

Focus on **Consumer Health**

## JAMIA

*Viewpoint* ■

## Telemedicine and the National Information Infrastructure: Are the Realities of Health Care Being Ignored?

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**Abstract** Health care is shifting from a focus on hospital-based acute care toward prevention, promotion of wellness, and maintenance of function in community and home-based facilities. Telemedicine can facilitate this shifted focus, but the bulk of the current projects emphasize academic medical center consultations to rural hospitals. Home-based projects encounter barriers of cost and inadequate infrastructure. The 1996 Telecommunications Act as implemented by the Federal Communications commission holds out significant promise to overcome these barriers, although it has serious limitations in its application to health care providers. Health care advocates must work actively on the federal, state, and local public and private sector levels to address these shortcomings and develop cost effective partnerships with other community-based organizations to build network links to facilitate telemedicine-generated services to the home, where the majority of health care decisions are made.

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“Information Technology In Community Health,” the theme of the AMIA 1997 Spring Congress, is critically important and particularly timely. As the FCC’s Advisory Committee on Telecommunications and Health Care observed: “The convergence of health care and telecommunications technologies offers an extraordinary opportunity to expand the availability and affordability of modern health care.”<sup>1</sup>

Yet the Telecommunications Act of 1996 and the FCC’s Universal Service Rules implementing the health care provisions of the Act have taken a conservative view of the potential of the national information infrastructure (NII) to promote community and individual health.

This paper reviews briefly some of the major shifts going on in health care today and the current applications of telemedicine to deliver health care services electronically. It assesses the impact of the 1996 Telecommunications Act and the FCC rules on the potential of telemedicine to respond to the new health care needs of our society. It concludes with outlining some essential next steps for the health care sector and professional organizations such as AMIA to take in order to ensure that both telemedicine and the Telecom Act do in fact fulfill their promise to ensure more equitable and cost effective health care in our communities.

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## Health Care in the Year 2000

Our health care system is undergoing major transformations today, but these unfortunately are often poorly understood and only sporadically supported and implemented.

Health care is moving increasingly away from the hospital to the community and the home. The patient's home health care team now encompasses a much broader set of nonmedical players, such as social workers, home care health aides, therapists, and nutritionists. Information is playing an increasingly more important role in health care as patients' preventive and treatment options proliferate and the opportunities for health care choices increase. Technology continues to broaden the range of tests, screening, treatment options, and information access points available. It also facilitates much of the research that has highlighted the impact of life style behaviors on long term health.

As health care costs have soared in this country, too little attention has been paid to the health care distribution system in the United States. Many people have no health care insurance, and many individuals and communities, particularly rural and inner city areas, have little or no access to health care resources. Unhealthy life styles, medical care foregone or postponed, and inadequate responses to the chronic and long-term health care service needs of large segments of our population not only exacerbate the cost of care but constitute a blotch on a system that has prided itself on providing the most technologically advanced health care in the world.

The health care establishment pays only lip service to the fact that today health care embraces a much more comprehensive concept of wellness and health promotion than is encompassed by our traditional medical model of hospital-based acute care. The Institute of Medicine defines telemedicine as "diagnostic, treatment and other *medical* decisions or services for particular patients" (emphasis added).<sup>2</sup> Their report gave no recognition to the broader therapeutic uses of telemedicine for patient or care giver support or for education and self-care information access.<sup>3</sup> HCFA and other third-party payers continue to focus reimbursement coverage primarily on acute medical care provided in hospital, outpatient, and nursing home settings. Most HMOs emphasize their cost constraining role and pay relatively little attention in their actual practices to the increasing need for nonacute community and home-based services for postacute convalescence, therapy, and the long-range management of chronic conditions. Patient electronic record

systems ignore the fact that significant portions of patient care take place in the home and are not captured in the electronic record, which is still essentially hospital and physician office oriented. Finally, home health care team members have much less access to each other to share and record their observations of the patient than did the hospital or nursing home staff in their daily briefings and casual encounters in the halls of their institutions.

Paralleling these shifts in health care have been the equally dramatic strides that telecommunications and information technologies have made in the last decade in changing the ways we can communicate and access data. The Internet has developed into a low-cost switched communications network for those Americans who can afford computers and are interested in linking to networked services. Text messages can be instantaneously communicated via fax or computer limited only by the speed of the computer modem or the bandwidth of the line to which the computer is linked. Two-way video communications are equally available, providing that the participants have access to a line with sufficient bandwidth and have the money to pay for deployment and usage.

## Telemedicine Responses to The Changing Health Care Needs

There are over 150 telemedicine projects currently being conducted in over 40 states involving some 5000 patients.<sup>4</sup> These projects are probing the extent to which telemedicine can in fact increase access to health care and reduce the costs of delivering it. Many projects also compare the relative efficacy of different communications modes to serve the needs of providers and patients.<sup>5</sup>

### Management and Design of Telemedicine Projects

Almost 75% of these telemedicine projects are sponsored by urban or university-based medical centers seeking to serve their surrounding rural community primary health care providers.<sup>6</sup>

These projects typically employ a combination of ordinary telephone and ISDN or other high-speed links. Individual usage breaks down as follows:

- 78% of facilities use telephone lines
- 76% of facilities use dedicated lines
- 52% use fiber optic lines
- 52% use switched or ISDN lines
- less than 10% use either satellite or microwave links<sup>7</sup>

