CHAPTER 7

TELEMEDICINE SERVICES

Telemedicine, one of the newest health care technologies, has captured the interest of policymakers and health care providers alike. Telemedicine is an infrastructure for furnishing an array of individual services that are performed using telecommunications technology. The technology is evolving in response to developments in telecommunications itself and as new applications are found for the delivery of health care. The number of applications is growing, effectiveness is improving, and startup and operating costs are declining.

Although telemedicine potentially could transform the way many health care services are delivered, for Medicare and other payers it poses a more immediate policy dilemma. Payers must make coverage decisions for each service and must determine how to structure fees to ensure access to quality health care at reasonable costs. While many are optimistic about the ability of telemedicine to expand access to care and improve productivity, payers also are concerned about its effectiveness and costs in the long run.

At this time, there is no national Medicare coverage policy for telemedicine services. Nevertheless, Medicare may pay for telemedicine services that do not involve patient contact, such as use of teleradiology or telepathology for interpretation of diagnostic tests. Providers are not paid, however, for telemedicine services that entail face-to-face patient contact, such as teleconsultation or emergency triage and evaluation. Patient-contact telemedicine services raise policy issues regarding payment for multiple providers and impacts on service volumes, which could drive up Medicare costs.

To make informed coverage decisions, payers need a clear taxonomy of telemedicine services, along with credible information on how different coverage and payment structures for these services might affect costs. Several issues should be resolved before Medicare coverage of telemedicine applications can be offered without risking undue escalation of Medicare costs. Among these are:

- lack of information on the value of telemedicine applications compared with the traditional services they would replace,
- potentially large increases in utilization and costs if telemedicine services improve access to care,
- barriers to the sustainability of telemedicine systems in some rural markets, and
- uncertainty about whether various telemedicine payment methods might stimulate excess service use or otherwise affect service patterns.

Other issues that are unrelated to payment also will affect the integration of telemedicine services into health care delivery. These include:

- absence of professional standards or practice guidelines for appropriate use of telemedicine services;
- state medical licensure laws that have restricted clinical specialists from serving as consultants across state lines;
- greater medical liability exposure where telemedicine changes physician-patient relationships or local standards of care; and
- unique requirements related to patients' informed consent for telemedicine services and recording of sessions, and confidentiality of electronic medical records.

This chapter provides an overview of the current status of telemedicine services, with emphasis on its implications for Medicare coverage and payment policy. It first summarizes the history and current state of development of telemedicine applications, describing a taxonomy of telemedicine services based on their readiness for health insurance coverage. Issues involved with Medicare coverage and payment decisions then are examined, including options for structuring payments for these services. Design requirements are suggested for studies to evaluate payment options to ensure that they result in reliable information on which to base payment decisions. Finally, several additional issues unrelated to payment are identified, which will influence future growth and evolution of telemedicine services.

WHAT IS TELEMEDICINE?

Indicative of an emerging technology, consensus on the definition of telemedicine has eluded policymakers, practitioners, and analysts. One definition of telemedicine that reflects its potentially broad application in both national and international health care markets is "the practice of health care delivery, diagnosis, consultation, treatment, transfer of medical data, and education using ... audio, visual, and data communications" (Kansas Telemedicine Study Group 1993).

Three underlying characteristics help define this technology. First, telemedicine is but one set of applications for a growing telecommunications infrastructure that is transforming almost all industries. Thus, it will continue to change as this infrastructure expands and becomes more sophisticated. Second, at this time, telemedicine offers a new way of providing the same services that medicine already has been using, rather than adding new diagnostic or therapeutic capabilities. Its potential benefits will derive from enabling patient care to be delivered by providers who are physically separated from the patient or each other. Third, telemedicine has the potential to improve medical capabilities over time, as its infrastructure allows medical data to be integrated and new applications to be developed.

A telemedicine system consists of three components: the telecommunications infrastructure, the telemedicine infrastructure, and a set of telemedicine applications. All telecommunications and most telemedicine infrastructures are technologies that can be applied to many fields (Kansas Telemedicine Policy Group 1993). The telecommunications infrastructure provides the

technology to move information electronically between geographically dispersed locations. Participating sites are linked through electronic networks.

The telemedicine infrastructure consists of the equipment and processes used to acquire and present clinical information and to store and retrieve data. Acquisition and presentation technologies include teleconferencing, data digitizing, and display (e.g., remote X-ray, laboratory tests); text processors (e.g., scanners, fax); or image processors (e.g., video cameras, monitors). Data storage and retrieval include storage devices (disks, tape, CD ROM), along with technology to compress, transmit, and store data. Although most of these technologies have more general application, some are unique to telemedicine.

The telemedicine applications are the health care functions performed across two or more locations. These services can be grouped into four general categories: (1) remote interactive communication between physician and patient or between two physicians, (2) noninteractive transmission and storage of clinical images or data for interpretation, (3) medical administration functions, and (4) medical education. Examples of interactive uses are emergency triage and evaluation, consultations for postsurgery followup, psychiatric evaluations, and patient education. Examples of noninteractive uses are interpretations of electrocardiograms, echocardiograms, X-rays, or computed tomography (CT) scans and diagnosis of lesions in tissue samples. Medical administrative uses include electronic medical records, billing, and scheduling. Among the medical education functions are video classes for continuing medical education, various kinds of videoconferences, and remote grand rounds.

