File Telemedicine 4/3

Dear Chris:
Thought this current effort of our State Board might be of interest to you & your colleagues. Please feel free to share it as well! All the best to you.
Sylvia Beck

STATE OF WASHINGTON
WASHINGTON STATE BOARD OF HEALTH
1102 SE Quince Street • PO Box 47990
Olympia, Washington 98504-7990

February 26, 1997

Dear Friend:

RE: REQUEST FOR RECOMMENDATIONS REGARDING TELEMEDICINE

Enclosed please find *Telemedicine: An Interim Report,* prepared by the Washington State Board of Health. The *Interim Report* provides background and a synopsis of presentations made to the State Board to date. We hope you will find it of interest.

The Legislature requested the State Board of Health to complete its study of current and potential uses of telemedicine, with recommendations, by November 1997. A Final Report will be issued at that time.

The Board would appreciate hearing from you regarding your suggested recommendations. The Western Governors' Association identified 6 categories of telemedicine barriers, which provide a useful structure for grouping recommendations. Please send suggestions for consideration in any or all of the following 6 categories:

1. Information infrastructure and infrastructure planning
2. Regulatory distortions, limitations on competition, and fragmented demand
3. Public and private reimbursement policies for telemedicine services
4. Physician licensing and credentialing rules
5. Malpractice liability
6. Confidentiality of patient information

Please post or FAX your recommendations to (360) 586-6033 by May 15, 1997. You may also E-mail your recommendations to DHA0303@hub.doh.wa.gov. If you have any questions, you may contact the Board office at (360) 586-8558. Thank you for your assistance.

Sincerely,

David H. Albert
Senior Health Planner

Enc.

TELEMEDICINE: AN INTERIM REPORT

WASHINGTON STATE BOARD OF HEALTH

February 12, 1997

TELEMEDICINE: INTERIM REPORT

Washington State Board of Health

February 12, 1997

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TELEMEDICINE: AN INTERIM REPORT
WASHINGTON STATE BOARD OF HEALTH
February 12, 1997

A. Legislative Mandate

Engrossed Substitute Senate Bill 6251 Section 18, enacted in the 1996 Legislative Session states "$8,000 of the general fund -- state appropriation is provided for a study to be completed by the board of health on the current and potential use of telemedicine in the state, including recommended changes in rules and statutes. The study shall be completed by November 1, 1997 and a report submitted to the appropriate committees of the legislature."

B. Toward a Definition and Description of Telemedicine

> *"Telemedicine is the use of electronic information and communication technology to provide and support health care when distance separates the participants."*
> -- Institute of Medicine,
> *Telemedicine: A Guide to Assessing Telecommunications in Health Care* (1996)

There is no universally recognized definition of telemedicine, as the variety and scope of health applications being enhanced by modern communications technology is widening quickly. The American Academy of Family Physicians (1995) employs a definition which seeks to encompass the entire range of medical uses and technological components: "Telemedicine can be envisioned as a mode of health care delivery -- diagnosis, consultation, treatment, transfer of medical data, and education -- using interactive audio, visual, and data communications."

In some circles the word *telemedicine* is being replaced by the more inclusive, non-physician-specific term *telehealth*. Jim Barrett, Ed.D., Director, Center for Educational Resources, University of Washington (UW) School of Medicine, describes telehealth as "the systematic application of telecommunication technology to the field of health care." (1996) Some experts are making distinctions within the telehealth field between *telemedicine* and *medical informatics*. The latter would encompass those administrative and education elements of telehealth not directly involved in the delivery of health care, including: patient record transfer, practitioner recertification training and continuing professional education, administrative video conferencing; and accessing health information databases.

At its simplest, telemedicine may be thought of as simply removing distance and time barriers via technology to provision of health services or health information. Another way to think of

telemedicine is to consider its hallmark, which is the use of electronic signals to transfer information from one site to another.

In the direct delivery of health care, telemedicine is usually thought of as a set of computer terminals with two-way audio, video, and other modalities at different sites. The consulting practitioner is at one site with the patient and other practitioner at another. Information is exchanged, resulting in a diagnostic and/or treatment plan. Rashid Bashur, Ph.D., Editor of the *Telemedicine Journal*, considers telemedicine an "integrated and complete system of health care delivery which uses telecommunications and computer technology in place of face-to-face contact between provider and client or two providers." (1995) More recent telemedical developments pioneered by the military, such as remote robotic surgery, may eliminate face-to-face contact between provider and patient altogether.

Telemedicine applications are often specific components of medical care, rather than comprehensive care tools, e.g., paramedics transmitting EKG information to a hospital emergency room, or radiologists receiving scanned telefluoroscopy images via telephone connections. There are many specific direct health care applications, including: teleradiology, telepathology, medical consultation and diagnosis, remote robotic surgery, speech pathology, telepsychiatry, and remote trauma support and field triage.

Dr. Barrett (1996) describes direct telehealth applications as falling within five general categories:

1. POTS (Plain Old Telephone Service) applications include telehomecare, telenursing, and patient education and monitoring. These applications make use of standard telephone lines and may be the fastest growing segment of the telemedicine field.

2. Electronic patient visits and telenursing make use of cable systems and peripherals, as well as POTS.

3. Store-and-Forward applications allow patient diagnostic information to be recorded for future use by the consulting practitioner. Still-image x-ray transmission is a prime example.

4. Interactive telemedicine uses interactive television (IATV), two-way audio, fax, and data transmission simultaneously. These require wide bandwidth connections.

5. Experimental applications make use of robotics and virtual reality technology.

C. Brief History of Telemedicine

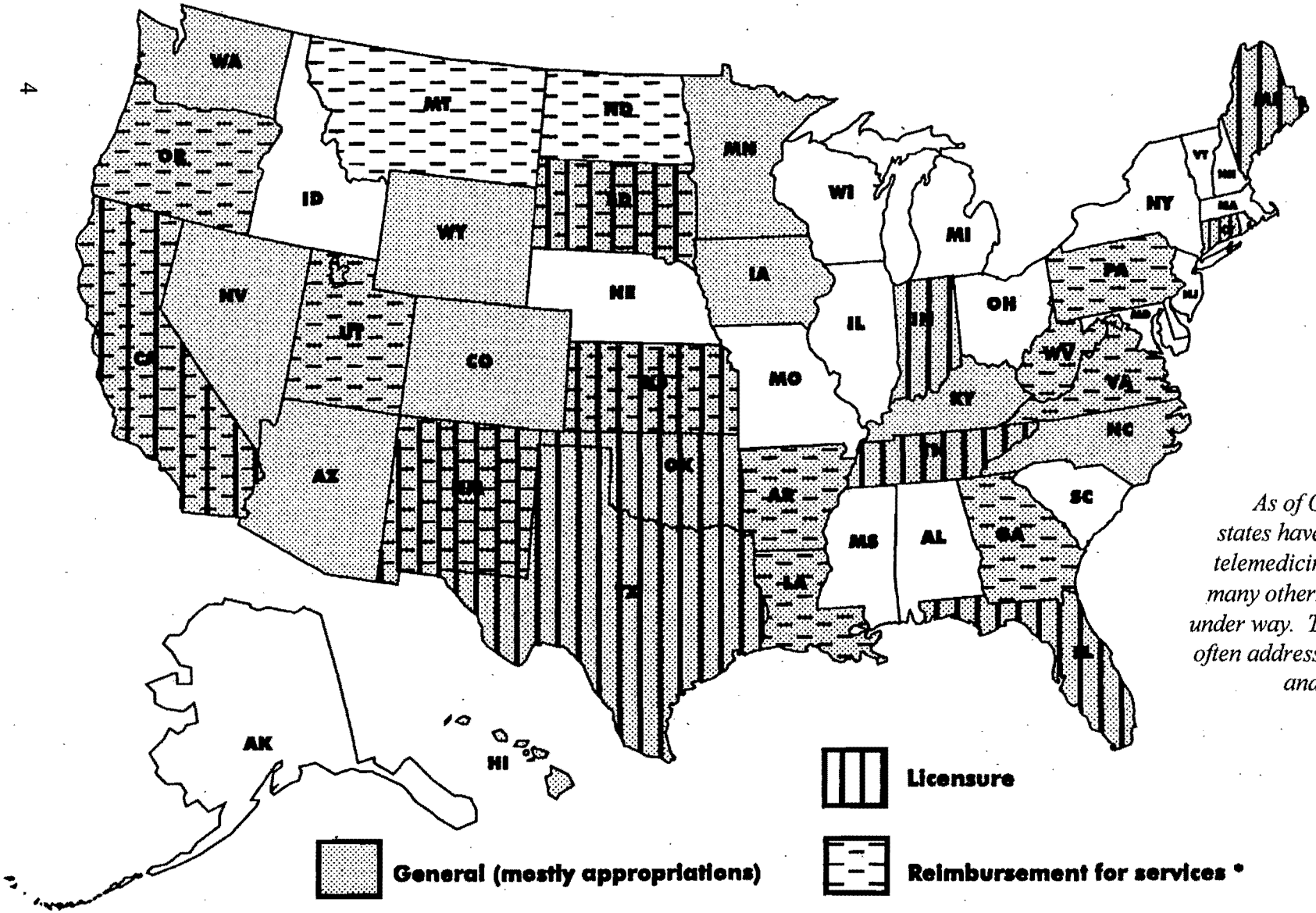
The idea of using communication technology for medical applications has existed nearly as long as modern communication technology itself. Advances in telemedicine have followed each new step in medical and communications technology development. However, before widespread access to digital communications in the late 1980s, telemedicine remained experimental.

