleconferencing equipment for consults and care delivery encounters often use them also to provide educational services to care providers and to host administrative meetings between remote sites. This helps pay for the ongoing costs of operation. For example, the Telemedicine Center at East Carolina University has conducted more than 10,000 distance learning and CME activities since 1992.[37] For the Midwest Rural Telemedicine Consortium, cost savings of avoided travel and time away from work associated with these "secondary services" keeps the telemedicine program up and running. The percent of time the network is used for patient care is small; the biggest uses are for educational programs and administrative services.[38]

### Case in Point 10

#### CREATIVE, ENERGETIC FUNDING SAVVY

The Eastern Montana Telemedicine Network (EMTN) has almost ten years of experience using two-way video teleconferencing to bring medical services and medical education to patients and physicians in rural Montana. Energetic funding and reimbursement efforts support this premier program, including:

- Originally funded with grant monies, EMTN continues to take advantage of private and public funding opportunities to expand its network.
- Each of the facilities, including EMTN's urban hub, the Deaconess Billings Clinic, provides financial support in the form of personnel, transmission, and operational costs.
- Each of the facilities promotes the program within the community. Some 94 percent of patients who received care over the network were retained in their local community and 96 percent of their providers indicated the patient would have been referred elsewhere if the network had not been available.
- EMTN saves providers money: Educational activities conducted over the network represent a savings of $530,082 annually in travel costs and lost wages.
- Administrative activities save participating members $182,342 each year.
- EMTN leverages their technology and generates $22,487 in revenues from telebusiness.
- Finally, EMTN has used its clout in the state to secure reimbursement for telemedicine activities from both public and private payers.

Source: Eastern Montana Telemedicine Network Web site (www.emtn.org).

Fortunately, some private insurers understand the benefits of providing access to specialty services that only video teleconferencing solutions can bring to rural areas. They have started programs that fairly spread costs and benefits among all constituents—patients, physicians, allied health professionals, and payers. Results have been good. Today, California has one of the 18 state Medicaid programs that reimburse for telemedicine services.

## Case in Point 11

### BLUE CROSS OF CALIFORNIA NETWORK LINKS MULTIPLE SITES

With the help of six grants, Blue Cross of California has established a telemedicine network working with clinics, practices, and providers. Blue Cross funded the purchase of equipment, computers, and infrastructure at these sites to create a network of 40 primary care centers and five specialty centers. To participate in the program, sites must:

- Have adequate telecommunications connections or capability to have them installed;
- Have access to secure email;
- Have a designation of rural status as defined by the state of California;
- Be located in a specialty shortage area (as defined by California); and
- Have the administrative support to sustain the program.

The program provides both live video specialty encounters and store-and-forward encounters. The reimbursement scheme is aimed at being cost-neutral to the provider sites, using these guidelines:

- Live video encounters mirror Medicaid reimbursement, covering a primary care office visit and a specialist consult visit;
- Store-and-forward coverage includes the primary care office visit and a second opinion fee;
- In addition, Blue Cross allows the site that initiates the call to file a claim for the time spent connected to the other site to cover the cost of the telecommunication line;
- Blue Cross also offers a discount program for the permanent line charge to help minimize the connection costs.

Overall, Blue Cross believes the program is successful and sees it as a differentiator for the organization. Here are a few key indicators of performance:

- The number of visits has been steadily increasing each year, with approximately 1,000 to 1,500 per year.
- Patient survey results indicate that more than 85 percent are satisfied with the program.
- Only 8 percent of the cases required a face-to-face follow-up visit.

Source: Personal communication with Bridget Cole, Blue Cross of California Telemedicine Program, March 2002.

# Appendix A: Resources

| Organization and Web Site | Type of Resource |
|---|---|
| American Telemedicine Association www.atmeda.org | IT |
| Association of Telehealth Service Providers www.atsp.org | IT |
| California Rural Health Policy Council www.ruralhealth.ca.gov | RH, F, R |
| California State Rural Health Association www.csrha.org | RH, F, R |
| California Telehealth and Telemedicine Center www.cttconline.org | H, IT |
| Center for Technology and Health—UC Davis Telemedicine Program http://cth.ucdavis.edu | H, IT |
| U.S. Health and Human Services, Health Resources and Services Administration (HRSA):<br>– Bureau of Primary Health Care/Community Access Program www.bphc.hrsa.gov/cap<br>– Federal Office of Rural Health Policy http://ruralhealth.hrsa.gov<br>– Office for the Advancement of Telehealth http://telehealth.hrsa.gov/grants/preview.htm | <br>RH, F<br>RH, R<br>H, IT, F |
| National Association of Rural Health Clinics www.narhc.org | RH, R |
| National Library of Medicine, National Telemedicine Initiative www.nlm.nih.gov/research/telemedinit.html | H, IT, F |
| National Rural Health Association www.nrharural.org | RH, R |
| Northern California Grantmakers www.ncg.org | H, F |
| Northern Sierra Rural Health Network www.nsrhn.org | RH, IT |
| Rural Healthcare Division of the Universal Service Administrative Company www.rhc.universalservice.org | RH, F |
| Rural Information Center Health Service www.nal.usda.gov/ric/richs/funding.htm | RH, F |
| Sierra Health Foundation www.sierrahealth.org | H, F |
| Telemedicine Research and Information Exchange<br>– Telemedicine Information Exchange www.tie.telemed.org<br>– Telemedicine Research Center www.trc.telemed.org | H, IT, F<br><br>H, IT |
| The California Endowment www.calendow.org | H, F |
| The California Wellness Foundation www.tcwf.org | H, F |
| The James Irvine Foundation www.irvine.org | H, F |
| Tides Organization/Community Clinics Initiative www.tides.org | H, F |