The parts of a telemedicine system that users see are the rooms and equipment at their local sites. Each site has the basic equipment for communicating with other sites in its network and the specific applications it has established. There might be equipment for specific diagnostic applications, such as CT scan, echocardiogram, or biopsies, which could be in different locations. One room in the facility might be equipped for teleconsultations with video cameras, monitors, microphones, equipment to transmit or display data or images, and diagnostic equipment such as an electronic stethoscope. To conduct a teleconsultation, physicians and patients must go to these rooms at their respective sites.

EVOLUTION OF THE TECHNOLOGY

Among the first telemedicine programs in this country were demonstration projects funded in the 1960s and early 1970s by government agencies. These programs included neurological and psychiatric evaluation services in Nebraska, mobile telemedicine for rural health care on the Papago Indian reservation in Arizona, services to jail inmates in Florida, and a nursing home project in Boston. The programs demonstrated that some telemedicine applications could be effective, measured as no consistent differences in quality of care compared with traditional services. Virtually all these
programs were discontinued when funding was withdrawn because they were not self-sustaining (Grigsby, et al. 1993).

After a decline in activity during the late 1970s, telemedicine reemerged as a promising technology, largely because of the expanded capabilities of telecommunication systems and improvements in telemedicine applications. Most of today's large-area telemedicine networks are designed to improve access to care for rural residents by connecting a tertiary hospital or other facility with one or more rural sites. Some applications, such as teleradiology or medical education, are being used increasingly by urban providers.

Most early telemedicine programs were single-purpose applications that tended to emphasize technical diagnostic procedures rather than remote consultations between physicians and patients. The newer systems are more comprehensive, providing a range of medical and educational services and allowing integration of patient data from a variety of sources. Teleconsultations have become important components of these systems, and image transmission technology has improved for other diagnostic procedures (Grigsby, et al. 1993; Kansas Telemedicine Policy Group 1993). Although costs remain high, they have decreased as the technology has matured and can be expected to decline even further (Grigsby, et al. 1994a).

To many who have worked with telemedicine or followed its evolution, the uncertainty regarding its future is not whether it will exist, but what roles it will have in the health care system. As the technology becomes more sophisticated and costs continue to drop, telemedicine systems will become more accessible for physician practices, institutional settings, home-based care, and other providers. The costs of telemedicine systems and their impact on demand for services are pivotal policy issues for payers, however, as they determine whether and how to pay for telemedicine services. Their coverage decisions will help shape the future growth and evolution of the technology.

EFFECTIVENESS OF TELEMEDICINE APPLICATIONS

Any new health care technology, including telemedicine services, must be determined to be clinically effective before it can become a candidate for insurance coverage. Because individual telemedicine services are at different developmental stages, they are at varying levels of readiness for insurance coverage. Effectiveness does not guarantee coverage, however, because payers may decide not to cover a service if it fails to meet other standards such as equivalency with other treatment options or cost effectiveness.

Although in principle the effectiveness of each telemedicine service should be evaluated, it is impractical and prohibitively expensive to do so. One reason is the sheer number of applications. Another is the difficulty in designing controlled studies, including comparisons with equivalent existing services, to measure the performance and costs of telemedicine services effectively. Comparisons are particularly difficult for existing services that do not have formal practice standards, such as evaluation and management services.

Experience with setting standards for teleradiology procedures highlights how difficult it is to measure comparability. Thus far, teleradiology standards are among the few formal telemedicine standards established by professional organizations (American College of Radiology 1994). For some applications, these standards have been criticized as too stringent and, therefore, as

holding teleradiology to a higher standard than that for traditional radiological procedures. For others, standards may not be stringent enough to achieve comparable diagnostic accuracy. Primary diagnostic interpretation of difficult bone fractures, for instance, is less accurate using teleradiology than the original X-ray films (Scott et al. 1993).

In one study performed for the Health Care Financing Administration (HCFA), a taxonomy was developed to summarize current information on the performance of telemedicine applications. The taxonomy classifies applications into one of four categories according to their readiness for insurance coverage and payment, based on what is known about their effectiveness and costs. The categories are applications that (1) are effective and probably have limited impacts on health care costs, (2) probably are effective but have unknown cost impacts, (3) are not yet proven to be effective, and (4) are emerging and untested technologies (Grigsby et al. 1994a). Applications in the first two categories are the strongest candidates for insurance coverage.

The first category includes applications that generally are accepted as effective and are not expected to increase payer costs substantially, but for which information still is needed on how to structure coverage policy and payments. Among these are:

- initial urgent evaluations, triage decisions, and pretransfer arrangements, often in emergency or trauma situations;
- medical and surgical followup and medication checks, with or without the primary care provider present at the remote site; and
- primary care supervision and consultation where a physician is not available at a remote site.

Applications in the second category are those that probably are effective, but whose potential effects on the health care system are unknown because they have not been widely used. Examples include:

- diagnostic evaluations, such as interpretation of transmitted images or data and video consultations with a patient or physician;
- extended diagnostic workups or short-term management of conditions involving a limited number of sessions, which may not require the presence of a primary care physician; and
- open-ended chronic disease management that requires a specialist who is not available locally but does not need the presence of a primary care physician (e.g., dialysis or management of chronic disability).

