THE ISSUE IS NOT GEOGRAPHY: HEALTH CARE MARKETS AND THE DIFFUSION OF TELEMEDICINE

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1. INTRODUCTION/BACKGROUND

For nearly thirty years, telemedicine has been heralded as a means of overcoming geographical and economic barriers to rural health care delivery (Lipson and Henderson, 1995; McCaughan, 1995; Preston, et. al., 1992). Despite rapid growth in the number of active telemedicine programs in the last three years, most telemedicine projects remain experimental and largely dependent upon state, federal, or private grant funding. Few telemedicine projects have specific plans for sustainability when grant supports are no longer available (Emery, 1996). Moreover, telemedicine has become a tool of large, urban hospitals (Emery, 1996). Despite recognition of telemedicine's potential to improve rural health care and the numerous grant programs that support rural initiatives, academic medical centers possess the human, financial, and technical resources for generating successful telemedicine grant proposals to build viable telemedicine programs. In many cases, rural hospitals are key members of consortia organized and controlled by larger, urban hospitals in order to qualify for rural-designated telemedicine programs. This scenario can be advantageous for all involved, but it can also leave rural hospitals dependent upon and subject to the strategic goals of larger, more powerful partners.

The persistent experimental status of telemedicine and the dominance of large, urban hospitals in the diffusion of telemedicine are interrelated phenomena. Regional development theory has long proposed that rural areas will be slower to benefit from technological and economic trends that germinate in the diversified social and economic conditions of urban areas (Schumpeter, 1969; Pred, 1976; Gaile, 1980; Jacobs, 1984). Because "rural hospitals are handicapped by geography, demographics, and economics," in general, it is most advantageous for them to partner with larger, urban hospitals (Halpern, Alexander, and Fennell, 1992); this logic certainly extends to telemedicine partnerships. It is therefore essential first to explain why telemedicine has not become a mainstream component of medical care, before exploring why rural communities and rural hospitals have yet to play a leadership role in the evolution of telemedicine.

There are several explanations for the persistent experimental status of telemedicine: technological, social-behavioral (physician and patient acceptance), legal, and economic-policy. While these categories are certainly interrelated, each can be analyzed separately, and each can explain part of the slow acceptance of telemedicine.

II. METHODS

This research builds upon survey research undertaken in 1995. The surveys were sent to the administrators of 341 hospitals in the Southeastern US, and 51% responded. These surveys included questions about whether and when hospitals had adopted or planned to adopt telemedicine, the size and sources of the hospitals' financial investments in telemedicine, the role of telemedicine in hospitals' strategic planning, current uses of telemedicine, and the perceived barriers to adopting telemedicine. The results of the survey research were used as a base for the next phase of this research.

Building on the survey, interviews were conducted in 1996-1997 with key informants, including telemedicine program directors and administrators, hospital administrators, academic researchers, and policy makers. These were loosely structured interviews, designed to address key areas of interest, but also to allow for extemporaneous commentary by the interview subject. The interviews focused on four key issues: 1) current and future financing of telemedicine, 2) barriers to widespread use of telemedicine, 3) the reasons the hospital/organization initiated telemedicine programs, and 4) the role managed care plays in telemedicine strategy.

III. RESULTS

Technological Barriers

Advances in medical and telecommunications technologies increase the reliability, resolution, and speed of transmitting medical images between remote locations, making telemedicine more useful clinically. Improved technologies and market forces are lowering the cost of equipment

and transmission charges. Although much telemedicine research still focuses on describing and establishing acceptable technological solutions and protocols for telemedical consultations (Satava, 1993; Yamamoto and Wiebe, 1989), researchers are discussing ever-finer points of technological standards. Presently, the main technological debate compares dedicated telemedicine rooms with desk-top telemedicine systems. Although technological barriers continue to present challenges, after thirty years of development, telemedicine projects have reached a critical threshold; technological issues are subtle, rather than insurmountable barriers to utilization.