Ninety of these use real time technologies and two thirds or 66% use store and forward technologies, with most sites using both. All are configured on a hub and spoke basis, with the hub site at the urban hospital center.<sup>8</sup> A 1995 Office Of Rural Health Policy survey of telemedicine found that 85% of the 459 respondents used interactive video transmissions.<sup>9</sup>

### Service Scope of Telemedicine Projects

The preponderance of these projects deal with tele-radiology, cardiology, orthopedics, dermatology, and psychiatry in that order.<sup>10</sup> Other telemedicine projects provide telecare in other subspecialties, such as oncology, pathology, renal dialysis, urology, trauma, and ophthalmology.<sup>11</sup>

Only a few projects involve the provision of general health and home care services and information. These projects focus on special health care conditions such as AIDs and infectious diseases or on special populations, such as the homebound elderly, newborn infants, spinal cord injury patients, or inmates in correctional institutions.<sup>12</sup>

Some of these home care treatment or monitoring projects involve two-way video over telephone or cable lines. They are configured on a hub and spoke basis, with the hub site typically in the local community hospital, which houses the hub equipment located in a specially outfitted "studio." Some, with the help of commercially available desktop telemedicine terminals utilizing regular telephone lines, enable patients and care givers to monitor the patient's vital signs (blood pressure, ECG, pulse, etc) and relay this data visually to the patient's health care professional in the serving health care facility; others enable the remote nurse to "visit" patients electronically using a specially configured two-way analog video cable link, observing the condition of elderly or recently hospital-discharged patients, reminding them of their medications, monitoring their recommended self-care activities, and recording their vital signs, which patients can take themselves and display the results on their TV screens.<sup>13</sup>

In one case involving the Beth Israel Deaconess Medical Center in Boston, hospital personnel focussed on helping young mothers to care for their low birth-weight infants after their discharge from the hospital.<sup>14</sup>

Another project involving the care of spinal cord injury patients successfully employed a still-image telephone to care for these patients in their homes to check for pressure sores and other conditions that could require rehospitalization or other acute care intervention.<sup>15</sup>

A few HMOs are probing the value of telemedicine to deliver health care services to their enrolled members. Kaiser Permanente is conducting a series of pilot telemedicine projects to conclude at the end of 1997. One project is testing an intranet service to provide its members with 24-hour access to health care information from its Web site. Members are also able to address questions to a nurse, which will be answered asynchronously, and to request a nonemergency appointment.<sup>16</sup> Another is testing an interactive video home health system in Sacramento, California for postsurgical patients and others requiring home nursing.<sup>17</sup> Kaiser also has a psychiatry pilot using microwave links and a teledermatology pilot in process. A Minneapolis-based HMO conducted a video telemedicine visit program for 14 cardiac, pulmonary, congestive heart failure, diabetic, and wound care patients selected because of their unreliable care givers, poor medication compliance record, or unstable adherence to self-care instructions and requiring two or more nurse visits a week.<sup>18</sup>

### Efficacy of Telemedicine

In general, the evaluations of these projects were highly supportive of the feasibility of using electronic communications links to deliver health care services. One dermatology project compared the accuracy of the diagnosis by live, video, and store and forward image consultations. It concluded that consistency of diagnosis among the three modes was essentially the same and that no increase in biopsy recommendations occurred despite the lower confidence level rate of the teledermatologists in their recommendations.<sup>19</sup> However, therapeutically, both the live and video consults were regarded as more effective than the store and forward image-based consult, which did not enable the specialist to advise the primary care physician during the consult as to the nature of the image desired or to direct questions to the patient in order to make a diagnosis.<sup>20</sup>

Nephrologists also postulated more satisfactory results through the live video mode because of the importance of live physician interaction in real time with patients who want to cut short their dialysis program or ask the physician questions.<sup>21</sup>

The physicians in charge of the spinal cord injury patients study concluded that the video telephonic visit using the fixed-image telephone resulted in an earlier identification of pressure sores at a lower level of intensity than patient self-care alone monitored either by a weekly telephonic checkup or through a standard hospital checkup visit every 7 weeks.<sup>22</sup> Patient satisfaction was high in all reported telemedicine projects that tested for this factor.<sup>23</sup>

### Costs and Savings of Telemedicine

None of the reported telemedicine project evaluations tried to quantify the trade off of costs versus time involved in making face-to-face or remote diagnosis or treatment decisions. For example, the transmission of chest x-rays over ISDN lines takes 40 minutes, in contrast to 4 minutes for transmission over a T1 line.<sup>24</sup> For time-sensitive applications such as trauma cases and some ER-generated x-rays, this can be a significant factor.

The variable operational comparative costs of the telemedicine and actual face-to-face visit invariably favored the telemedicine approach. Electronic house calls were calculated by one project to cost one half the face-to-face care delivered to the home by a nurse.<sup>25</sup> Savings for video consults performed by dermatologists were calculated at one half the costs of other live consults performed at the center involving helicopter or ambulance transportation.<sup>26</sup> Dr. Ace Allen of the Kansas Medical Center estimated that 50% of nurses' home visits could be performed electronically and that nurses could increase their home patient case load by four to five times using electronic house calls.<sup>27</sup> A study of 14 cancer, congestive heart failure, pulmonary, diabetic, and dementia HMO home care patients found that, while frequency of home encounters increased, use of outpatient facilities and the overall HMO monthly expenses for treating these patients declined 30%.<sup>28</sup>

State-financed correctional facilities and military installations invariably found the costs of the two-way video telemedicine consult substantially less than the face-to-face health care service which it replaced. For correctional institutions, the savings achieved by the electronic consult lay in avoiding the transportation and medical reimbursement costs involved in transporting the prisoners and their guards to an outside clinic, ER, or hospital.<sup>29</sup> The same was true for military establishments. The telemedicine link to the battlefield or military installation was invariably less expensive than the transportation costs involved in bringing patients to the remote mainland medical installation for diagnosis and treatment. Similar results were found to apply to civilian trauma and other emergency cases requiring ambulance or helicopter transportation of the patient to the nearest appropriately equipped facility.