Telemedicine's early development closely coincides with the development of post-World War II telecommunication technology. Development of products associated with radio, cable and broadcast television in the 1940s and 1950s provided many devices necessary for telemedicine. Credit can also be given to the National Aeronautics and Space Administration (NASA) for playing an important role in the early development of telemedicine. There were several pioneering efforts in not only the United States, but all over the world.

In the 1950s, rural communities pursued television access through coaxial cable. By the mid-1960s, about 1,000 sites in the U.S. had access to cable television. The Nebraska Psychiatric Institute was one of the first facilities to be wired with closed circuit cable television. In 1964, a $480,000 grant from the National Institute for Mental Health facilitated a two-way link between the Psychiatric Institute and Lincoln Regional Center (state mental hospital), 112 miles away. The link was used for educational and consultation purposes between specialists and general practitioners. The Psychiatric Institute also experimented with group teletherapy.

Radiological applications of telemedicine were among the earliest and most common. In 1959, telefluoroscopy was pioneered in Montreal using coaxial cable. Radiology was well-positioned for telemedicine expansion because: 1) practices have had a well-established consulting infrastructure based on mail and courier x-ray delivery; 2) early use of digital imaging technologies e.g. fluoroscopy and magnetic resonance imaging; and 3) early determination by the Health Care Financing Administration (HCFA) that teleradiology consultation should be covered for Medicare reimbursement. By 1987, teleradiology had widely replaced mail and courier delivery.

In the 1960s, satellite communications became available to telephone and broadcast television companies. The joint Canadian/U.S Hermes satellite provided Canadians with an opportunity to use satellite technology in distance education and medical care. Memorial University of Newfoundland (MUN), an early participant in the Canadian space program, began using the Hermes satellite in the 1960s for teleconferencing with the University of Nairobi School of Medicine, Kenya. In 1977, MUN began developing interactive audio networks for educational programs and transmission of medical data. MUN's province-wide teleconferencing system has been a model for judicious and low-cost use of telemedicine.



As of October 1996, 29 states have laws governing telemedicine initiatives and many others have programs under way. The 2 issues most often addressed are licensure and reimbursement.

Licensure

General (mostly appropriations)

Reimbursement for services *

*** Montana and North Dakota authorize without law**

The information above is excerpted from an upcoming National Conference of State Legislatures report titled "Major Health Care Policies: 50 States Profiles."

Between 1972-1975, NASA developed Space Technology Applied to Rural Papago Advanced Health Care (STARPAHC) which provided health care to astronauts in space and Papago Indian Reservation residents in Arizona. A van staffed by two Indian paramedics carried a variety of medical instruments including electrocardiograph and x-ray. The van was linked to specialists at two hospitals through two-way microwave data and audio transmission.

More recently, NASA has applied its satellite capacity to SpaceBridge, a program to provide telemetry in trauma situations. After a 1988 earthquake in Armenia, a connection was established between a hospital in Yerevan, Armenia and four U.S. hospitals. Information was transmitted via one-way video, two-way voice, and FAX technology. The same technology was later applied to a railway accident site in Ufa, Russia.

Electrocardiograms (EKG) became common instruments in large hospitals in the late 1960s. Shortly after an EKG's introduction at Miami's Jackson Memorial Hospital in 1967, the hospital and Miami Fire Department pioneered the use of voice radio to transmit electrocardiograms. This practice was introduced in Seattle in 1970 and is now commonplace between paramedics and hospital emergency rooms.

Massachusetts General Hospital staffed a medical station at Boston's Logan International Airport in 1967, using microwave telemedicine transmission. This is the first cited example of nurses used as onsite caregivers responding to telemedical instructions from physicians. The airport clinic was staffed by doctors only four hours-a-day. Evaluation of the nurse's diagnosis and treatment was performed by participating personnel and independent physician observers. The program operated for three years.

By the 1980s, many issues related to providing telemedicine were well understood. But not until the digital revolution of the late 1980s did the extravagant cost of transmitting medical information significantly decrease, making telemedicine on a widescale potentially cost-effective. The effort to create the digital National Information Infrastructure combined with the politics and economics of the managed care approach to health services delivery are arguably the two most important factors driving the current surge in telemedicine. Health Maintenance Organizations and physician-hospital alliances are competing for regional contracts on the basis of cost, quality, and access to care. Telemedicine may have the ability to reduce the economic and medical risks associated with caring for patients in rural areas, and to provide relatively low-cost specialty services to areas where fulltime staffing is impractical or uneconomical.

D. Recommendations of the Governor's Telecommunications Policy Coordination Task Force

Governor Mike Lowry established the Governor's Telecommunications Policy Coordination Task Force by Executive Order in September 1994. The Task Force was directed to assess current telecommunications policies and recommend ways the state can better attract telecommunications companies and the jobs and services they provide while encouraging the deployment of advanced networks to Washington business and residents. The Task Force considered how:

- Washington tax and regulatory policies affect decisions by the telecommunications industry to locate and expand in Washington; and

- How overall state policies affect the deployment of advance infrastructure in Washington.

The Task Force chose to concentrate on telecommunications infrastructure rather than focusing on the types of content which might be transmitted over that infrastructure. Their first report published in April 1996, "Building the Road Ahead: Telecommunications Infrastructure in Washington State," provided interim recommendations in five broad areas:

1. Achieving regulatory consistency in converging industries

2. Leveling the taxation playing field

3. Balancing local interests with state infrastructure needs

4. Bringing infrastructure to rural areas

5. Leveraging the state's role as a large purchaser, user, and provider of telecommunications services.

Decisions made in any of these areas potentially affect deployment and use of telemedicine in Washington. The Task Force recommended establishment of a state telemedicine advisory council, with representatives of the public, health care professions, higher education, state government, insurance industry, and telecommunications service providers. Such an advisory body would develop policy in setting telemedicine infrastructure and implementation standards, evaluating medical and cost effectiveness of telemedical procedures and services, registering and overseeing participating health care providers, and ensuring privacy and security of health care records.

The Task Force also recommended Washington Utilities and Transportation Commission (UTC) consider educational tariffing in light of the Federal Telecommunications Act of 1996

(TCA). Such tariffs could be established where there is a compelling need for schools, libraries, hospital or other medical institutions seeking advanced infrastructure from local exchange companies.