Emerging telemedicine applications fall in the third and fourth categories. The third category consists of unproven or untested applications that require additional basic research on their safety and effectiveness, including some imaging or auditory (e.g., cardiac auscultation) procedures and telerobotic laparoscopic surgery. The fourth category is emerging and untested

technologies that are not yet candidates for effectiveness evaluation, such as the data glove for virtual palpation or robotics for orthopedic and other surgical applications.

EXPERIENCE OF EXISTING TELEMEDICINE SYSTEMS

Most telemedicine systems have been implemented to increase access to health care for rural residents These systems also have been adopted to strengthen rural communities by enhancing local health care resources. Through telemedicine, it may be possible to retain rural patients for care by local physicians and hospitals. In addition, telemedicine may help foster interactions of local physicians and other providers with those in other locations, thus reducing their isolation and supporting their continuing professional education (Office of Rural Health Policy 1994c; Information Infrastructure Task Force 1995).

Some applications, such as medical education, teleradiology, and other digitized diagnostic tests, also are being used in urban areas. It is probably only a matter of time before telemedicine is more widely adopted in urban settings (Grigsby, et al. 1994b). Anticipation of expenditure increases associated with this growth has made payers reluctant to cover the services.

Comprehensive information is not available about the extent to which telemedicine services are being used in this country. The Office of Rural Health Policy, within the U.S. Department of Health and Human Services, has funded a study to obtain such information on rural applications of telemedicine services and to evaluate experience with existing systems. This study will develop comprehensive profiles of where and how telemedicine is being used, and it will use this information to define a minimum dataset for routine collection of information on telemedicine services. The study also will set up an evaluation framework for examining the benefits and costs of telemedicine based on clinical use and functional technology (Gaumer et al. 1994)

Another source of information is the Telemedicine Information Exchange (TIE) operated by the Telemedicine Research Center in Portland, Oregon, in conjunction with the newly formed Clinical Telemedicine Cooperative Group. HCFA has provided funding to help support development of this collaborative research effort. The TIE database will include information on telemedicine research, bibliographies, telemedicine projects, funding, and news on current activities and products (Telemedicine Research Center 1994). The TIE has the potential to develop complete and comprehensive information on telemedicine activity, although it will require time to become fully established.

Rural Telemedicine Systems

Relatively few telemedicine systems have been in operation long enough to establish a track record. Among these are four rural systems in the states of Georgia, Kansas, Texas, and West Virginia. These systems, described below, show that the uses of telemedicine vary as widely as the needs and preferences of the local communities and providers.

Medical College of Georgia. Initiated in 1991 with funding by the state and the local telephone and power companies, this telemedicine network has been serving a growing number of rural sites. The system provides interactive video consultations, including use of adapters for transmitting images from otoscopes and ophthalmoscopes, as well as microcamera transmission

of images from endoscopes, cystoscopes, microscopes, and others. It also provides teleradiology through both video and digital transmission of images. Insurance payment has been negotiated with Blue Cross Blue Shield of Georgia, and Medicare payment is being provided on an experimental basis (Grigsby et al. 1994a).

University of Kansas. Initiated in 1988 by a pediatrician who felt growing isolation from subspecialty consultants, this network consists of five rural sites connected to the university as the central hub. The system, which is operated in conjunction with the Kansas Area Health Education Center program, emphasizes clinical consultation. It provides interactive video consultations, including teleradiology capability, which have been used for consults in oncology, neurology, psychiatry, surgery, and pediatric cardiology. Most of these consults have been scheduled appointments, with only a few emergency uses. Clinics in neurology and cardiology are held, and other clinics are being planned (Grigsby et al. 1994a).

Texas Telemedicine Project. This system began operation in 1991, following completion of a study to develop a model for statewide telemedicine systems. It is operated by a not-for-profit organization and is supported wholly by private funding from corporations and foundations. The system brings services from a medical clinic, hospital, and state youth commission in Austin to health care facilities in Giddings, Texas. The network provides interactive specialty consultations in allergy, cardiology, dermatology, nephrology, neurology, psychiatry, pulmonology, rheumatology, and urology (Preston 1993).

West Virginia University. Beginning in 1985 with telephone consultations, a broader telemedicine system was established in 1990 by adding video consultations, called Mountaineer Doctor Television (MDTV). The network consists of two hubs and six rural sites, and it receives grant support from the federal Office of Rural Health Policy. If a telephone consultation indicates the need for an interactive video consultation, the consultation either is arranged immediately or scheduled for a later time, depending on the urgency. Electronic stethoscopes, otoscopes, and ophthalmoscopes, as well as videotransmitted teleradiology, are provided at each site. To date, use of the MDTV capability has been low (D'Alessandri et al. 1994).

Telemedicine in Urban Settings and Integrated Delivery Systems

Little information is available about how urban providers or integrated delivery systems are using telemedicine services. It is important to understand how telemedicine is diffusing in these settings, where most people receive their health care services. In particular, information should be developed on the use of telemedicine services by health maintenance organizations (HMOs) and integrated delivery systems. Because managed-care organizations have strong cost control incentives, they would be likely to invest in telemedicine applications that offer a return on their investment through improved productivity. Cost effectiveness of telemedicine in managed-care organizations may not be fully generalizable to the fee-for-service sector, however, if part of the savings is due to inherent efficiencies of managed care that fee-for-service providers are not able to achieve.