Despite these comparative costs savings, the absolute costs of these telemedicine projects are high and out of reach of most health care providers.

The Joint Working Group on Telemedicine of the Department of Commerce reported that the average equipment costs paid by these hospital-oriented hub

sites was \$287,503, while the costs for each spoke site averaged \$134,378. Annual transmission costs averaged \$80,068 for the hub site and \$18,573 for the spoke site.<sup>30</sup> In general, monthly transmission costs increased sharply with increases in bandwidth. Voice transmission costs averaged \$300; ISDN, \$545; T1 lines, \$2000; and fiber, \$3,000.<sup>31</sup>

On a per-consult basis, the project costs of these telemedicine studies clearly varied in terms of the type of network installation used, the number of consults and the particular expenses incurred by the sponsoring organization. In the urban medical center generated telemedicine projects, however, the number of patient-physician contacts at each project was relatively small—in many cases about one to five a week—not enough for a small health care provider without other resources to justify the high transmission and equipment costs.<sup>32</sup>

The high project costs of the principal telemedicine projects operating today are generated in part by the specialty health care focus of these urban medical centers and in part by the lack of a ubiquitous, universally available, high-speed advanced network capable of providing the range of asynchronous and synchronous audio and two-way video communications to link health care providers and users. In order to obtain this network capacity, special dedicated high-speed lines have to be leased from an available carrier, which is a very expensive proposition. The hub and spoke design used in these projects makes sharing of these high-speed advanced network leasing costs with other organizations difficult if not impossible. Finally, the specialty acute medical incident focus of the major telemedicine urban institutional providers taps a relatively small percentage of the health care needs of individuals today, which again accounts for the low consult ratio of these urban-centered telemedicine networks.

With 80% of today's health care decisions being made outside the medical center,<sup>33</sup> it is clear that the low consult rate of the bulk of these urban medical center telemedicine projects is not representative of what telemedicine usage would be if it focused on the full gamut of the day-to-day health care needs of the individual. Moreover, if local health care providers had access to a shared public network, such as the telephone network, upgraded to provide a range of bandwidth capabilities, their network costs would be substantially reduced. Even if these network capabilities had to be leased from local carriers, providers could aggregate their needs with other users in the community—something they cannot do with current hub and spoke designed systems—and share the lease costs for at least some portion of their network.

Their network expenses would then be lower than they are under the hub and spoke network designs deployed in medical center-generated telemedicine systems.

### **The Health Care Service Potential of Advanced Community-Based Networks**

Such community-based advanced networks can facilitate the type of patient-centered health care delivery system that makes up the totality of health care today.<sup>34</sup> In such locally based systems, patient welfare can be seen as the product of a wide variety of health-related social and home- and community-based services integrated into the more traditional patient information and education, preventive, chronic illness management, and diagnostic and clinical health care services.<sup>35</sup>

Advanced community networks can enable local physicians, physician assistants, nurses, and nurse practitioners to provide much more cost effective care to their patients in their homes by having the option to substitute electronic for face-to-face visits wherever this option is therapeutically feasible. It can also serve home care agencies, nutritionists and therapists. Similarly, neighborhood clinics can link up with other health-related groups in the community, such as mental health and substance abuse providers, and offer their services on an integrated one-stop basis to the patients who come to their doors. By the same token, local nursing homes and assisted-living facilities can more easily serve their clients if they can share their information through linking up electronically with the broad array of health care and social service resources available in their communities.

Maintaining a single comprehensive health care patient record for health care consumers can be more easily facilitated by this type of community network, since all patient encounters as well as the assessments and interventions of allied health personnel and home health and social workers can be captured wherever they take place. Moreover, such a network can enable home care team members to maintain contact with each other electronically, share their observations and recommendations for the care of their patients, and record their observations electronically in the patient's health care record.

The therapeutic value of support groups for both care givers and patients is being increasingly recognized, and such groups can be easily created and conducted over two-way visual networks. While not strictly essential, the video component contributes to the effectiveness of these contacts.<sup>36</sup>

Home care agencies can, wherever feasible, substitute

electronic for face-to-face interventions with their clients and supervision of their home health workers—one of the single most costly components of home health services today.

The overall usage of community electronic networks for the day-to-day health care needs of individuals, therefore, would be substantially greater than the current predominant focus of telemedicine on specialty consults.

If two-way video electronic links to the home can provide more cost-effective access to health care services both in the home and between primary care physicians and specialists, we have to ask ourselves why so few and such limited types of home care telemedicine projects exist today. Some telemedicine leaders are even predicting that the use of less expensive but also, for many applications, less satisfactory store-and-forward modes will be the wave of the future for telemedicine.<sup>37</sup> While store-and-forward may in some instances be preferred, to predict its ascendance as the predominant future mode of telemedicine is a disservice to the broad potential of the technology for expanding access to health care services.