Social-Behavioral

In a survey of hospital administrators conducted in 1995, 51% indicated that physician acceptance was an important barrier to their decision to adopt telemedicine technologies; 29% cited a lack of internal interest in telemedicine, and 18% cited patient acceptance as important barriers (Emery, 1996). These three barriers are generally discussed in the context of the social and human aspects of using telemedicine. Researchers point to the general inattention to important subtleties in the social interaction between physicians and patients. According to these social researchers, such nuances represent a potential stumbling block to wide-spread acceptance of these technologies, and ultimately the success of telemedicine programs. When telemedicine is recognized as both an effective and efficient means of interacting with patients, physician adoption should pose a minimal barrier. One telemedicine project administrator explained, "physicians are trained almost religiously to rely on face-to-face interactions with patients to gather the bulk of the data they use for diagnostic purposes." Numerous projects have demonstrated, however, that telemedicine can provide acceptable "diagnostic concordance" compared to face-to-face patient encounters (Abboud and Bruderman, 1996; Korsoff , et al, 1995; Trippi et al, 1996; Zelickson, 1997).

Importantly, many of these same demonstrations have shown that telemedicine technologies can enable physicians to nearly double patient volume. This technology could significantly change physician work flow. Whether this change in work style acts as a barrier to physician acceptance of telemedicine technologies, however, depends partly on the larger context of physicians' work environments. These telemedicine experiments are taking place at a time when many physicians' work patterns are already in the midst of dramatic change due to managed care. Since advances in telemedicine technologies have made a lack of medical-utility nearly a moot point and medical practice patterns are in a state of flux in many health care markets, it is important to focus on the cost-effectiveness of these technologies to physicians. Most insurance companies do not provide reimbursement for non-face-to-face consultations - or most telemedical consultations; therefore, many physicians do not receive compensation for telemedical consultations; physicians cannot be expected to embrace activities that are not reimbursed. Therefore, the barrier of physician acceptance can be seen more as an reimbursement problem than a human relations question.

Patient acceptance is a barrier to adoption if the administrator and/or medical practitioners believe that patients would be uncomfortable with telemedicine technologies. The risk of losing patients, or of purchasing a technology that would remain unused in order to avoid making patients uncomfortable may deter adoption. However, physicians, by virtue of their expertise and the nature of medical consultations, generally play the dominant role in physician-patient relations. Thus, it can be argued that in practical terms, patient reluctance could be mitigated as a barrier if physicians accepted the technologies. Furthermore, as Williams (1996) has explained, in the current experimental context of telemedical interactions, patients are often more satisfied with telemedically mediated interactions than with face-to-face exchanges with physicians. Patients believe that they receive more personal attention and time with physicians during telemedical consultations. In the future, if physician acceptance of these technologies is high, it is also plausible that patient acceptance will be high.

When the hospital administrator and/or the hospital staff simply have no interest in adopting telemedicine, two factors could plausibly explain such a lack of interest. First, if a hospital faces no pressing need to connect with others for remote medical education consultations or continuing education curriculum, the hospital would likely face very little competition and would be large or isolated enough to provide adequate specialty care to its community. While such hospitals still exist across the country, their numbers are dwindling.

The second explanation is the persistent experimental nature of these technologies. Due to the complex financial arrangements involving multiple institutions, departments, and sources of funding that are typical of most telemedicine initiatives, it is nearly impossible at present to systematically determine cost effectiveness. This problem is exacerbated by limited adoption, so costs and benefits have not reached equilibrium levels. Therefore, little data exist that can reliably present the costs and benefits of telemedicine technologies (Emery, 1996). Given the considerable investment necessary to launch and to operate a telemedicine program, it is hardly surprising that hospital administrators are uninterested. Three decades ago when telemedicine was truly a new means of delivering health care, the relationships between the physician and patient, and between the physician and hospital administrator, were very different. With competitive pressure growing more intense, economic considerations increasingly dominate the personal transactions of medicine. Consequently, it makes more sense to explain what were formerly characterized as human barriers to the adoption of telemedicine as economic or policy-driven barriers.