SB6705, passed in 1996, provides $42 million for establishment of a K-20 education telecommunications network in the state. The Task Force believes the state can and should play a direct role in bringing telecommunications infrastructure to small communities and rural areas through local schools, with provisions for community groups and businesses to use network connections when they are not being used for classroom purposes.

E. The Federal Telecommunications Act of 1996 (TCA)

TCA was enacted on February 8, 1996. Among other requirements, it directs the Federal Communications Commission (FCC) to convene the Federal/State Universal Service Joint Board with responsibility for matters "regarding the jurisdictional separation of common carrier property and expenses between interstate and intrastate operations," and to make specific recommendations on how to provide communication services to rural and underserved areas, known as universal service. TCA also directed the FCC to convene the Advisory Committee on Telecommunications and Health Care to provide advice to the FCC on telemedicine.

The Telecommunications and Health Care Advisory Committee published its findings in October 1996. They recommended "...and believe the Act requires [under TCA Section 254(b)) Universal Service Principles] adequate telecommunications infrastructure be made available to rural health care providers. The telecommunications infrastructure must be sufficient to allow access to a basic set of telemedicine applications necessary for health care in rural areas. In the opinion of the Advisory Committee, the minimum bandwidth necessary to meet this requirement would be 1.544 megabits per second (mbps)," equivalent of T1 bandwidth. The Committee further recommended that public or non-profit health care providers serving rural or underserved areas be furnished access to bandwidth up to 1.544 mbps at a rate similar to that paid by urban customers.

The Federal/State Joint Board adopted final recommendations on November 7, 1996. Responding to the TCA's requirement that telecommunications services for hospitals, libraries, and schools be provided at a discount, the board recommended, in contrast to the Advisory Committee, that the FCC seek further information before designating the exact scope of services to be required and furnished at a discount for rural health providers. The FCC will take public comments until May 1997 when the FCC will adopt regulations.

As required under TCA, UTC prepared a comprehensive report "Implementing the Telecommunications Act of 1996: A Progress Report on Local Telephone Competition in Washington State". The Report issued November 30, 1996 detailed Washington's transition to

a competitive telecommunications market. Washington had already reduced barriers to competition prior to TCA's passages, and UTC reported there are no unreasonable barriers to entry into the telecommunications market at the state level. No future action is planned until FCC adopts its universal service regulations in May 1997.

Copies of the Final Recommendations of the Advisory Committee on Telecommunications and Health Care and Final Recommendations of the Federal/State Universal Service Joint Board are available from the State Board of Health office.

F. The Federal Health Insurance Portability and Accountability Act of 1996

The federal Health Insurance Portability and Accountability Act of 1996 addresses two issues related to telemedicine and medical informatics by requiring data and privacy standards and requirements for the electronic transmission of certain health information.

The Act calls for the U.S. Secretary of the Department of Health and Human Services (DHHS) to create data standards for financial and administrative transactions. The standards will be added to a new section of the Social Security Act, Title XI, "Parts C - Administrative Simplification." Standards will be set with "the goal of both improving the operation of the health care system and reducing administrative costs." One set of standards would provide for a "unique health identifier for each individual, employer, health plan and health care provider for use in the health care system." The DHHS Secretary is also charged with adopting standards for: code sets; security for health information; specifying procedures for the electronic transmission and authentication of signatures; and transfer of information among health plans.

Confidentiality of individually identifiable patient records is covered by the Act. At a minimum, new regulations must address: 1) rights of an individual who is a subject of individually identifiable health information; 2) procedures that should be established for exercise of such rights; and 3) uses and disclosures of such information to be authorized or required. Under the Act, any regulation promulgated will only supersede state laws which are less stringent.

Once regulations have been enacted, DHHS will assume responsibility for enforcement. The Act requires the DHHS Secretary to make recommendations on data and privacy standards to Congress by August 1997. If Congress fails to act on those recommendations by August 1999, the DHHS Secretary will establish regulations by August 2000.

G. Institute of Medicine's 1996 Report Telemedicine: A Guide to Assessing Teleommunications in Health Care

In October 1996, the Institute of Medicine (IOM) published a report *Telemedicine: A Guide to Assessing Telecommunications in Health Care*. Noting that "most clinical applications of telemedicine have not been subjected to systematic comparative studies that assess their effects on the quality, accessibility, or cost of health care," the National Library of Medicine requested IOM develop a broad framework for evaluating telemedicine.

Developed by a 15-member national committee with support from an eminent technical advisory panel, the IOM report's objective is to "encourage evaluations that will guide policymakers, reassure patients and clinicians, inform health care plan managers, and help those who have invested in telemedicine to identify shortcomings and improve their programs." The report includes a list of questions to be utilized in evaluating quality of care and health outcomes, access to care, health costs and cost-effectiveness, and patient and clinician perceptions.

Copies of the IOM Report are available on loan from the State Board of Health office.

H. Synopses of Presentations Made to the State Board of Health

Since passage of ESSB6251, the State Board of Health has held an ongoing series of briefings and dialogues around the state with experts from Washington and around the nation on telemedicine applications, opportunities, and challenges. Transcripts of all presentations are available from the State Board of Health office.

Following is a list of briefings held to date:

May 8, 1996 - Coupeville

- **The First Report of the Governor's Telecommunications Policy Coordination Task Force** - Len McComb, Task Force Chair and Department of Revenue Director

- **Telemedicine Demonstration** - Sharon Baker Johnson, Community Health Coordinator, and Jan Hays, Acting Administrator, Forks Community Hospital; and Keith R. Lundberg, Associate Administrator for Regional Services, Virginia Mason Medical Center

June 12, 1996 - Friday Harbor

- **Interstate Health Profession Regulatory Issues; and Telemedicine Demonstration** - Pat Brown, Deputy Director, Health Professions Quality Assurance Division, Department of Health

July 10, 1996 - Cathlamet

- **Telemedicine Discussion** - Douglas Perednia, M.D., Director of Advanced Telemedicine Research, Oregon Health Sciences University and Managing Director, Telemedicine Research Project; and Paul Orbuch, Counsel, Western Governors' Association

October 9, 1996 - Tacoma

- **Telemedicine Discussion** - David Zulauf, M.D., Yakima Valley Radiology; and Colonel Duane Jeffers, M.D., Chief, Clinical Information Division, Madigan Army Medical Center--Project Seahawk

November 26, 1996 - SeaTac

- **Telemedicine Discussion** - Melicent Whinston, M.D., Medical Director, Community Health Plan of Washington

December 11, 1996 - SeaTac

- **Telemedicine Discussion** - Lee Palagyi, Policy Consultant. Washington Utilities and Transportation Commission, and Staff Member, Federal/State Joint Board on Universal Service; Steve Sulzbacher, Ph.D., Attending Psychologist, Children's Hospital & Medical Center Outreach Clinic--Washington State Children's Community Health Access Project, and Professor, Departments of Pediatrics and Psychiatry, University of Washington School of Medicine

January 8, 1997 - SeaTac

- **Telemedicine Discussion** - Jay Sanders, M.D., President, American Telemedicine Association and Chief Executive Officer, The Global Telemedicine Group; Thomas W. Pendergrass, M.D., M.S.P.H., Children's Hospital & Medical Center, and President, Washington Chapter - American Academy of Pediatrics, and Washington State Medical Association Telemedicine Workgroup Chair; Brent Stewart, Ph.D., Associate Professor of Radiology and Director of Imaging Informatics, University of

Washington School of Medicine; Stephen Carter, M.D., Clinical Associate Professor of Radiology, UW School of Medicine; Margot Nelle, Director of Rural Health, Washington State Hospital Association and Vice President, Washington Health Foundation, and Karim Slifka, Assistant Director, WHF Rural Initiative; Ron Seymour, INPHO Project Manager, Washington State Department of Health Management Services Division

Each of the presenters has reviewed the presentation summary and provided updated information as necessary. The following are synopses of each of the presentations:

Len McComb, Governor's Telecommunications Policy Coordination Task Force Chair and Department of Revenue Director

"Building the Road Ahead: Telecommunications Infrastructure in Washington State" is the First Report of the Governor's Telecommunications Policy Task Force. It is an interim report. There will be a final report completed prior to the 1997 Legislative Session. With TCA's passage, major telecommunications deregulation is taking place, which is likely to result in massive new investment in technology and services to business and consumers. Washington is particularly well-positioned to attract much of this new investment. The building of new infrastructure holds the key for lower costs and additional productivity for business, and greater consumer choice.