### **Inadequacies of Current Telemedicine Options**

There are few readily available, affordable options today to provide advanced network communications to serve the full range of patients' needs. While the Internet is touted as the most likely and publicly available access point for individuals to access health care information services, it suffers from two basic limitations: (1) whatever high-speed capability the Internet has is essentially limited for individual use by the capability of the "last mile" of the network that links the home or office; (2) a relatively small number of households have computer and network service capability.

As of 1994, only one-third of American households had home computers, and only 10% of these had access to network services. In 1997, the number of Americans linked to the Internet reached 14.7%. As of 1994, fewer than 10% of people with a yearly income of less than \$10,000 had home computers, only 1–2% of which are networked, while two-thirds of Americans with incomes over \$75,000 had home computers, 60% of which are networked.<sup>38</sup> These relative demographics have probably not changed very much since 1994.

Public space options are equally limited. While kiosks could provide more public access, the cost per kiosk of \$35,000 makes them an expensive option for a community. Moreover, kiosks can only provide a relatively narrow range of health care information-based

services which consumers would feel comfortable exploring in such a public setting.<sup>39</sup>

Only a small percentage of other publicly available community-based options—such as schools (35%), libraries (22%), neighborhood health care centers (15%), or hospitals (23%)—provide access to computer services to the public.<sup>40</sup> While these numbers will undoubtedly increase as a result of the 1996 Telecom Act discounts, these facilities have limited potential because of the lack of privacy they could offer consumers. In addition, schools have problems of security and overcrowding, which would limit their availability to the community, while libraries are contending with budget problems that have forced them to curtail both hours and staff resources. Neighborhood health centers could provide privacy to users, but this option will still be dependent on the opening hours of the center and would not meet the needs of homebound patients.

The most effective approach to take full advantage of the potential of telemedicine to meet the everyday demands for health care services is to look to the two major communications networks—telephone and cable—that currently provide some form of communications services to the home. Wireless has the potential to reach individual households, but its current projected capabilities are limited to voice. Satellites can clearly provide the full range of voice, data, and video communications, but they constitute a very expensive option for most individual offices and households.

Cable networks pass some 90% of American households, although only 60% of these households have actually subscribed to a cable network. While cable can handle video communications coming into the home, they cannot provide either switched or downstream video. Cable subscribers, therefore, can receive only communications transmitted by the cable company; they cannot send out video communications or communicate in any mode with the range of providers of health care and related services or with other patients and family members involved in their health situation.

Telephone networks have a national penetration of 93% of American households. Actual penetration in certain specific neighborhoods and communities, however, may be as low as 60%. Telephone networks are typically referred to as the public network because of their obligations of common carriage and universality. These are switched networks, have the most extensive penetration, and connect every individual, wherever located, to any other individual with a telephone. The copper telephone wire is currently limited

to handling voice communications. With compression and other technology enhancements, it can also handle slow-speed data, image, and video communications, providing the householder has a computer and network service. Current copper networks cannot handle high-speed data or high-resolution, full-motion video without substantial upgrading to broadband capability.

Telephone and cable companies have announced ambitious plans to rewire and upgrade their networks to the home by the first decade of the next century. Yet recently they seem to be retracting their ambitious promises. Time Warner announced recently the discontinuance of its Orlando pilot program to test the upgrading of their coaxial cable networks to enable them to carry two-way video. Instead of the complex set top box configuration originally planned, they are reported to be focusing on using the much more limited last mile capability of the Internet to access American homes.<sup>41</sup>

Bell Atlantic maintains it is still planning to rewire its copper network to the home in New Jersey with fiber by 2010 and to bring switched broadband to Pennsylvania residents by 1999. However, since 1991, when it first made this announcement, Bell Atlantic has only deployed 800,000 miles of its 56-million mile network in New Jersey (less than 2% of the total).<sup>42</sup>

Nynex claims its plans to rewire Connecticut and New York are still on schedule.

Until the public voice network—or some equivalent, equally ubiquitous, universally available network such as cable—can be upgraded to provide two-way, high-speed capacities, health care providers and consumers will continue to be severely handicapped in their ability to tap the capabilities of the new telecommunications technologies to meet the principal health care needs of the community.

It is necessary, therefore, to turn to the recently enacted 1996 Telecommunications Act to understand the extent to which public policy is supportive of promoting the deployment and application of these new advanced information technologies to provide universal access to health care to all Americans in every region of this country.

### **The Promise of the 1996 Telecommunications Act**

In enacting the 1996 Telecommunications Act, Congress made clear its intent to ensure that the country's historic universal service communications policy be applied to the new advanced telecommunications technologies.

Section 254(b) of the Act provides in part that: “(2) Access to advanced telecommunications and information services should be provided in all regions of the Nation; and “(3) Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high cost areas, should have access to telecommunications and information services. . . .”<sup>43</sup>

Section 706 of the Act provides that: “The Commission and each State commission . . . shall encourage the deployment . . . of advanced telecommunications capability to all Americans. . . .”

Congress was especially concerned that health care providers, schools, and libraries have early access to the benefit of advanced telecommunications services. Thus, it provided that a universal service fund to achieve its goals of universal service should be made available to these public institutions and that they should also receive special discounted rates on their communications services.<sup>44</sup>

However, it drew a sharp distinction between health care providers, on the one hand, and schools and libraries on the other. It provided that only health care providers in rural areas were eligible for universal service support, in contrast to libraries and schools throughout the United States—all of which were eligible. Similarly, while libraries and schools were to receive discounts on their telecommunications to be determined by the FCC, rural health care providers were only to receive subsidies to the extent their rural rates were higher than comparable urban rates.