According to anecdotal information, use of digital transmission and storage of diagnostic tests by urban providers may be increasing. Many academic medical centers, for example, are using teleradiology to improve their productivity and reduce the incidence of lost X-ray films.

[1] Health care organizations also are using video conferencing for continuing medical education and other kinds of conferences. As equipment is installed in more facilities, expansion into teleconsultations and other patient care applications seems a natural next step.

It does not appear that HMOs have invested yet in many telemedicine applications. Little is known about how they are using the technology, although informal contacts indicate that some HMOs are in the early stages of evaluating some applications. Managed-care associations have not been collecting information on their members' use of telemedicine.

Funding of Telemedicine Systems

Both public and private organizations have provided financial support to supplement investments by health care providers in their telemedicine systems. Private funding has come from foundations, other not-for-profit organizations, and businesses. Funding from telecommunications firms and telemedicine equipment vendors has been an important source of support, allowing these firms to refine their products and increase their client base. Information is not available, however, about the amount of funding provided by the private sector. Substantial public sector funding has come from state governments and federal agencies, including the National Library of Medicine, Health Care Financing Administration, Office of Rural Health Policy, Agency for Health Care Policy and Research, Rural Electrification Administration, and Department of Defense (Information Infrastructure Task Force 1995).

The federal Office of Rural Health Policy sponsors a program of three-year grants to develop information for systematic evaluation of rural telemedicine systems and to facilitate development of rural health care networks through the use of telemedicine. In 1994, 12 rural telemedicine projects were awarded grants totaling $5.3 million. Of these projects, 11 are new programs funded at $250,000 to $500,000 apiece. The grants will be used to purchase and install telemedicine equipment and begin system operation.[2] The other project, at West Virginia University, received $800,000 in its third year of funding for its MDTV program (Office of Rural Health Policy 1994b).

HCFA has awarded four grants for rural telemedicine infrastructure development in Iowa (two projects), West Virginia, and North Carolina. The West Virginia and North Carolina projects are among those also funded by the Office of Rural Health Policy. As these projects become operational, HCFA plans to use the experience and cost information developed to test payment options, which may include use of Medicare waivers for experimental payment methods (HCFA 1994).

Sustainability of Telemedicine Systems

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[1] This information was provided by a representative of a teleradiology equipment vendor.

[2] The funded projects are High Plains Rural Health Network (Colorado, Nebraska, Kansas), University of Kentucky Medical Center (Kentucky), University of Minnesota Hospital and Clinic (Minnesota), University of Missouri-Columbia Health Sciences Center (Missouri), Deaconess-Billings Clinic Health Systems (Montana), Good Samaritan Hospital (Nebraska), Mary Imogene Bassett Hospital (New York), East Carolina University School of Medicine (North Carolina), University of North Carolina Program on Aging (North Carolina), Rapid City Regional Hospital (South Dakota), and University of Washington School of Medicine (Washington, Alaska, Montana, Idaho).

Currently, few telemedicine applications are self-sustaining due to high capital and operating costs and low service volumes. One important reason for this problem is that, until recently, telemedicine services were not covered by health insurance. Coverage still is limited to a few experimental sites, and probably will not be broadly available until telemedicine offers proven performance at reasonable costs.

Several market barriers also are restricting the growth of telemedicine activity. These include the limited number of applications with proven effectiveness, high capital costs, incompatibilities among systems within the infrastructure, high transmission costs, state licensure laws that limit medical practice by out-of-state physicians, resistance by physicians, and the small size of many markets (American Telemedicine Association 1993; Grigsby et al. 1994a; Information Infrastructure Task Force 1995).[3] Technological and cost barriers are expected to decrease as telemedicine applications are refined and the telecommunications infrastructure expands.

Small population size, predominantly a characteristic of rural markets, is a structural market barrier because a small population generates low service demand for telemedicine services. Although only a small portion of the country's population lives in these small markets, these residents are among those who might benefit most from telemedicine services by gaining greater access to needed health care. Financial incentives in the form of tax incentives or low interest loans or regulatory assistance such as lower transmission rates might be required to overcome this barrier.

The reluctance of physicians to use available telemedicine services may be a key reason for the slow growth in service activity for rural telemedicine systems. Among the factors suggested anecdotally as influencing physician attitudes are concerns about quality, control of patient care and referral relationships, convenience, and payment for their services. Some physicians may think that lack of face-to-face contact and tactile diagnostic information in video consultations compromises their ability to deliver quality care. Some rural physicians may fear they will lose patients to urban physicians and hospitals that are using telemedicine networks to increase their own service activity. Some also may feel their professional autonomy and credibility are threatened when they are compared with physicians practicing in urban locations. Finally, some may be reluctant to change the way they practice medicine. These issues may become less important as physicians gain experience and familiarity with telemedicine services.

Design of telemedicine sites and services also may be discouraging use of these services. For example, some facilities have placed their video consultation rooms in locations that are inconvenient for physicians and patients. These choices may be a result of having grant funding rather than being paid for services delivered. With grant funding, systems receive their funds regardless of how many patients they serve. Under insurance, where payment is tied to service activity, systems would have an incentive to be more responsive to user needs and preferences.

MEDICARE COVERAGE AND PAYMENT ISSUES

[3] Medical licensure, which is a regulatory issue, is discussed later this chapter.