Telemedicine benefitting rural areas in Alaska, Montana, Idaho, and Washington radiates from the UW School of Medicine, and significant pilot projects in the state are funded by the federal Centers for Disease Control and Prevention. Specialized expertise can be provided through telemedicine to rural providers and residents. There is significant telecommunications potential in medical records management for cost reductions in claims processing.

Washington is well-positioned to be a leader in the telemedical field. There are obstacles and inconsistencies in state policy. Utilization of telecommunications technology in the medical arena is being frustrated by several factors. One obstacle is that UW does not have access to the kind of transmission capacity necessary to take advantage of newer technology's capabilities. There is a lack of ISDN (Integrated Services Digital Network) connections -- high speed broadband transmission capacity -- even between Tacoma and Seattle. Steps need to be taken by UTC to ensure ISDN is provided for telemedicine and consumers.

Changes in the telecommunications industry may not result in increased benefit to rural areas. There are problems associated with telemedicine billing practices. Even though money is saved and better service provided by having teleconferences between rural providers and urban area specialists, Medicare and private health insurers will not pay for the telecommunications costs or a portion of the costs of the devices necessary to carry out this function. Yet they

might pay, and the patient will certainly pay, for the travel expenses of physician and patient. Billing and reimbursement should be technologically neutral. Another problem is providing for health practitioner licensing across state lines, as well as legal liability and medical malpractice. When a telemedicine consultation results in patient harm, it is unclear who is liable -- the local provider, consultant, or local telephone company which may have provided poor transmission.

One Task Force recommendation is to make use of the state's investment in linking up all higher educational institutions as the telecommunications backbone for other public entities. TCA requires educational tariffing, ensuring educational and medical institutions and libraries receive special rates for the use of telecommunications lines. Investments in telemedicine and public health infrastructure need to build off each other to ensure they are not duplicative.

Sharon Baker Johnson, Community Health Coordinator, and Jan Hays, Acting Administrator, Forks Community Hospital; and Keith R. Lundberg, Associate Administrator for Regional Services, Virginia Mason Medical Center

Applications of advanced telecommunications technology in medicine at Virginia Mason Medical Center (VMMC) contain elements of old as well as new technologies. Traditional systems have been used effectively over the last 30 years to communicate using toll-free telephone lines, speaker phones, and conference calls. Within the last 20 years, telephones lines have been used effectively to transmit facsimile images of medical data (i.e., patient information such as lab reports, fetal heart monitoring strips, EKG and EEG strips.) Within the last 5 years, x-ray images have also been transmitted over regular telephone lines.

Within the last 2 1/2 years, VMMC has experimented with the use of a broad-bandwidth T1 connections with Forks to evaluate the use of real-time, interactive, televideo conferences to facilitate physician-to-patient and physician-to-physician clinical consultations. VMMC has also used its own internal communication system as well as T1 connections to transmit x-rays at high speed around the main campus of the Medical Center in Seattle and between VMMC and its regional satellite clinics. In 1986, VMMC established its first suburban satellite clinic and currently operates 22 such clinics. Advanced information systems are used between these satellite clinics to access patient information and other clinical decision support tools.

In 1995, VMMC celebrated its 75th anniversary and is a referral center for the Pacific Northwest (Alaska, Idaho, Montana, and Washington). Approximately 40% of the patient activity at VMMC comes from outside the greater Seattle area. VMMC employs approximately 400 physicians, and over 3,500 physicians work regularly with and refer patients to VMMC. VMMC has worked with Forks Community Hospital (FCH) for over 25 years and knows the interests and capabilities of the local physicians. It is for this reason that

FCH was chosen for implementing advanced telemedical applications. VMMC also has other demonstration projects in Juneau and Sitka, Alaska and in Port Angeles.

FCH is a part of a public hospital district. FCH has 17 acute care beds, 36 long-term care beds, an active emergency room, and an ambulance service. There is a rural health clinic and several other clinics up to 30 miles away. The closest health care facilities other than FCH are 60 miles away in Port Angeles and 100 miles away in Aberdeen. One-third of the 11,500 people served by the hospital district are below the poverty line, making them geographically and financially isolated. There is a large and increasing senior population, less likely to be able to travel, a significant Hispanic population, and 3 Native American tribes.

After a pilot project in Spring 1995, FCH began regular telemedicine activities in October 1995. FCH and VMMC are testing telemedicine applications in many areas to try to determine which are most appropriate. Through December 1996, 78 consultations had taken place, 54 in speech therapy. Many speech therapy consultations are for long-term care residents who must be assessed for swallowing abilities, but others are for rehabilitation of patients suffering some form of brain damage. Previously, there could be a wait as long as 2 weeks for a speech therapist to visit the area for a consultation. Other consultations include: allergy; rheumatology/ arthritis; cardiology; dermatology; neurology; orthopedics; pain management; and psychiatry. Telemedicine has also been used to deal with patient management issues. Tumor boards including VMMC and local physicians have been conducted, as have cardiology rounds. There have been several nursing in-service programs covering issues including: clinical pathways; preventing swallowing difficulties; and intravenous pump use. The telemedicine link has also been used by diabetes and breast cancer support groups, and diabetes education classes.

Three principles provide the framework for the VMMC telemedicine project:

1. Look for opportunities to move information rather than people;
2. Involve the right person at the right time, right place, over the right medium; and
3. Telemedicine technology is a tool, not in and of itself a solution.

It has been the experience of the VMMC project that initial resistance to telemedicine technology among physicians. With actual experience, however, physicians' attitudes move to "cautious optimism". As many VMMC physicians as possible are being given the experience of telemedicine so that the project can be led by clinical thinking. VMMC has initially chosen to use the high end of available technology. Levels of clinical confidence are being evaluated. Thus far, there have been high levels of patient and family satisfaction. Needs are assessed from both provider and patient perspectives. Open architecture technology, compatible with other systems is utilized. VMMC is also communicating via telemedicine links with many

other places in the U.S., including a six-bed hospital in Big Sandy, Montana, and to larger medical centers such as the Emory University Clinic in Atlanta, Georgia.

Telemedicine assists providers in responding to the demand side of health care and improves access. Patients are encouraged to make use of telemedicine consultations through their physicians. Consultations are now available within 24 hours when necessary. Telemedicine decreases isolation among Forks providers, though there are barriers. Studios and cameras do not exist in every clinic, so they must go to FCH to use the technology, which changes practice patterns. Continuing Medical Education (CME) has been successfully offered through telemedicine. All physicians connected to VMMC via the telemedicine link can participate in VM's weekly medical grand rounds and receive CME credits.

Cost is a barrier for the hospital district. The T1 line used is costly. Maintenance and leasing equipment cost $3,400/month. The line must be paid for 24-hours-a-day, seven-days-a-week even if not used. Partial bandwidth cannot be purchased at this time. The district agreed to such a commitment because it is part of its community responsibility to improve access. The district is working to partner with the new UW Olympic Natural Resource Center which also needs T1 capacity. It would be a challenge for community physicians to forego their established pathways for consultation if they feared the new communication system would be maintained over the long run. T1 line costs may not be that expensive when amortized over patient consultation, CME, and administrative uses which extend value to the community.

VMMC is careful to select applications most likely to add value. Transmission of endoscopic images remains problematic. The ophthalmoscope has yet to be used effectively. FCH also sends out EKGs and fetal heart tracings via telecommunications. Legitimate ways must be explored to keep costs down. Reimbursement and interstate licensure issues need addressing. VMMC does not currently bill for telemedicine consultations.