In furtherance of these goals to make advanced telecommunications services available to all regions of the nation, the Act requires that adequate telecommunications infrastructure be made available to rural health care providers as well as to schools and libraries.<sup>45</sup>

Section 706 defined advanced telecommunications capability to all Americans as “high speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics and video communications using any technology.”<sup>46</sup>

Finally, the Act also mandated the FCC to institute a Federal State Joint Board to make initial recommendations on the implementation of these new federal universal service support provisions.

While giving significant weight to competition to achieve the nation’s communications goals as provided in the Act, Congress made clear its intent to use regulatory policy as an equally significant tool to achieve its universal service goals. Congress also spe-

cifically granted states the authority to impose, on a completely neutral basis consistent with Section 254, requirements necessary to preserve and advance universal service, protect the public safety and welfare, ensure the continued quality of telecommunications services, and safeguard the interests of consumers.”<sup>47</sup>

The Federal Communications Commission was expressly charged to enhance “. . . access to advanced telecommunications and information services for all public and non profit elementary and secondary school classrooms, health care providers and libraries and to define the circumstances under which a telecommunications carrier may be required to connect its network to such public institutional telecommunications users.”<sup>48</sup>

Thus the Telecommunications Act clearly envisages an evolving concept of universal service from narrow band to broadband services that both the federal government and the states have responsibilities to implement.

In May, 1997, the FCC announced the rules it is ordering to implement these provisions.<sup>49</sup>

The FCC ruled that all public and non-profit health care providers, as enumerated in Section 254(h)(5) of the Telecom Act who are *in* rural areas are eligible for universal service support.<sup>50</sup> These rural health care providers were identified as encompassing the following:

- Post-secondary educational institutions offering health care instruction, teaching hospitals, and medical schools
- Community health centers or health centers providing health care to migrants
- Local health departments or agencies
- Community mental health centers
- Not-for-profit hospitals
- Rural health clinics
- Consortia of health care providers consisting of one or more entities described above<sup>51</sup>

Under this definition, correctional institutions, assisted living facilities, nursing homes, visiting nurse associations, nonprofit HMOs or any other health provider who cannot be brought within one of these enumerated categories would not be eligible for support regardless of their role in providing health care to patients in rural communities.

Despite the urging of many commentators, the FCC refused to broaden or expand this definition, claiming

it was consistent with the overall congressional scheme for promoting universal services for health care providers. It also specifically rejected including rural home care providers within the definition on the grounds that congress had not included them in its definition.<sup>52</sup>

This definition, based as it is on the legislation, will undoubtedly need to be addressed in the future as more experience is gained with the implementation of the FCC rules as they are presently drafted. There is nothing in the record which indicates that these excluded institutions were even considered by the congress when it drafted the definition of health care providers. Thus the congressional definition which the FCC is following appears to be more the result of an act of omission than of commission. This may make an amendment easier once a factual basis can be developed for it.

The FCC declined to specify any particular set of core or additional health care services as eligible for universal service support under Section 254 (c)(1) and (3). Rather it left the choice of the specific type of service application up to each eligible health care provider.<sup>53</sup> It ruled that "additional services" as defined in the Telecom Act eligible for universal service support are not limited by the conditions listed in Section 254 (c)(6). This is an important finding, since one of these conditions specified that services eligible for such support must be subscribed to by a majority of consumers.<sup>54</sup> Such a condition could have prevented video services from ever qualifying for support, since they are not available to subscribers over current last-mile networks into the home, and hence a majority of subscribers will never exist.

Instead, the FCC ruled that universal service support mechanisms for eligible health care providers should support commercially available services that are reasonably related to the provision of health care services up to a bandwidth of 1.5 Mbps.<sup>55</sup> In discussing this standard, the FCC noted that this bandwidth was necessary for real-time, two-way interactive emergency and diagnostic quality video applications, which commentators had pointed out were a significant part of the health care services that could be effectively delivered electronically. The FCC also rejected recommendations that support for this bandwidth be confined to large hospitals and not be available to small clinics. It pointed out that needs for videoconferencing were shared by both types of providers.<sup>56</sup>

The FCC also included public health services within the services eligible for universal service support.<sup>57</sup> These services were defined as including education, collection, and dissemination of public health data,

coordination of public response to disasters, and prevention and control of disease.

The FCC noted that Internet access can provide health care providers with access to e-mail, on-line support groups, expert information and data bases, and services sponsored by the Institute of Health Warren G. Magnusen Clinical Center and the National Library of Medicine. Accordingly, the FCC authorized universal service support for limited toll charges incurred by health care providers for Internet access. It limited the available toll charge support to the lesser of the toll charges incurred for 30 hours of access to an Internet service provider or \$180.00 per month of toll charge credits for toll charges imposed.<sup>58</sup>

The FCC stated that it will revisit the list of supported services in 2001 or earlier if it receives a request for expedited review because of changing circumstances.<sup>59</sup>

In order to better equalize telecommunications rates for rural and urban health care providers the FCC ordered that the applicable urban rate will be no higher than the highest tariffed or publicly available rate actually being charged to a commercial customer in the nearest large city defined as having a population over 50,000.<sup>60</sup> Further, the FCC ruled that distance-based charges incurred by a rural health care provider shall be supported for a distance not to exceed the distance between the health care provider and the point on the jurisdictional boundary of the city used to calculate the urban rate that is most distant from the rural health care provider.<sup>61</sup>