***H** – Health focus* ***RH** – Rural health focus* ***IT** – Health information technology*
***F** – Funding information* ***R** – Regulatory/government information*

# Appendix B: Interviewees

**Speranza Avrim, Director**
Northern Sierra Rural Health Network
Nevada City, CA

**John Berger, Vice President**
NightHawk Radiology Services
Coeur d'Alene, ID

**Larry Bettesworth, M.D.**
Sacred Health Medical Center
Spokane, WA

**Yvonne Bice, Executive Director**
Central Valley Regional Health Network
Sacramento, CA

**Andrea Ernst, Manager of Marketing and Public Relations**
Mid America Heart Institute of Saint Luke's Hospital
St. Luke's–Shawnee Mission Health System
Shawnee Mission, KS

**Ellen Friedman, Vice President**
The Tides Foundation
San Francisco, CA

**Bridget Hogan Cole, M.P.H.**
Manager, Business Development—Telemedicine Blue Cross of California, State Sponsored Programs
Wellpoint Health Networks
Camarillo, CA

**Jana Katz, Director, Chief Administrative Officer**
Center for Health and Technology, UC Davis Health System
Davis, CA

**Dr. Joseph Larschen, Chief Clinical Support Services**
Veterans Administration
Iron Mountain, MI

**Beth Lee, R.N., B.S.N., C.C.R.N.**
Director, Patient Care Services, CV Surgery
Mid America Heart Institute of Saint Luke's Hospital
St. Luke's–Shawnee Mission Health System
Shawnee Mission, KS

**Joseph Middleton, Vice President of Facilities Management**
Bassett Healthcare
Cooperstown, NY

**Laura Paoli, Executive Director**
California Rural Health Association
Sacramento, CA

**Herschel "Buzz" Pedicord, President and CEO**
HomMed LLC
Brookfield, WI

**Mike Peterson, e-Business Director**
Eastern Maine Healthcare
Bangor, ME

**Holly Russo, R.N., M.S. CE's**
Home Care Technology expert

**Frank E. Seidelmann, M.D.**
Franklin and Seidelmann, Radiology Practice
Chagrin Falls, OH

**Robert Webber, M.D.**
Family Doctors
Watsonville, CA

# Appendix C: Representative Vendor Information

| Technology Products by Category | Vendor | Contact Information |
|---|---|---|
| **Web Sites/Portals/Communication** | | |
| Secure email for physician-patient communications | MDHub.com | www.mdhub.com |
| | Medem, Inc—messaging, consult and library services | www.medem.com |
| | Axolotl's Elysium clinical messaging | www.axolotl.com |
| Online training for physicians, nurses, and allied professionals | MedCases Inc. | www.medcases.com |
| | HealthStream's Healthcare Learning Center | www.healthstream.com |
| Medical knowledge/library services | InteliHealth | www.intelihealth.com |
| | e-cure me | www.ecureme.com |
| | UpToDate | www.uptodate.com |
| | ClineGuide | www.clineanswers.com |
| **Send/Share Data** | | |
| Collect/send data | Health Hero—Health Buddy—home health data | www.healthhero.com |
| | HomeMed home monitoring system | www.hommed.com |
| | Motion Media Technology—remote data capture instruments using phone lines | www.motion-media.com |
| **Send/Share Images** | | |
| Remote radiology interpretation service | NightHawk Radiology Services | 250 Northwest Blvd. #202, Coeur d'Alene, ID 83814 |
| | Virtual Radiologic Consultants | www.virtualrad.net |
| Remote pharmacy order review | Pyxis Corporation—Pyxis Connect | www.pyxis.com |
| **Teleconferencing/Video** | | |
| Teleconferencing equipment/services | Polycom (Picture Tel) | www.polycom.com |
| | AMD Telemedicine—medical devices for telemedicine consults | www.amdtelemedicine.com |
| | Cyber-Care Inc—Electronic House-Call® system—Products and services for health management for providers, patients, and payers | www.cybercare.net |
| | American TeleCare—home telemedicine services | www.americantelecare.com |
| **Remote Monitoring** | | |
| ICU monitoring | Visicu's e-ICU remote ICU monitoring technology and service | www.visicu.com |

# Appendix D: Additional Information Sources

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- National Library of Medicine, Research Programs: Digital Computing and Communications, (www.nlm.nih.gov)
- Federal Telemedicine News (www.federal-telemedicine.com)
- 2001 Report to Congress on Telemedicine, U.S. Department of Health and Human Services, Health Resources and Services Administration, and the Office for the Advancement of Telehealth (http://telehealth.hrsa.gov/pubs/report2001/main.htm)
- 2001 Report on U.S. Telemedicine Activity, Association of Telehealth Service Providers
- Telemedicine Information Exchange: Comprehensive information resource on telemedicine and telemedicine activities (www.tie.telemed.org)

# Endnotes


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