Legal Barriers

Two types of legal issues are often cited as potential barriers to the diffusion of telemedicine. Medical liability issues constitute a barrier to adoption if the practice of telemedicine involves greater or unforeseen medical liabilities on the part of the hospital. Since telemedicine is such a new technology, neither legal precedents nor practice guidelines exist. Medical licensure issues are a barrier to adoption when linkages cross state borders. Recent legislation introduced in Kansas, Nevada, Oklahoma and South Dakota require physicians to be licensed to practice telemedicine in these states (Richards, 1996). Policies aimed at limiting physician competition from outside the state are currently under consideration in at least 20 other states. However, many health care organizations that provide telemedical consultations across state borders employ physicians who are licensed to practice in multiple states (Goodall, 1997).

Economic-Policy Issues

Present economic trends and key policy decisions are more important than technological advances, social-behavioral factors, or legal precedents in determining whether telemedicine technologies become a relevant component of medical care at the turn of the century, or whether they remain merely a promising curiosity.

Hospital administrators cite the cost of purchasing telemedicine technology and the cost of telecommunications service as important barriers to the adoption of telemedicine. These cost barriers exist only because hospitals have no direct reimbursement mechanisms. The Health Care Financing Administration (HCFA) currently does not reimburse for "non-face-to-face consultations," which include most telemedicine consultations (Smits and Baum, 1995). Most other insurers follow HCFA in their reimbursement policies; thus, the HCFA standard is a de-facto industry standard. As a result, hospitals and physicians generally cannot integrate telemedicine into their standard medical protocols. In the interviews, few hospital administrators were able to identify applications of telemedicine that would make sense for their hospital in the absence of HCFA reimbursement. The survey highlighted the impact of HCFA reimbursement policies on the ways hospitals currently use telemedicine. The survey revealed that telemedicine is used most frequently in hospitals for radiology consultations, followed by emergency medicine, pathology, cardiology, internal medicine, and pediatrics. Utilization by radiology and pathology services is not surprising since these two specialties, along with selected cardiology consultations, are

exceptions to the HCFA "non-face-to-face" restrictions; as they are routinely practiced, radiology and pathology consultations do not involve physician-patient interactions. Thus, the insurance restrictions are not relevant to the practice and reimbursement of these services, regardless of whether telemedicine technologies are used. Without reimbursement mechanisms, other medical specialties employ telemedicine technologies in a much more limited and experimental fashion.

Hospital administrators have determined avenues for telemedicine reimbursement; teleconferencing; continuing medical education; marketing; and capitated or contracted reimbursement schemes, which include hospital contracts with prisons, international and domestic "brand equity," and as a component of a managed care strategy.

Telemedicine as an Administrative Tool

Telemedicine is a particularly useful tool for large health care organizations. Earlier research which showed that hospitals that are members of an Integrated Delivery Network (IDN) are 2.3 times as likely as non-IDN members to adopt telemedicine; members of multi-hospital systems are 2.6 times as likely as single, independent hospitals to adopt telemedicine; and the odds of adopting telemedicine increased with the size of the hospital (Emery, 1996).

Teleconferencing

Several administrators of large, multi-site hospital organizations indicated that the use of telemedicine technologies for administrative teleconferences is an important strategy to reduce their overall operating costs. As one administrator explained when interviewed, in his network of nearly 30 clinical sites, the CEO of each participating hospital meets with the administration at the headquarters at least once a month. By using telemedicine for these executive conferences, "the savings are easy to calculate."

Medical Education

Using telemedicine to deliver medical education provides two types of financial benefits to hospitals. First, there are the savings of travel time. Telemedicine allows hospital staff, especially nurses and technicians to maintain their professional credentials without traveling long distances and thus without taking time away from their primary duties. One administrator described the interactive video connections with a medical school over 100 miles away, which allowed this rural hospital with only 42 beds to offer a residency program for rural primary care physicians. For a hospital this size to run a residency program is unprecedented. One physician, who had used telemedicine, described a more subtle form of medical education: the remote physician learns from the specialist in the urban center when a consultation occurs; the next time the rural doctor encounters a similar case, she or he will be better equipped. One administrator explained that he expected this transfer of skills to also reduce the cost of care, as physicians share "best practice" guidelines using telemedicine.