The State Board of Health's focus should be on removing barriers and identifying incentives to improve access, reduce costs, and enhance quality. Another key action for the Board should be to encourage the creation of an ISDN (or similar) telecommunications network infrastructure for the state.

Telemedicine services to the western side of the Olympic Peninsula are being enhanced in 1997 through a U.S. Department of Commerce grant to link VMMC's Physical Medicine and Rehabilitation Department with West End Outreach (FCH's outpatient mental health clinic), Quileute Clinic in La Push, and the Indian Health Service Clinic in Neah Bay. This network will provide a comprehensive pain management program to patients, as well as access to other telemedicine services. Internet access will link patients to a pain management "chat room" website when they can receive support from other chronic pain sufferers.

Pat Brown, Deputy Director, Health Professions Quality Assurance Division, Department of Health (DOH)

DOH's Health Professions Quality Assurance Division (HPQA) works with the 18 professional boards and commissions regulating health providers in Washington. New opportunities are being created through telemedicine, including: increased access, especially in underserved areas; expanded availability of specialized expertise; and reduced cost. Telemedicine includes telenursing or other forms of care delivery making use of modern telecommunications. Home nursing care can be delivered through use of telecommunications apparatus. There is no reason for such a system of care delivery to be limited by state boundaries, wherein the challenge lies. Legislative staff requested HPQA to provide some focused analysis and creative thinking on licensing issues relating to telemedical practices. The concern is to maintain the high standards of patient care provided within the current regulatory framework without being unduly burdensome to individual providers or erecting unnecessary barriers.

Currently, for the most part the only way to legally engage in delivering care through telecommunications is to be licensed in each state where patients reside. There are some individual variances and practice acts exemptions which are provided on a case-by-case basis. There is no a clear way for providers at one site to deliver care in many different states in ways which hold them accountable for the quality of care. Nor is there a way for the state to take action to correct or restrict substandard practice of a provider located in another state.

There is urgency to finding a remedy because if the states do not do so, providers will seek federal action in order to be able to expand their practice without state barriers. The Federation of State Medical Boards and National Council of Boards of Nursing are suggesting different approaches to the problem. A workgroup is being convened to look at these issues. The goal is to define workable options and make recommendations. The product will be forwarded to the State Board of Health, DOH Secretary, legislative health committees, regulatory boards and commissions, and health professional associations. State Board members and staff participate in the process, with representation from professional associations and regulatory boards.

Telemedicine challenges us to think in creative and non-traditional ways to promote and maximize access while protecting quality. There already seems to be illegal interstate practice going on, including triage nurses operating in one state without licenses to practice in the states wherein their patients reside. A dilemma associated with the licensing issue is the difference in standards across states. Care standards may be different across regions, and it is difficult for practitioners to become apprised of different standards in various states in which they may practice. Credentialing is a difficult issue, as it is not the intent to be regressive in interpreting practices to inhibit already-existing consultation. If a consultation is more directive than purely consultative, at some point the Medical Quality Assurance Commission would have to look at it as the practice of medicine within Washington.

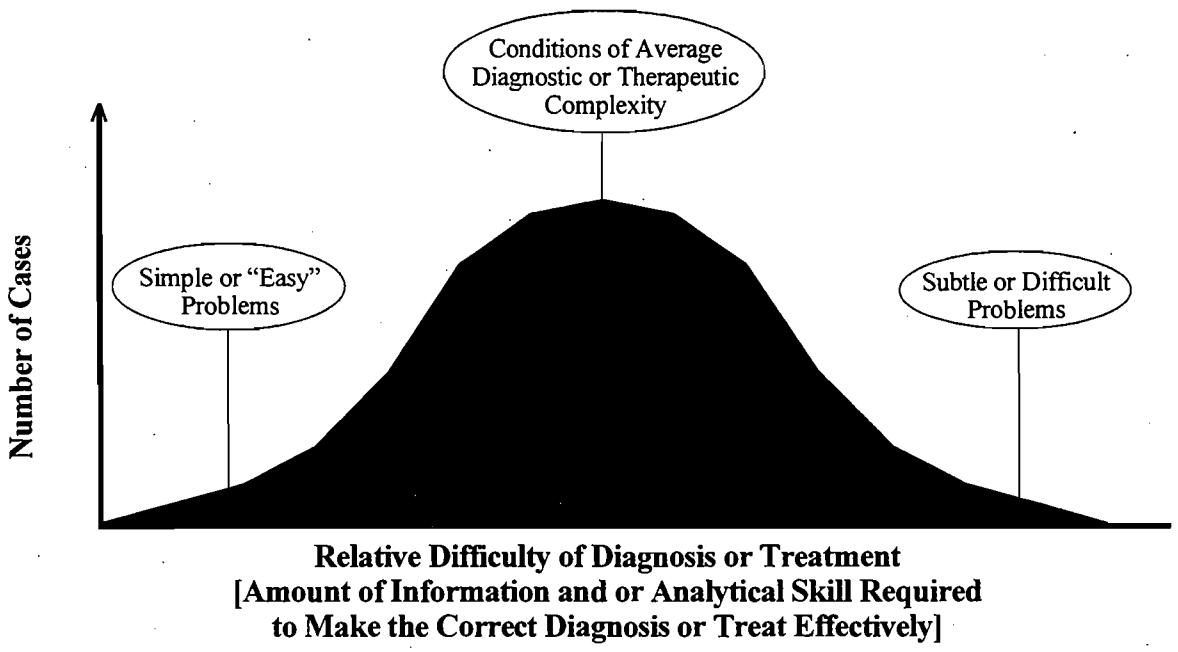
Douglas Perednia, M.D., Director of Advanced Telemedicine Research, Oregon Health Sciences University and Managing Director, Telemedicine Research Project

Advanced telemedicine research at Oregon Health Sciences University (OHSU) is funded through a High Performance Computing and Communications contract with the National Library of Medicine to study teledermatology. The Telemedicine Research Center (TRC) is funded largely by contracts with HCFA and focuses on telemedicine evaluation research.

Four elements are required for telemedicine: data or medical information; distance necessitating data transmittal; someone able to interpret data appropriately; and electronic transfer of data. A reasonable telemedicine definition would be electronic transmission of information for use in medical care consisting of the delivery of image, sound, text, and graphical data. A typical system would have a person, camera, and computer on one end, with data transmitted over a telephone line to a health professional at the other end.

All medical problems within each specialty lie on a spectrum of diagnostic or management difficulty which can be displayed as a curve. (see Figure 1) A small fraction of easily diagnosable and treatable cases are called "doorway diagnoses". On the other end are problems which are difficult to diagnose, the most difficult only being diagnosed through autopsy. Another way to express this concept is to say the more complicated a problem is, the greater the information or skill required to come up with the right diagnosis and therapeutic decision. Hence, when physicians cannot figure out what is going on, they order more tests.

