The use of interactive video has been recognized as a means of delivering medical support to isolated areas since the 1950s. The Department of Defense recognized early the capacity of telemedicine to deliver medical care and support to front-line military personnel. In 1989, the Texas Telemedicine Project received grants and support from the then American Telephone and Telegraph Company (now AT&T) and the Meadows Foundation of Dallas, Texas, to establish and evaluate telemedicine delivery in central Texas. That project had 6 connected telemedicine sites: 3 in Austin, Texas, and 3 in Giddings, Texas (a small community 55 miles to the southeast of Austin). The sites in Giddings included a chronic outpatient dialysis facility, an inpatient psychiatric hospital, and the emergency department at Giddings Hospital. Patient contact began in April 1991 and continued through March 1993. During that period, data on the 1500 patient contacts made were recorded. After termination of the Texas Telemedicine Project, AT&T continued to provide the transmission lines, and between 1993 and 1996, another 12,000 patient contacts were made. Approximately 80% were dialysis evaluations and 20% were non-dialysis primary care contacts.

The original cost of materials and equipment in the Texas Telemedicine Project exceeded $50,000 per site. Today, a secure Internet connection with full-motion video and wireless data transfer to almost any location in the world is achievable with an iPad. Multiple inexpensive applications with connections for electrocardiogram, otoscope, and stethoscope, among others, make this technology extremely inexpensive and user-friendly.

The revolution now is rapidly moving forward, with Medicare reimbursing telemedicine contacts in medically underserved areas. Multiple bills are before Congress to expand Medicare and therefore private insurance payment for this service.

**Key words**
Telemedicine, telepsychiatry, American Telemedicine Association

**Introduction**
The directional transmission of full-motion video has been available since the late 1940s and generally available to the U.S. public since the early 1950s. That capacity for visual and sound transmission now allows for information to be received by almost every individual in the United States.

Interactive video was soon recognized to be a means for delivering medical support to isolated areas. It was particularly developed by the Indian Health Service to provide care to the Pima Indians on reservations in New Mexico and Arizona. It was evidently applied to support astronauts in space and during the moon landings.

The Department of Defense recognized early the capacity of telemedicine to deliver medical care and support to front-line military personnel. Regular meetings were held at various sites in the United States, primarily supported by the Department of Defense, with open invitations for participants to organize and present results of techniques and care delivery using this medium.

**Discussion**

**Texas Telemedicine Project**
In 1989, the Texas Telemedicine Project received grants and support from the then American Telephone and Telegraph Company (now AT&T) and the Meadows Foundation of Dallas, Texas, to establish and evaluate telemedicine delivery in central Texas.

The project had 6 connected telemedicine sites: 3 in Austin, Texas, and 3 in Giddings, Texas (a small community 55 miles to the southeast of Austin). The Austin sites included the Austin State Hospital, a private psychiatry office, and an outpatient nephrology office. The sites in Giddings included a chronic outpatient dialysis facility, an inpatient psychiatric hospital, and the emergency department at Giddings Hospital.
The sites were organized and directed by the two principal investigators of the project, psychiatrist Dr. Jane Preston and nephrologist Dr. Jack Moncrief, and included support by nurses in various locations as required.

The interactive video equipment included T1 transmission lines, with a transmission capability of 384 kilobits per second (approximately half full-motion video). The lines were provided by AT&T. At each location, the equipment also included a 30-inch monitor and cameras with remote control capacity for pan, zoom, and autofocus. The video monitor in the dialysis unit was on a rolling cart with a 35-foot extension connection, allowing for a patient to be seen while undergoing hemodialysis in a single large room or for the equipment to be moved into a private room for personal care.

Written records were kept for each patient contact, and weekly meetings were scheduled for discussion of needed adjustments, problems, options, and benefits. Patient contacts began in April 1991 and continued through March 1993. During that period, data for 1500 patient contacts were recorded. Those contacts included monitoring of an average of 30–40 patients who underwent hemodialysis for 4 hours 3 times weekly, and of patients in the psychiatric facilities in Austin and Giddings.

After termination of the Texas Telemedicine Project, AT&T continued to provide the transmission lines, and between 1993 and 1996, another 12,000 remote patient contacts were made. Approximately 80% were dialysis evaluations, and 20% were non-dialysis primary care contacts.

Before the telemedicine installation, the 8-person nephrology group responsible, on a rotating basis, for the dialysis-dependent patients had to physically visit the distant dialysis facility twice each week. Those visits (Monday, Wednesday, and Friday; morning and afternoon) usually included seeing each patient on a morning dialysis shift, waiting until the shift was complete, and then again seeing patients scheduled for the second shift. The visits required approximately 3 hours for patient contact and 2 hours for automobile transportation. Single-shift days (Tuesday, Thursday, Saturday) required 1 hour for patient contacts, plus the automobile transportation. Thus, 1 nephrologist spent 2 half days each week to see every patient for 5 minutes, once weekly, in this small community 55 miles from Austin.

With the use of the telemedicine equipment, a single nephrologist at the Austin site could see each patient individually and discuss problems, give direction to the nursing staff, and return to office practice within 30 minutes. If required, a second or even a third visit could be made to an individual patient, because the distant nephrologist was continuously “present” electronically in the dialysis facility during the entire dialysis shift.

During the time of the Texas Telemedicine Project, it became obvious that a national organization to stimulate and foster the use of this medium would be very helpful.

American Telemedicine Association
The American Telemedicine Association was incorporated in 1993, and a board of directors was established. The association has become the primary venue for organizational support, information sharing, general recommendations, and political activity for the developing telemedicine industry.

The evolution of techniques for the delivery of health care through interactive video has been astonishing. The original cost of materials and equipment as described for the Texas Telemedicine Project exceeded $50,000 per site. Today, a secure Internet connection with full-motion video and wireless data transfer to almost any location in the world is achievable with an iPad. Multiple inexpensive applications with connections for electrocardiogram, otoscope, and stethoscope (among others) makes this technology extremely inexpensive and user friendly.

Current status of telemedicine in dialysis
Today, the question is why hasn’t the delivery of health care using interactive video become more widespread and generally available and usable?
Potential answers include these:

- Failure of the medical community to adapt to the new technology
- Absence of national medical practice licensure
- Failure of organized medicine to recognize the capacity and convenience associated with the use of the technology
- Criticism from the medical community that “If it can’t do everything, it can’t do anything”
- Failure of the business model of medical delivery through the new medium
- Experimental nature of uses to date
- Failure of Medicare to lead the way
The revolution is now moving rapidly forward, with Medicare reimbursing for telemedicine contacts in medically underserved areas. Multiple bills are before Congress to expand Medicare—and therefore private insurance—payment for telemedicine service.

Everyone should get ready, because the telemedicine revolution is coming!

**Disclosures**
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