Telemedicine also generates revenue for tertiary care centers that offer continuing medical education programs. In this application, telemedicine acts as a "better distribution channel" for tertiary hospitals' products, including education. By selling medical courses, tertiary centers can generate revenues with telemedicine technologies.

Marketing

Administrators invariably relate telemedicine to some aspect of marketing. One Chief Financial Officer summed up the hospital's decision to adopt telemedicine in one word: "positioning." Another administrator of a rural hospital said that telemedicine was driven by patients' requests: "patients expect hi-tech assistance. It makes them feel special. The physicians feel that it's a gimmick." He went on to explain that telemedicine did not change how physicians at his hospital practice medicine, rather it made his hospital competitive because patients demanded state-of-the-art technologies. In the words of another administrator, "we see everybody else turning to telemedicine, and we know we need to keep up." Another telemedicine project director identified telemedicine as a component of his health care system's strategy to differentiate their product, or network of hospitals, relative to their competitors. One hospital administrator likened

telemedicine to clinical consultation services; physicians in remote areas dial a toll-free number to receive consultations from a tertiary care center; the tertiary care center offers this service to establish relationships and referral patterns between the physicians and the hospital. This administrator saw telemedicine as an extension of this idea. This type of application is already in use in several locations. As another administrator described his program, "telemedicine is used as leverage in the marketplace," to provide services to a network of physicians. By connecting physicians to a tertiary care center via telemedicine, this administrator's hospital gained referrals that had previously gone to another hospital in another state.

Prison Contracts

Prison contracts represent another profitable model. Several hospitals and independent contracting health care organizations provide medical consultations via telemedicine to state and county prison populations. Typical contracts take one of two forms. In one scenario, a hospital enters a capitated contract, where the state or county corrections agency pays a flat rate per year per inmate. The hospital provides consultations on a routine, scheduled basis. Alternatively, the corrections authorities pay on a fee-for-service schedule, after an initial flat-rate. Under either plan, hospitals and physicians are reimbursed for their services and the cost of the technologies are recouped over time. According to the administrators of prison-telemedicine projects, these arrangements are cost-effective for all parties involved. The state or county corrections authorities realize substantial savings by avoiding the typically high cost of transporting inmates. Hospitals and physicians receive guaranteed income. Payment mechanisms are negotiated and guaranteed at the front-end of the contracts, so the financial provisions of prison telemedicine resemble the capitated pricing schemes of many managed care organizations.

As telemedicine technologies become increasingly reliable from both a medical and a technological standpoint, many hospitals and health care organizations are using telemedicine as a means to expand the range of their market. By using telemedicine technologies, Mayo Clinic, MD Anderson Cancer Center, Massachusetts General Hospital, and Duke University, among others, are capitalizing on their "brand equity" to export medical services and compete in the national and international health care market place. While some projects merely target patients across state and regional boundaries, telemedicine technologies also allow US hospitals to provide services to hospitals and patients as far away as Austria, South America, the Middle East, and Southeast Asia. Typically, tertiary care hospitals in urban centers in the US enter either a flat-rate or fee-for-service contract with foreign hospitals, providing diagnostic and second opinion consultations.

While these contracts generally do not represent a large portion of these tertiary centers' annual income, as one administrator explained, they represent "found money." Moreover, these contracts provide an additional, albeit far-flung, referral base. Like prison contracts, international and domestic telemedicine contracts provide a guaranteed funding source for telemedical consultations.