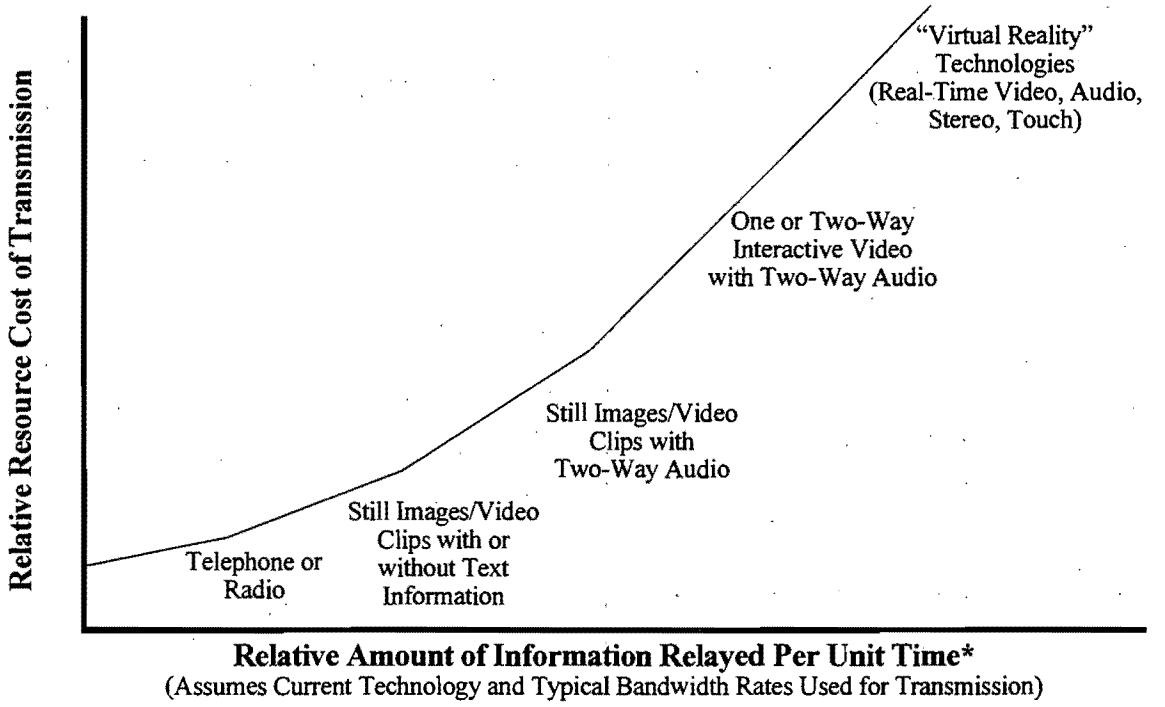
Figure 1: Distribution of diagnostic or therapeutic difficulty for hypothetical medical condition.



Source: Telephones, Telemedicine, and a Rational Reimbursement Policy, Douglas A. Perednia, M.D. and Jim Grigsby, Ph.D. (1996)

All telecommunications modalities present tradeoffs between cost and amount and type of information relayed per unit of time. (see Figure 2) As the amount of information increases and image accuracy and manipulation capacity expands, costs per unit of time increases. This varies from a physician describing a skin condition over the telephone, to interactive video and virtual reality at the other extreme. Seeing the patient in-person increases information available beyond what is available through telecommunications, while costs of in-person consultation can vary widely, depending on distance to be travelled.

Figure 2: The spectrum of telecommunications technologies that are in use, or have been proposed, for the delivery of health care services.



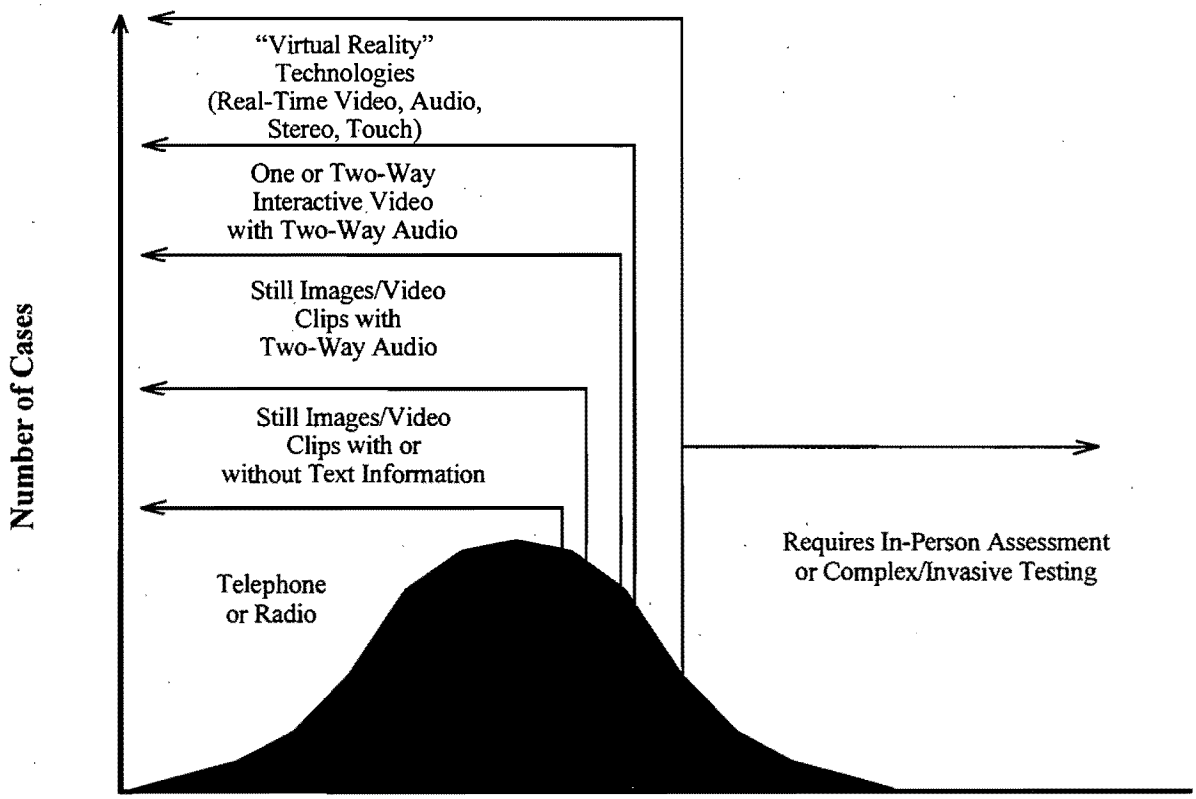
* Note that the amount of information relayed refers to the actual throughput of data that is available to interpretation. It does not necessarily imply that the information is (1) needed, or (2) sufficient, for a given purpose. For example, detailed information about a patient's heart may or may not be valid in the context of a clinical consultation requested for the control of blood sugars in a diabetic.

Source: Telephones, Telemedicine, and a Rational Reimbursement Policy, Douglas A. Perednia, M.D. and Jim Grigsby, Ph.D. (1996)

Telecommunications modalities facilitate diagnosis and management of a specific fraction of medical problems. Some problems will still require in-person consultations, others cannot be properly diagnosed by consultation of any kind. A large portion of problems requiring consultation can be handled effectively via telephone. Incrementally larger numbers of cases can be diagnosed and/or managed with increasingly complex technologies. Sufficiently difficult cases may absolutely require face-to-face consultation and/or complex intervention. (see Figure 3) The difficulty is in determining: 1) the least amount of technology and lowest

resource cost necessary to handle problems which go beyond capability of telephone consultation; and 2) if the cost differential for each step up in technology is worth additional benefit gained.

Figure 3: Diagram illustrating the relationship between the amount of information required to establish a diagnosis or treatment plan, the type of technology used, and the proportion of cases for which that technology may be expected to be effective, for the hypothetical condition presented in Figure 1.



Source: Telephones, Telemedicine, and a Rational Reimbursement Policy, Douglas A. Perednia, M.D. and Jim Grigsby, Ph.D. (1996)

Each medical specialty would have different information needs which could be supplied through telemedicine. The probability that the medical system will be able to diagnose and treat a problem effectively is increased by telemedicine. Conventional services and telemedicine are complementary and cannot replace each other.

The idea behind telemedicine has been around since 1924, when experimental television was first introduced. Over the past several decades there has been intermittent interest. It has now taken off as resource costs of teleconsultations have dropped dramatically with the advent of

digital technologies. As of February 1996, there were 116 U.S. telemedicine programs tracked by TRC, not counting the tens of thousands of teleradiology systems in use. Originally it was thought these systems would provide more sleep time for radiologists, but the opposite has turned out to be true, as cases are sent to radiologists at all hours.