Telemedicine poses many of the same payment policy questions that are involved with any emerging medical technology. It differs, however, because it is an infrastructure for the provision of a variety of services rather than a single new clinical capability. Medicare coverage decisions must be made for each individual telemedicine service. The willingness of Medicare to cover telemedicine, as well as the payment methods it uses, likely will influence policies of other payers (Office of Rural Health Policy 1994c).

HCFA has the regulatory authority necessary to establish Medicare coverage and payment policy for telemedicine services just as it does for any other new health care technologies. In making these policies, HCFA considers the effectiveness and medical indications for each telemedicine service, as well as the potential effects of different coverage and payment options on Medicare costs (HCFA 1994). (Chapter 6 provides a broader discussion of Medicare coverage policy and issues involved in coverage decisions for new technologies, of which telemedicine is one example.)

Key issues pertinent to telemedicine services are the value they offer compared with traditional methods of performing the same services, and their potential to escalate Medicare costs by stimulating overuse of health care services. When evaluating telemedicine applications, HCFA often faces decisions regarding how much it is willing to pay for expected improvements in health care delivery. Evaluations should consider the possible added value of telemedicine services through their potential tri

- expand or protect access to care for underserved populations,
- increase efficiency in service delivery,
- improve quality of care through integrated approaches, and
- strengthen capabilities for emergency medical services.

There is little information available regarding how insurance coverage for telemedicine might affect service use patterns or the extent to which it might stimulate overuse of services. Coverage would eliminate a financial barrier by paying providers for each service delivered and reducing patients' **costs.** Presumably, some telemedicine services would substitute for traditional services, particularly in

urban areas, which could offer greater convenience for patients and providers at no additional cost. It also may be presumed that, by increasing access to care for residents of underserved areas, telemedicine coverage would elevate their service activity and costs to levels comparable to those of most urban residents. It is not known, however, how much inappropriate service demand might be stimulated in either urban or rural areas.

HCFA has different payment policies for telemedicine services that involve patient contact (e.g., consultations) and those that do not (e.g., interpretation of diagnostic tests). Providers are not paid for telemedicine services involving patient contact, such as teleconsultation or emergency triage and evaluation, because they do not satisfy current HCFA requirements that services be performed "face-to-face." HCFA does allow payment for interpretation of diagnostic tests and

other~non-contact services. In the absence of national Medicare coverage policy, carriers have discretion to pay for telemedicine services. With only a few exceptions, carriers have chosen not to do so because of the complexity of issues involved.

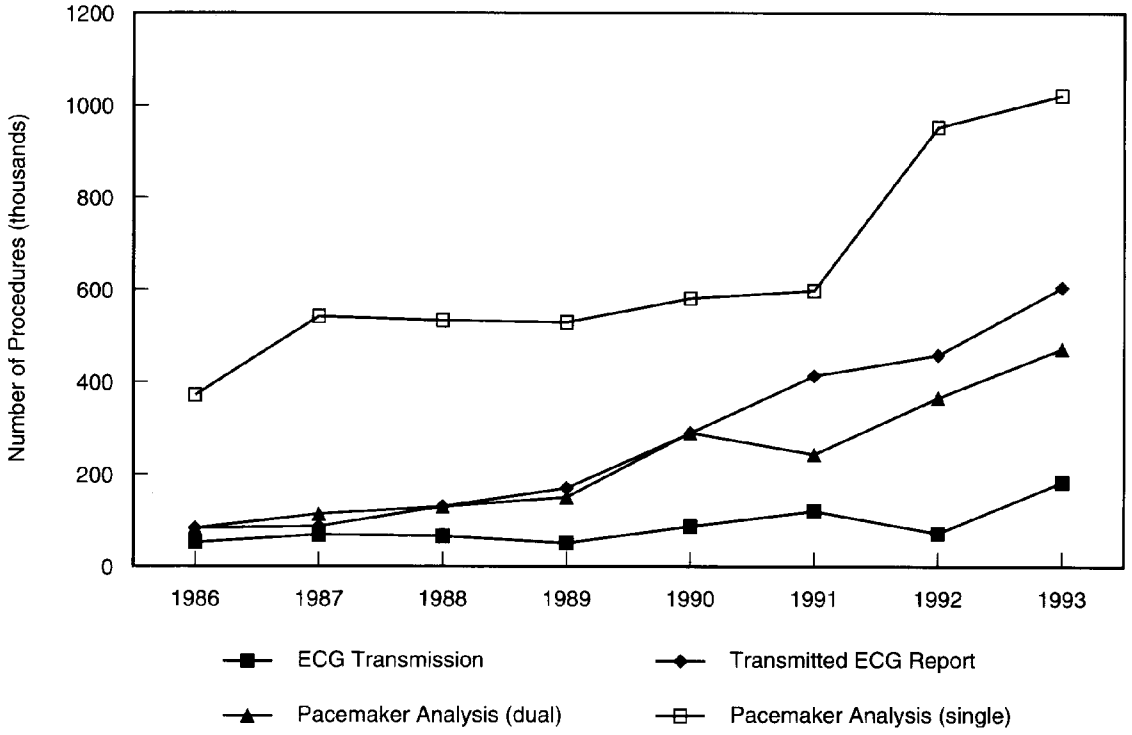
Telemedicine Services Covered by Medicare

HCFA's current policy for telemedicine services not involving patient contact is to pay the same fees that would be paid for traditional services. For example, HCFA will pay physicians for interpretation of X-rays whether the physicians obtain the X-rays in their own facilities, by mail, or by electronic transmission. This policy leaves to providers the clinical and financial decisions regarding the media they will use for such services, and it assumes that providers are making choices of technological capability based on current standards of practice.