Managed care

Managed care contracts and capitated pricing regimes fundamentally change the reimbursement scenario and therefore the incentives hospitals and physicians face in delivering health care. In such an environment, hospitals would choose to employ telemedicine technologies to reduce costs, and thus HCFA reimbursement issues would be irrelevant. While few hospital administrators in the Southeastern US indicated that they had specific strategies for using telemedicine in a managed care environment, 63% indicated that telemedicine was highly important to their hospital's overall managed care strategy. One hospital administrator from this region described his hospital's plans to supply telemedicine consultations on a contract basis, whereby for a negotiated flat rate they would provide clinical consultations in a variety of specialties to other hospitals or physicians' practices. Even in the absence of significant managed care penetration, this hospital already had established plans to implement its own

capitated pricing for telemedicine. Another administrator explained that under managed care, hospitals face an incentive to avoid bringing patients into the hospital, where care is expensive. In his words, "Under managed care, you want to keep 'em down on the farm, where it's cheaper." Therefore, if telemedicine could allow patients to remain in their communities, it could be an important component of a managed care strategy. This same administrator further stressed that this technology could also help him to be more competitive in a managed care environment because patients who stay in their own communities would have less travel time to receive care, and therefore experience greater satisfaction. Other hospital administrators hypothesized a capitated pricing regime, using telemedicine to reduce costs in outlying affiliated medical centers or clinics by substituting telemedicine consults with a reduced staff at the rural site. Thus, where the hospital or clinic employed a general practitioner or internist, the physician or part of the physician's time could be replaced by a mid-level practitioner supplemented with telemedicine.

In a capitated pricing environment, several administrators reasoned that utilizing telemedicine to access specialty consults would be less expensive than transporting patients to a tertiary care center. Thus, telemedicine could allow smaller hospitals to improve their competitiveness by increasing the mix of services they could offer and reducing their cost of providing these services. It is important to note, however, that among this group of administrators, such a strategy was not an explicit component of their reasons for adopting telemedicine.

In general, hospital administrators in the Southeastern US discussed the use of telemedicine within the framework of strategic plans for the future. In contrast, administrators of hospitals and hospital systems in health care markets with greater managed care penetration readily discussed telemedicine as a tool currently employed as a component of their managed care contracts and strategies. An administrator explained that his organization is currently investing operating funds into developing telemedicine to conduct remote consultations and remote patient monitoring, based on calculations of savings expected from improved resource management. These strategies and current uses of telemedicine were echoed by another administrator, whose health care organization also operated in a highly penetrated managed care market, but served a primarily rural patient base. Like his urban colleague, this administrator explained that telemedicine helps his organization manage patient flow and resource utilization. While neither of these administrators could demonstrate that telemedicine had yet generated a profit for their organizations, each indicated that the current expenditures on telemedicine represented research and development investments that their organizations fully expected to pay off within five years, regardless of HCFA policy. As the costs of telemedicine technologies decrease, and as costs are distributed across all enrolled patients, this barrier becomes less significant and the benefits of telemedicine become more significant.

IV. DISCUSSION

While the barriers to widespread adoption and use of telemedicine technologies are many and varied, the single most important barrier remains state and federal policies that deny reimbursement of most telemedical consultations. As one administrator bluntly characterized the issue, " HCFA is the fly in the ointment of telemedicine usage." Even if current reimbursement policies remain in place, however, telemedicine technologies may not necessarily be condemned to remain perennially exciting yet experimental technologies. This research demonstrates that telemedicine can be an effective means of delivering health care, if reliable means of reimbursement are identified.

This research does not suggest that policy makers should let market forces take care of the future of telemedicine. Telemedicine remains a promising tool to improve access to health care, particularly in rural areas. Unless rural hospitals are members of larger hospital organizations, or unless they operate in a managed care environment, there is little reason to expect that the financial models suggested in this paper would

provide feasible means for rural hospitals to adopt and employ telemedicine technologies. Using telemedicine to offer prison contracts or international or domestic trade in health care is a strategy limited to large, urban, tertiary care centers with specialists and "brand equity" in the prestige of their institution. Managed care is largely a phenomenon of urban areas. Thus, if rural hospitals are to benefit from the potentially greater access to quality health care that telemedicine can offer, equitable reliable reimbursement policies must be identified and implemented.

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