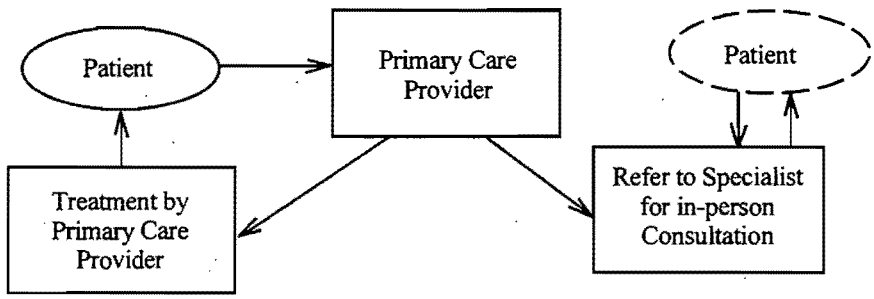
OHSU's project is examining referral patterns for rural patients with skin problems. Patients at three eastern Oregon clinics, 180 per site, were tracked over eight-week periods. Primary care providers of patients with skin problems were asked how they planned to treat, how confident they were about their diagnosis, and whether they would refer the patient to a dermatologist. 10-15% of patients come in for skin-related problems. Providers are certain about 46% of the time; 54% not completely certain, including 5% of the time when they are totally uncertain. Only about 1% were referred to a specialist.

In the health care business, each course of treatment can be thought of as a series of transactions. Each transaction has three elements which define the cost: frequency, charge per visit or treatment, and failure rate. By not referring to a specialist when needed, the frequency and failure rate is increased. When patients return for follow-up visits after treatment failure, primary care physicians are more likely to refer. (see Figure 4) When telemedicine is added to the equation, there is a third choice: the primary care provider can treat the patient, refer for a face-to-face visit with a specialist, or do a telemedical consultation. A teledermatology consultation is often less expensive than one in-person. (see Figure 5) It is likely the failure rate can be reduced, lowering the overall cost of care. The number of cases referred for in-person consultations may also be reduced, resulting in lower associated costs in travel time, cost of lost work, and cost of maintaining a dermatologist office facility. Used properly, telemedicine should lower the costs associated with health care transactions. Where a teledermatology system was put in place, the number of referrals for consults, now conducted via telecommunications, rose by a factor of 10. Physicians were 10 times more likely to refer with a telemedicine system in place. These are most likely for cases in which the degree of uncertainty was not so high as to result in a referral for an in-person consultation, but for cases where physicians were sufficiently uncomfortable that they would prefer not to manage them on their own.

Applying the same transactional analysis to radiology, teleradiology does not change anything except where the film is read. As films can be read faster or more conveniently, with no other changes in the system, teleradiology has really taken off. The transaction model can also be used in considering home health care service delivery. Telemedicine allows a home health care provider to consult with a patient prior to referring to other specialists. In-person consultations will still be needed, but only in a fraction of the cases.

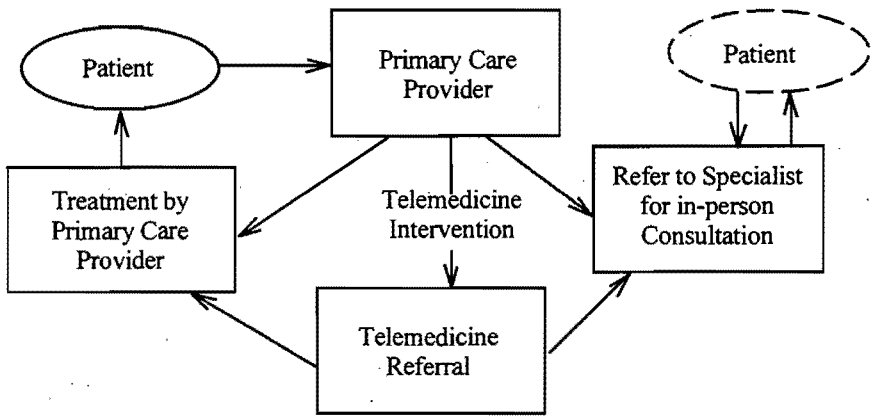
Telemedicine has the potential to profoundly transform practice and referral patterns. The number of people seen by dermatologists may increase by an order of magnitude. Interstate

Figure 4: "Conventional" in-person patient care transactions are essentially binary with respect to how and where the patient receives professional counsel for a skin problem. The primary care provider is, in most cases, responsible for both treating the patient and deciding when aditional advice or expertise should be sought. For most problems and in most cases, the patient never leaves the self referral, self management loop on the left side of the diagram. The system of incentives inherent in many managed care plans often work to reduce the rate of referral to specialists even further. Even after being referred to a specialist, the patient may or may not be able to continue receiving specialty consultation, depending upon health plan payment policies, barriers to travel (dotted lines). If the failure rate of primary care management is high, patients may circulate through the lefthand care loop many times before (1) the problem is corrected; (2) the patient gives up; or (3) specialty referral is sought.



Source: Telephones, Telemedicine, and a Rational Reimbursement Policy, Douglas A. Perednia, M.D. and Jim Grigsby, Ph.D. (1996)

Figure 5: Patient care transactions in the presence of telemedicine. Note that care is still ultimately delivered by either the primary care provider or the specialist, but that the option of an appropriate telemedicine intervention may be able to reduce the frequency of management failure by the primary care provider and/or improve access to follow-up by the specialist provider.



Source: Fear, Loathing, Dermatology, and Telemedicine, Douglas A. Perednia, M.D. (1996)

and international health care delivery becomes possible as long as it is cheaper and more convenient to provide a teleconsultation rather than move the patient. There will be greater choice of specialists and more competition among specialists. In some specialties there may be a decrease in number of specialists needed, in others an increase. There will be potentially important modifications in personal practice. Telemedicine rounds may be added. More 24-hour service will be expected. There may be more or less efficient use of time, depending on whether patients are appropriately referred with the necessary data provided. Effects on practitioner time, income, and satisfaction are unknown. Patients in general like telemedicine. Telemedicine is a means to an end, not an end in itself.

Little data has been collected on physician efficiency and effectiveness, and quality of care in a telemedicine setting. Most telemedicine programs were set up as demonstration projects using federal funds. Systems were put in place that do not necessarily have a sound clinical or technological basis. There have been very few organized efforts at coordinating telemedicine evaluation activities across programs. Programs are self-evaluated, with little effort to decide whether the telemedical use is worthwhile.

HCFA is now requiring those who seek a waiver in order to be reimbursed for telemedical consultations to take part in a uniform evaluation of their programs. This evaluation is being conducted by Dr. Jim Grigsby, Center for Health Services Research, University of Colorado, in conjunction with TRC. So there may now be a single, large-scale evaluation cutting across multiple programs, although the study has been considerably delayed by the federal Office of Management and Budget. HCFA currently pays for teleradiology which the market has already determined to be cost effective.

In dermatology or radiology, the degree of specialist comfort will be partially determined by quality of the image. Quality can always be improved at increased cost. The real question is what is the lowest cost image -- in fidelity and aesthetics -- which still provides necessary information for diagnostic purposes. This will differ based on the specialty and the individual case. Liability insurance providers do not differentiate between practitioners who make extensive use of telemedicine and those who do not. Insurance providers may feel physicians are now getting more information as a result of telemedicine than they would otherwise. There may be more differentiation once there is litigation.

International telemedicine practices are already underway. Washington is likely to be a leader in providing telemedicine services to Asia and the Pacific Rim.

Six Principles for a Rational Telemedicine Policy

In a 1996 paper titled "Titles, Telemedicine, and a Rational Reimbursement Policy" co-authored by Dr. Douglas Perednia and Dr. Jim Grigsby, Center for Health Services Research, University of Colorado, six principles for a rational telemedicine policy are put forward:

1. Diagnosis and management of any given medical condition requires information that can be interpreted and acted upon by a health care provider. Although the relationship is not linear, larger amounts of information are generally necessary for diagnosis and management of more complex conditions. Different types of information (e.g., images or blood glucose values), processed by different sensory systems (e.g., rales, papilledema, splenomegaly, acetone halitosis) are needed to diagnose different types of conditions.

2. All telemedicine technologies, including the telephone, represent components of a discontinuous spectrum of information transmission. Different types of telecommunications technologies transmit different types and different amounts of information.