Unfortunately, because providers use existing procedure codes to submit Medicare claims for teleradiology, telepathology, and other noncontact services, information about trends in service volumes and expenditures is not available for most of these services. At this time, only four telemedicine services have their own procedure codes: electrocardiogram (EKG) transmission, reading the transmitted EKG report, and analysis of either dual or single chamber pacemaker systems. Volumes of these services have grown from 1986 to 1993, especially for reading of EKG reports and analysis of the single chamber pacemaker (Figure 7-1). Although these trends raise questions about possible overuse of services, further analysis would be required to better understand the trends and their net effects on quality of care and Medicare costs.

It would be desirable to collect additional information on providers' use of telemedicine diagnostic and monitoring services for Medicare beneficiaries. One approach would be to establish modifiers to existing procedure codes for telemedicine applications. Because these modifiers would not determine fees, however, providers would have little incentive to use them, and use of telemedicine services probably would be underreported. Despite this limitation, separate modifiers would provide information on telemedicine diagnostic service activity that currently is not collected, which could be used to guide more rigorous analysis on the effects of telemedicine on Medicare radiology and pathology service volumes.

Figure 7-1. Medicare Volume of Telemedicine Services that have Procedure Codes, 1986-1993



SOURCE: Physician Payment Review Commission analysis of 1986-1993 Medicare claims, 100 percent summary file.

Teleconsultations

Telemedicine services that involve interactive video communication pose the most diff~cult policy concerns because they change the roles of participating providers. Depending on the nature of a teleconsultation, physicians' work may be different than their work for the comparable face-to-face consultation. Many video consultations involve two physicians or a physician and a nonphysician practitioner, as well as technical support provided by the site facility, all of whom want to be paid for the services they provide.

Two examples show the complexity of payment issues for teleconsultations. An emergency teleconsult with a specialist that occurs during a patient's visit to a primary care physician would involve two physicians. In this case, it should be acceptable to pay both, because the encounter would be equivalent to the two sequential face-to-face visits that it would replace, one with the primary care physician and the second with the specialist. A more difficult case is a teleconsult that is scheduled separately following a primary care physician visit, in which both physicians participate with the patient. These two encounters would involve three physician visits (two primary care and one specialist), rather than two face-to-face visits if the patient had traveled to see the specialist after the primary care visit.

Another relevant issue is that coverage of video consultations would reopen the question of payment for telephone consultations. Medicare does not pay physicians for telephone consultations, presumably because of concern that coverage would lead to excess use and costs. For some applications, however, telephone consultations have been found to be of comparable quality to video consultations at lower cost (SCI Systems, Inc. 1974; Conrath et al. 1977). If payment was provided for video consultations but not for telephone consultations, physicians would have an incentive to use video consultations when a less costly telephone call might suffice. This issue highlights the dilemma of how to define the scope of telemedicine services and structure payment so that the value of telemedicine capability may be obtained without unduly escalating Medicare costs. Given such uncertainties, HCFA's cautious approach has been understandable.

Possible Payment Approaches for Teleconsultations

Concerns about the uncertain cost implications of video consultations have led to suggestions that Medicare allow coverage on a restricted basis. One approach that is suggested frequently would be to permit coverage only in rural locations or, even more restrictive, only in underserved rural areas. Coverage also could be limited to specific applications that have been accepted as effective and are not likely to be overused, such as emergency or triage teleconsultations. Another approach would be to contract with a limited number of telemedicine networks, using competitive bidding among networks to identify the winning networks and establish payments.

The first step in establishing a payment method would be to determine the types of teleconsultations for which it is acceptable to pay multiple providers using existing codes and payments, and those for which it is not. As described above, a followup teleconsultation with a patient in which both the primary care physician and specialist participate (after an initial primary care physician visit) is an example of the latter category. Two basic approaches could be used to establish provider payments for encounters that involve extra physician visits. First, individual providers could be paid separately under the Medicare Fee Schedule, using separate codes and relative value units. Payment design issues to be resolved with this approach include:

- whether telemedicine services should be coded using separate procedure codes or modifiers to existing codes,
- how to set separate payments for professional and technical services for physicians and facilities.
- whether to pay reduced rates to a primary care physician who serves as a second physician in a consultation with a specialist,
- how to determine the relative value units for each physician, and
- how to pay nonphysician practitioners at remote sites.

An alternative approach would be to establish a form of global fee for each type of teleconsultation. For the followup teleconsultation example, one fee would be paid for the encounter. The providers would negotiate among themselves their shares of that payment. The global fee might be designed to identify separately a component for applicable capital costs of telemedicine equipment, analogous to the capital portion of Medicare prospective payments for hospital inpatient services. The payment could be made to the provider that is managing the patient's care, for example, the primary care physician or the rural hospital. Different payment structures might be used for inpatient and outpatient teleconsultations.

HCFA recently has awarded several grants for projects that will test payment alternatives for video consultations to ascertain their effects on provider incentives and Medicare costs. One of these studies is testing how paying all physicians participating in teleconsultations would affect Medicare costs of care in the West Virginia MDTV program including how it would chance overall service use patterns and costs of care.