The FCC rules also dealt with the critical question of a health care provider's request for service that is not or could not be supported by the infrastructure or facilities currently in place. It concluded that while infrastructure development is not a telecommunications service within the scope of Section 254 (h)(1) A of the Act, nevertheless the Act did not bar support for non-telecommunications services. Accordingly, the FCC held that it had "the *authority* to implement a program of universal service support for infrastructure development as a method to enhance access to advanced telecommunications and information services as long as the program is competitively neutral, technically feasible and economically reasonable . . . and that extending or upgrading existing telecommunications infrastructure enhances access to these advanced services" (emphasis added).<sup>62</sup>

The FCC stated that the record did not contain adequate information to permit a determination as to the level of need for such infrastructure development. Accordingly, the Commission announced its intent to issue a Public Notice regarding whether and how to



support infrastructure development needed to enhance access to advanced telecommunications and information services.<sup>63</sup> No specific date has been set for this inquiry.<sup>64</sup>

Recognizing that Section 254 requires that universal service support mechanisms be specific, predictable, and sufficient, the FCC established universal service support for health care services with a \$400 million annual cap.<sup>65</sup> To put this number in perspective, it must be noted that FCC set aside \$2.8 billion to cover the universal service support to be given to schools and libraries. Health care providers' access to these subsidies will be on a first-come, first-served basis.

This cap is designed to cover the flat rate charges for telecommunications services that a health care provider has committed itself to pay plus a commitment of an estimated variable usage charge which it has budgeted to pay for its share of usage charges.

In establishing the cap, the FCC first estimated the number of eligible health care providers in rural areas. Using estimates provided by various federal agencies and national associations, the FCC determined that there were 12,000 eligible rural health care providers.

Second, the FCC assumed that each health care provider would in fact request support to use the maximum bandwidth of 1.5 Mbps and that the distance-based charges that would be funded by the support mechanism would be 100 miles per provider. Using this calculation, it estimated that it would require \$366 million in order to cover the difference between urban and rural charges for these 12,000 providers to lease T1 lines or the equivalent ISDN or satellite links in areas where T1 service might not be available.

Third, it assumed that each health care provider would seek toll free access to an Internet service provider and would use the maximum \$180 monthly support, thus requiring \$26 million to cover these costs.

Since the FCC has not yet determined whether infrastructure upgrades will receive universal service support in order to enable health care providers to access a network with the capability of 1.5 Mbps, it did not include any moneys for such upgrades in its current \$400 million cap.

The FCC specifically noted its authority to make adjustments to the cap if the amount of support needed for requested services should exceed the funding cap. The FCC also noted its intent to revise the cap in its three-year review proceeding or to revise the cap even sooner if this proves necessary.

### **Progress and Gaps in Telecommunications Regulatory Scheme**

The Telecom Act and the FCC's implementing rules have made a cautious start toward enabling telemedicine to fulfill its real potential to deliver day-to-day health care services to patients in their communities. Thus, rurally based local health care hospitals, community health centers, and neighborhood clinics are eligible now to themselves benefit from universal service support to generate their own horizontal or vertical community networks, to communicate with each other, to reach their patients in their homes, and to create links to any secondary or tertiary health care facility that can meet their needs for expertise and collaboration. As a result, some of the limitations of the current telemedicine projects in terms of their predominant focus on providing acute medical consultations to health care providers and their patients in rural communities can now be overcome.

The rules defining health care services functionally in terms of bandwidth required and declaring that the FCC has the authority to define infrastructure development as a telecommunications service which can receive universal service support are creative and courageous steps. This functionality definition of health care service applications should afford the eligible rural health care providers the flexibility they need to continue to explore the ways in which they can use telecommunications services to better and more effectively serve their patients.

Finally, the FCC rules have specifically recognized the importance of videoconferencing in providing health care services. Together with the comparable urban rate formula, these rules should ensure that store-and-forward and voice telecommunications links are no longer the only economically feasible option available to health care providers.

However, there are several shortcomings in the statute and the rules that will need to be addressed. Only a relatively small number of the broad range of rural health care providers who serve rural populations are eligible for support. Moreover, urban populations that may be severely underserved are totally excluded from the benefits of the Act.

An even more serious problem arises with the relatively small discounts and universal service cap which the FCC has authorized. The FCC has recognized that networks with a capability of 1.5 Mbps are critical to the delivery of the full range of health care services required by rural populations. The central issue, however, is how to make this capacity available and affordable to rural health care providers. For many small health care providers, T1 service, even though

available at the urban rate, will be beyond their budgets—assuming the service is offered at all in their community. Requiring health care providers to pay for T1 dedicated leased lines, even at urban rates, will always be more expensive than using the ubiquitous shared switched public network. Until the FCC, therefore, ultimately rules that public network modernization is entitled to universal service support, this situation will continue to prevail. A statutory amendment will be necessary to resolve the comparative urban–rural discount formula for health care providers unless the FCC or state public service commissions can be prevailed upon to apply the comparable rate formula to the discounted urban rates available to urban public institutions such as schools and libraries.

### **Federal and State Opportunities for Redress**

The FCC will continue its oversight activities in the telecommunications and health care arenas over the foreseeable future.