Special Applications of Telemedicine

Several telemedicine applications are being developed for identifiable population groups. Among these are:

- services to institutionalized populations in homes for the disabled, nursing homes, or jails and penitentiaries;
- monitoring and consultation for patients in their homes;
- continuous monitoring of ambulatory patients; and
- triage and emergency health care response during disasters.

Because these services are organized differently than the standard outpatient or inpatient visits, payment methods might be structured specifically for each application. In doing so, a balance should be maintained between enhancing access to needed care for these populations and protecting Medicare from excess demand or fraudulent billing, to which some applications may be vulnerable.

Telemedicine in Underserved Areas

It might be desirable to establish financial support mechanisms for telemedicine to help improve access to care in underserved locations, where costs may be unavoidably higher than average. Although capital and operating costs for telemedicine networks are declining, operating costs remain high in some areas because of telecommunications costs. As discussed above, a combination of high costs and low use rates may prevent some rural networks from being self-sustaining, even with insurance coverage.

Several approaches have been suggested to improve access to care by supporting telemedicine in underserved areas. First, the elimination of telecommunications regulatory barriers, such as conflicting fee structures for use of transmission lines, would improve access to

telecommunications technology and reduce transmission costs. Additionally, federal tax incentives and low interest loans for telemedicine systems could reduce financial barriers. Both approaches have been recommended in a recent report by the Health Information and Applications Working Group of the Information Infrastructure Task Force (Information Infrastructure Task Force 1995).

Another option would be to use a payment method that combines payment for services with grant funding. The payment rate would be established to include payment for a reasonable per unit overhead expense based on a system that was operating at full capacity. Grant support would provide funding for excess capital costs that would not be covered by payment due to low service volumes. The payment also might include a bonus payment mechanism to encourage telemedicine systems to serve the most severely underserved areas

INFORMATION NEEDED TO DETERMINE COVERAGE AND PAYMENT POLICY

Payers, including Medicare, will be relying on evaluation research to inform their decisions regarding coverage and payment methods for telemedicine technologies. The success of an evaluation will depend on having clear outcome goals to evaluate, sound study design and execution, and reliable operating data for the technology. It often is difficult, however, to operationalize measures of effectiveness and value in evaluation studies.[4]

Evaluators of the performance and costs of telemedicine services face at least four challenges that make it difficult to obtain useful results. First, each telemedicine service involves different clinical processes, outcomes, and costs. Because it would be extremely expensive to evaluate all these services, payers will have to set priorities for what services will be studied. Second, telemedicine services are rapidly evolving technologies. Services selected for evaluation should be among the more fully developed applications, so that studies can document the current performance of the relevant technologies as well as possible, while taking into consideration possible future changes in capability and costs. Third, the comparison group for telemedicine applications may be unclear. For example, a teleconsultation could be evaluated on its own merits, or it could be compared to a consultation performed either face to face or by telephone. Fourth, the small service volumes of existing telemedicine systems translate into small sample sizes and low statistical power for evaluations. The small numbers may distort estimates of unit costs, and the statistical limitation may prevent studies from drawing conclusions about medical outcomes or other findings.

The usefulness of an evaluation also will depend on how accurately the system being studied represents the operating capability and costs that a telemedicine system would have if a particular payment policy were fully implemented. This may be the most challenging problem, since the market structures and incentives for virtually all the existing telemedicine systems diverge substantially from

[4] The discussion in this section draws upon information provided by Rashid Bashshur (University of Michigan) and Douglas Perednia (Oregon Health Sciences University), who are principal investigators for two of the HCFA telemedicine evaluations. In particular, they offered helpful insights with respect to research design issues, information requirements, and methodological limitations.

what they would be if providers were being paid for services rendered and other market barriers were removed. As discussed above, incentives of telemedicine network providers under insurance payment differ from those under grant funding. Also, when insurance pays for their services, physicians will be more willing to participate than they have been thus far.

Getting Good Information for Decision Making

Before evaluations can be performed, a set of teleconsultation services needs to be defined based on the type of health condition being treated, clinical processes used, and telemedicine functions required. Separate teleconsultations might be defined, for example, for a chronic care consultation for renal disease or a cardiac condition. Services with the highest priorities for evaluation then should be identified. The selection process should consider the potential impact of payment for the service on access to care, as well as anticipated service volumes, costs, or clinical outcomes.

To evaluate payment systems for a type of teleconsultation, the first step would be to define a payment policy's goals. Then one or more payment methods would be developed and implemented to pay for services delivered by telemedicine systems. Evaluations would assess how well a payment method achieves the payment policy's goals. One goal, for instance, could be to reduce Medicare costs; another could be to gain added value, such as improved access or outcomes, at acceptable cost.[5] Outcomes measured should be responsive to the payment policy goals and should encompass impacts on patients, providers, and Medicare. For example, for a goal to reduce Medicare costs, an outcome measure would be total Medicare expenditures per beneficiary.

In establishing the teleconsultation payment rates to be evaluated, reliable information about telemedicine systems' overhead and the direct costs of providing the services should be obtained and compared to the existing payments for face-to-face services. Given that telemedicine systems are underused, the overhead cost assigned to a unit of service could be overestimated, thereby inflating the payments. Capacity utilization rates that assume a system is being fully used would generate the most reasonable payments, but they also could be difficult to estimate.

After the new payment method being tested is introduced, telemedicine systems participating in a study will respond to the new payment by changing the way they operate. Sufficient time should be allowed for them to achieve a new operating equilibrium before comparative analyses of costs and outcomes are performed. Data should be collected during the transition period to learn as much as possible about responses to payment changes.

Information should be gathered for episodes of care, identifying all Medicare costs that might be changed by the availability of payment for telemedicine services, in addition to the payments for the telemedicine consultations. The net impact on total Medicare costs will be affected by changes in service patterns, with higher costs for some services and lower costs for others. Among these would be costs of rural and urban hospital stays, patient transfers, emergency transport, emergency room use. and diagnostic tests performed.

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[5] Economists express a goal of added value as maximizing social surplus, which is the net value of the amount purchasers are willing to pay for a product in excess of the costs of supplying it.

Current Evaluations Being Performed

HCFA is funding two studies of telemedicine to help inform its coverage and payment decisions. One will evaluate the telemedicine program in Georgia; the other will assess programs at East Carolina University and in Iowa. The evaluations will emphasize feasibility, service delivery, and costs, rather than clinical effectiveness. Although they use somewhat different approaches, both studies are responsive to the issues discussed here.

All 12 of the telemedicine projects funded by the Office of Rural Health Policy have evaluation components, which will provide case study information on telemedicine performance. The evaluations will focus on improvements in access to care, acceptance of specific applications by providers and patients, and the administrative and financial feasibility of comprehensive telemedicine systems. The extent to which these evaluations will be useful for Medicare payment policy is uncertain. Because the projects can use grant funding to pay physicians for teleconsultations, the evaluations may yield some information on how payment affects utilization. The projects are performing separate evaluations, however, and all but one are new and changing. Thus, these projects may not be accurate reflections of fully operational systems under an established telemedicine payment policy, and their sample sizes may be small.

LEGAL AND PROFESSIONAL ISSUES

Several issues unrelated to payment were identified earlier as additional reasons for the low service activity of existing telemedicine systems. These legal and professional issues deserve attention to help remove barriers to the appropriate development of telemedicine services as part of the health care system (Grigsby et al. 1994b; Office of Rural Health Policy 1994b; Information Infrastructure Task Force 1995).

Standards for the Practice of Telemedicine

Adoption of practice standards would provide tools to guide the use of telemedicine programs and individual applications. If precedent is followed, this role would be assumed primarily by professional societies, accrediting organizations, or other private organizations. To date, formal standards have been established only for teleradiology, although some work for teledermatology is being sponsored by the Dermatology Foundation (American College of Radiology 1994; Amonette 1995). One reason for the absence of other standards is lack of supporting data required to develop them. Development of information on the effectiveness of telemedicine technologies could be an appropriate public sector role. As information becomes available, professional organizations and accrediting bodies may be able to establish telemedicine standards and practice guidelines for their constituencies. Such standards may help protect patients from inappropriate care and providers from medical liability exposure, and they can be referenced in Medicare certification and coverage policies.

State-Specific Medical Licensure

Under existing state medical licensure laws, which do not allow out-of-state physicians to practice in a state, specialty physicians may have to obtain multiple state licenses to provide telemedicine services. Kansas recently passed legislation that explicitly prohibits out-of-state consultation unless the physician also is licensed to practice in Kansas. A priority identified by the American Telemedicine Association (1994) is cross-state licensure for telemedicine interactions during disasters. The Information Infrastructure Task Force report (1995) recommends federal licensure for telemedicine services. Although federal law based on telemedicine as interstate commerce would have the potential to remove this barrier, state resistance could be substantial. The Federation of State Medical Boards is in an early stage of developing a model licensure process for telemedicine practice for approval by its membership, to ultimately enhance interstate practice of telemedicine (Harwood 1995).

Professional Liability for Consultant Physicians

Compared with providing traditional services, the provision of telemedicine services may increase liability exposure for physicians, not only because of the relative absence of practice standards but also because the technology changes relationships among physicians and patients. It may be difficult to assign liability among multiple providers in a telemedicine encounter. The presence of telemedicine capability also may change the local practice standards used to assess medical liability in legal proceedings. The changed nature of the physician-patient relationship may feel unfamiliar to patients, and this unfamiliarity may extend to perceptions by patients and juries that teleconsultations are inadequate because they are not hands-on. Further, technical aspects of image compression and transmission could lead to misconceptions that consulting specialists are working with incomplete data. Liability exposure might be reduced by such methods as establishment of minimum standards by professional organizations or videotape documentation of teleconsultations as part of medical records (American Telemedicine Association 1994; Office of Rural Health Policy 1994c).

Confidentiality of Patients' Telemedicine Records

The benefits of data integration capabilities offered by telemedicine systems are accompanied by risks of violating patients' rights to privacy. One aspect of this issue is informed consent from patients before teleconsultations in which they are participants, including their written directions with respect to recording of sessions and storage of tapes as part of their medical records. Another is protection of electronic medical records by telemedicine providers, including security for the computer systems and other media on which they are stored. Finally, confidentiality of medical information should be protected during transmission, using such techniques as data scrambling or closed transmission systems (Preston 1993; American Telemedicine Association 1994). Liability law motivates providers to ensure protection of confidential information, and the availability of model forms or procedures and technical guidance on telecommunication and information systems could help them to do so.

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