In August, 1998, the FCC is obligated under Section 706 of the Telecom Act to “initiate an inquiry concerning the availability of advanced telecommunications capability to all Americans (including in particular, elementary and secondary schools and classrooms).” The FCC is to determine in this inquiry whether this two-way switched video capability is being deployed to all Americans in a reasonable and timely fashion. Despite the congressional reference to classroom connections, the hearing is designed to involve deployment to all Americans. Clearly this involves health care patients without regard to whether they live in rural or urban areas.

Its public notice in connection with the eligibility of network modernization for universal service support is reportedly to be published shortly, although no specific date has yet been set. Finally, the FCC has said that it will revisit the definition of universal service in 2001.

Now that the FCC rules are in place, states and local communities will also play important roles in both infrastructure deployment and in the continuing redefinition of universal service.

Historically, states have carried the main burden of promoting universal service to enhance access to telephone communications. Now, under the Telecom Act they are specifically authorized to develop their own definition of health care services entitled to universal service support in order to promote the use of telecommunications to enhance health care services delivery. In addition, they are, along with the FCC, mandated to encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans.

Thus, health care providers and consumers will have significant opportunities to influence not only federal but also state and local policy as well as their own communities’ actions to ensure that the promise of the Telecom Act to provide all Americans with effective access to advanced telecom services and to the level and quality of health care services which they so desperately need is realized.

### **Next Steps For Health Care Professionals and Advocates**

It will take persistent vigilance and advocacy on the part of the health care sector and its advocates to make the promises of both telemedicine and the new information technologies a reality for the great bulk of the population seeking health care services.

Health care advocates must work on the federal and state levels to insist that advanced telecommunications networks are in fact deployed in their communities, that universal service support is in fact made available for network modernization, and ultimately that all health care providers in all communities, rural and urban, have access to advanced telecommunications networks on a par with schools and libraries.

Health care advocates must also work in their communities to create partnerships with other community organizations to share the costs of deploying advanced telecommunications networks so that the costs of these telecommunications links can be affordable to all health care providers. And finally, they must work within their own profession and with the general public to promote widespread public understanding of the potential of telecommunications and telemedicine to enhance access to health care among health care providers, their patients, and the general public.

### **Federal Advocacy Level**

Critical to the penetration of telemedicine into the community to serve the full range of health care needs is the modernization of the public network so that health care providers can utilize that network to serve their patients.

An essential—indeed, central—ingredient of the FCC’s modernization inquiry and of its Section 706 proceeding will be the extent to which advanced telecommunications networks are in fact available to health care providers in every rural community.

Some advanced fiber networks are already deployed by telecommunications and electric utility carriers in

parts of their service areas. In addition, some carriers may also have deployed dark or unused fiber. Cable companies have coaxial networks that are capable of being upgraded into advanced two-way video networks. Many states have statewide high-speed fiber networks for health, education, and other uses. In addition, many state highway departments are deploying fiber networks along major highways in their state to monitor traffic. Schools and libraries are now beginning to wire up their facilities. Businesses are also wiring up their various affiliates, and some communities have deployed fiber rings in their jurisdictions. Finally, there are telemedicine projects in various states which may have created their own advanced network linkages.

It is essential that all of these networks be identified and mapped as to their specific geographic location, their capabilities, and their receptiveness to access by or interconnection with other network users or networks. Advocates should petition the FCC to start to collect this data immediately. It is clearly relevant to both the universal service network modernization inquiry and to the Section 706 proceeding.

If the FCC and congress are to adopt a realistic telecommunications access policy for all health care providers and their patients, they need to understand the broad range of health care providers (both individual practitioners and HMOs), neighborhood clinics, home health agencies, assisted-living facilities, and nursing homes that serve the day-to-day needs of their patients and which need to be wired up.

They will need to have detailed documentation of the types of health care services required by health care providers and patients in rural communities that require videoconferencing and of the availability and costs of T1 and ISDN lines in their communities.

The FCC must understand the critical need that exists for the kinds of day-to-day health care services needed today and that telemedicine can provide so effectively and efficiently. The health care sector in every community needs to assemble this data as well as specific demographic data such as age, gender, and health care status of their community populations. Much of this demographic data may already exist at the state level in the State Health Plan or in state Medicaid offices.

Finally, advocates should ascertain whether there are home-care telemedicine projects operating in their communities. These projects will have very precise data on the services which they are delivering to patients in their homes, on the need for such services in their communities, and on the telecommunications

costs of delivering such services. This data must be assembled and provided to the FCC for their hearings.

In addition to assembling this critical data for these upcoming FCC proceedings, it is essential that representatives of the various health care segments, such as nurses, family practitioners, therapists, home care practitioners, and assisted-living and nursing home managers participate in these hearings so the FCC can appreciate the home care and community service needs of consumers and patients.

### **State Advocacy Actions**

State public service commissions have in the past played important and effective roles in promoting universal service in their service areas. Through their rate regulatory powers, they have been able to make arrangements with carriers under which carriers have agreed to extend or upgrade the quality of their networks in areas which they had previously not served or served inadequately. Replacement of party lines, lifeline assistance programs to promote affordability, and touch tone telephone service were frequently the outcomes of such negotiations between carriers wanting relief from rate regulations and the public service commission, which was then enabled to promote more consumer-oriented policies by the carriers.

These state regulatory powers still exist and are now confirmed and enhanced by the 1996 Telecommunications Act. Thus state public service commissions have the same interest and concern as the FCC in identifying the specific geographic location of advanced networks in their jurisdiction. Like the FCC, they will need this data to discharge their responsibilities to ensure universal service support for their citizens' access to advanced telecommunications. Moreover, state public service commissions and other state government departments with responsibility for health have ample powers to collect this network data. Health care advocates must petition them to do so.

Health care advocates should also turn to their public service commissions whenever T1 or ISDN service does not exist in their communities. They must also be alert to the opportunities afforded them to intervene in proceedings before their state public service commissions in order to make sure that competition is in fact providing their communities, health care providers, and patients with increased choice, higher quality services, and more affordable prices. These state public service commissions have both the authority and the power to make certain that services offered by telecommunications carriers are not arbitrarily withheld from certain communities and that

the tariffs for these services are fair and reasonable. If mergers appear to threaten the development of facilities-based competition, which Congress sought to encourage, advocates should make their voices heard on how such mergers will impact their community.

Finally, carriers are frequently fined for various transgressions against the regulatory regime. Advocates must fight to have these fines allocated to advanced network deployment, since all too often these fines are simply added to the rate base. At best, this means that each consumer may receive a one-time payment or rebate amounting to a few pennies or at most a few dollars.

### Local Community Actions

Health care advocates do not have to wait or depend on the actions of federal or state regulatory commissions in order to have access to advanced network capability.

Health care providers, consumers, and advocates should contact their local telecommunications carriers directly to ascertain their plans for deploying or upgrading their networks. They should question the carriers as to whether and when they expect to provide these advanced capabilities either directly to each resident's home or as an advanced network backbone running through the community. Depending on how deep the penetration of such a backbone network is, individual users could connect to it by leasing a dedicated line from the backbone network to their homes or offices, which could be a shorter distance than having to lease a line from the central office.

Carriers will be more likely to upgrade their public network capabilities if health care providers and their advocates can approach them together with a broad array of interested community participants. Similarly, if competition does in fact become a reality in various communities, opportunities may present themselves for those communities to bargain among competing carriers in order to secure access to the advanced services they need.

Upgrading the public network is clearly the optimum solution for health care providers since using that network requires no special organization among users to share its cost or use. With an upgraded public switched network, any health care provider could communicate with any other provider. They could meet electronically to discuss the progress or the situation of their patient. They could work with other community organizations to provide services which meet the needs of their patient. Their patients and patients' caregivers could also meet electronically for advice, sharing of experience, and support.

However, advocates may be forced—at least in the immediate future—to obtain their own advanced network capability by leasing ISDN or T1 lines from their carrier in order to provide services to their patients in their homes. Health care providers must explore the possibility of forming partnerships with other organizations and entities in their communities in order to share the costs of these leased lines.

Health care advocates' first step should be to inventory their community resources for advanced networks and the likely organizations in their communities which might be willing to partner with them to develop advanced networks to serve their joint needs.

Schools, libraries, local businesses, and other local organizations are beginning to wire up. Correctional institutions have solid evidence of the savings that can accrue to them by using electronic networks to bring health care to their facilities instead of transporting their inmates to the appropriate health care clinic, emergency room, or hospital. Small and medium-size businesses have a wide range of telecommunications needs that an accessible advanced telecommunications network in their community could serve. A wide variety of social service agencies providing prenatal care, substance abuse treatment, job training, and crisis intervention services share very common needs to interact with each other and with other community resources and to share information in order to serve their clients more effectively.

In many instances, these institutions are neighbors. They are logical partners with health care providers to share the expenses of bringing high speed wires from the central office of their telecommunications carrier to some nearby point equally accessible to the participants. Each partner would only have to pay separately for the short last mile link they would require to bring the commonly deployed line to their particular location. Individual households who reside near such a commonly deployed line with a need for such a high speed line might also be able to afford to pay for the last mile extension of the common line to their site.

The concept of aggregating community use of networks is not new. It has been advanced by both the Office of Technology Assessment and the Office of Rural Health.<sup>66</sup> Moreover, the FCC specifically recognized both aggregated purchasing and network sharing as methods by which to substantially reduce costs and sustain a rural telecommunications network.<sup>67</sup>

Health care advocates should take the lead in bringing these organizations together in order to explore to what extent they have common needs for advanced

network capacity. Each organization should identify the organizations and groups with which they want to interconnect and see to what extent they could share a common network.

Such "televillages," as these joint ventures are frequently called, have been created in several communities.<sup>68</sup> This televillage concept of creating a virtual electronic community offers members of communities an opportunity to access telecommunications capabilities which they otherwise could not afford. It is also an ideal way for health care providers and their patients to access health care services which they otherwise could not afford. It can bring the enormous benefits of telemedicine to those members of the health care establishment who need it most—the homebound patient, their care givers, and the health care providers and allied professionals who want to find ways to better and more efficiently serve the health needs of their patients and clients.

In order for health care advocacy to be effective, particularly on the local level, it is essential that there be a broad base of community support for health care providers to use the new information technologies to provide health care services to the community.<sup>69</sup>

Health care sector advocates must enlist the support of local officials, legislators, chambers of commerce, school and library boards and health care related institutions such as assisted living facilities, nursing homes, and public housing authorities in order to build public awareness of the potentials and benefits of these technologies in serving the needs of their customers and constituents.

In addition, they must inform, involve and educate community members about community focussed uses of telemedicine and electronic technologies and create alliances with public agencies, voluntary organizations and industry to intervene in legislative and regulatory proceedings on both the state and federal levels.

Finally, they must educate their own professional colleagues about the benefits that telemedicine can provide to serve the broad range of day to day health care needs in their communities.

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