3. All telemedicine technologies, including the telephone, can provide useful clinical services. Telecommunications modalities that transmit large amount of information facilitate acquisition and transmission of information required to diagnose and manage greater numbers of clinical conditions, but at a greater resource cost.

4. Selection of diagnostic and management modalities for patient care should be *technology neutral.* That is, selection of these modalities should be based on their relative costs and the appropriate outcomes of the medical intervention, rather than an arbitrary preference for one type of technology or another. Irrespective of the technology, one should utilize the necessary and sufficient tools needed to do the job effectively.

5. Coverage policies and reimbursement mechanisms should be *technology neutral.* That is, selection should be based on relative costs and expected outcomes of the medical intervention, rather than an arbitrary preference for one type of technology or another.

6. Reimbursement mechanisms for Medicare and other payers should be based on rational, measurable, and empirically-supported criteria that compensate providers according to the relative value of the health care services performed.

Paul Orbuch, J.D., Counsel, Western Governors' Association

The Western Governors' Association (WGA) is an association of 18 western governors, from Texas and the Dakotas to Alaska and Hawaii. WGA takes on issues which are non-partisan in nature and is getting heavily involved in technology issues. Regarding telemedicine, WGA is focusing on what can be done in individual states and the region as a whole. In 1995, WGA published the "WGA Telemedicine Action Report" and is now following through on its recommendations, which fit well with what Washington State is trying to do in fostering telecommunications infrastructure.

Many of the WGA report recommendations address interstate telemedicine applications, which the Board should not overlook. The future lies in interstate and international telemedicine. Given Washington's current position in serving the Northwest and Alaska regionally, the state is in an excellent position to take advantage of these opportunities as state boundaries evaporate. Business and consumer demand will drive toward erasing state boundaries, despite many interests which would erect barriers. It was recommended the State Board of Health include in its legislative report how Washington should position itself to fit a more regional, if not global market, and what should be done within Washington to perfect its telemedicine systems, as well as what can be worked on with neighboring states.

The WGA report notes that telecommunications have broad implications for rural health training, physician retention in rural areas, and numerous other applications beyond medical diagnoses. Washington State is trying to integrate telecommunications planning across the whole spectrum of government and private services in creating a technology backbone.

WGA identified six barriers to telemedicine and has asked experts to write a background paper about each of the barriers:

1. Inadequate information infrastructure and uncoordinated infrastructure planning: Washington is well ahead of other states in this area. A recommendation is to bring in private partners, and integrate information technology across state agencies and within communities.

2. Regulatory distortions, limitations on competition, and fragmented demand: TCA has helped reduce barriers, but there are still internal state problems which can be addressed. There is limited competition in rural areas, leading to unaffordability. WGA encourages creation of cooperatives for rural purchasing of telemedicine services as a way to bring down prices.

3. Public and private reimbursement policies that do not compensate for telemedicine services: HCFA is confused on what directions to take. Neither HCFA nor Washington State have clearcut reimbursement policies. WGA recommends governors in each state create

taskforces to negotiate and set statewide policies on telemedicine reimbursement. This will help HCFA determine future directions. This is already happening in North Dakota. Policies should include: what services to reimburse; payment levels; which practitioner receives reimbursement; how reimbursement is financed; and incentives to encourage reimbursement by insurance companies. States should also grant more support to universities providing telemedicine services.

4. Physician licensing and credentialing rules that discourage physicians from practicing telemedicine within states and across state lines: There are liability issues, as well as questions regarding choice of law and venue in potential legal cases which may be a disincentive for a practitioner to provide services across state lines. Such provision may lead to greater efficiencies and enhanced patient options. WGA has been charged with drafting a uniform state code for telemedicine licensure and credentialing, which would define telemedicine and create arrangements for interstate reciprocity, perhaps through a special license. This has not been accomplished yet. The Federation of State Medical Boards has also drafted a model act, with which WGA has problems, because it still leaves definitions of telemedicine consults up to each individual state medical board. The lack of a single definition across states could hamper reciprocity arrangements.

5. Concerns about malpractice liability associated with telemedicine: WGA is planning to ask the American Bar Association or some other institutions to provide analysis of how they would recommend a judge rule on a venue or choice of law question in the case of an interstate telemedicine consultation. WGA also recommends states amend their statutory limits on malpractice awards as it applies to out-of-state telemedicine providers.

6. Concerns about the confidentiality of patient information: Patients are wary of having their medical histories sent out over modems to remote locations. At present, a potpourri of state regulations shields records and does not easily lend themselves to interstate protections. Uniform standards may be needed, and Congressional legislation that would federalize confidentiality protection has been considered and may be taken up again in the future.

There is lack of clear analysis of costs and benefits. Analysis being done at institutions such as Dr. Perednia's will be very helpful. Having more telemedicine programs will help, as the current sample size for analysis is small.

David Zulauf, M.D., Yakima Valley Radiology

Yakima Valley Radiology (YVR) consists of nine specialists, subspecialists, and radiologists based in Yakima. YVR serves five hospitals in four cities in Central Washington and has six years' experience with teleradiology -- most of it being on-call or preliminary diagnosis for CATscan and ultrasound studies. YVR now uses a live video link with one hospital more frequently.

YVR is currently connected to Prosser Memorial Hospital (PMH) 60 miles south of Yakima. The sources at PMH are ultrasound video and fluoroscopy images taken using a live video x-ray device. There is a switchbox connecting the two video sources which feeds into a compressor/decompressor (codec). The codec digitizes and transmits the digital video signal down the communication link. YVR has the same equipment which decompresses the signal. PMH also has a laser digitizer which operates like a high resolution FAX machine. The communication link is a wide bandwidth T1 line. At four other sites CATscan images are digitized and sent over regular phone lines at normal speeds.

YVR's imaging center has four modem telephone lines hooked up to a fiber optic hub. There is a fileserver with four viewing stations, with each monitor displaying 2,000 x 2,500 pixels--80 times standard television resolution. These monitors display static images, and digitized x-ray and ultrasound images. There is another monitor connected to the codec which receives transmission of live video from ultrasound and fluoroscopy. The digitizer uses 4,000 shades of gray to provide fully diagnostic images. Digitizers may also be equipped with autofeeders and barcode readers to send patient demographic and clinical information with the image. They also use a digital time base corrector which cleans up the video signal.

YVR also uses a FAX machine, modem, and remote printer. Patient reports are dictated and transcribed at YVR and sent to the hospital where they are printed on letterhead.

PMH's particular situation led them to the use of teleradiology services. PMH has fewer than 30 beds and was losing their radiologist coverage. Demand for radiology services was 6-8 hours per week. PMH would lose $35,000/year if required to hire a staff radiologist for that coverage amount. Without availability of such services, a physician unsure about a diagnosis would need to transport a patient elsewhere, at extra expense and inconvenience to hospital, physician, and patient. This would occur 10-12 times a year, costing PMH $500-$1,000 per patient. If PMH were to receive a flat-rate Medicare payment, the hospital's costs of paying for patient transport and reimbursing other institutions would result in PMH losing money. There is also a cost in keeping a patient an extra day for a necessary diagnostic procedures. PMH was also aware that family practitioners and OB/GYNs in the community were not sending their patients to them because they only had six hours of radiology coverage. Physicians were unsatisfied with delays in radiological service delivery.

PMH generated insufficient volume to support on-site radiology coverage, but required availability of fluoroscopy procedures to maintain the hospital's level of care. Barium enemas are an example of a basic procedure PMH was unable to perform. The solution was to provide live video link for transmission of fluoroscopic images for remote examination.

Several considerations must be taken into account in implementing teleradiology services. The first technical consideration is whether the transmitted image would be of equal quality to the

native image. Live images would need to be 30 frames/second with aspatial resolution of 500 lines. Many tests were performed prior to use to enhance imaging. Quality was improved to 95% of the native image, which is considered satisfactory. T1 lines were needed to handle live video. Radiologists had to learn how to read compressed video images because such images change slightly in transmission. Radiologists were satisfied with the quality of the film digitizer.

Medical/legal issues were considered. PMH had to get an opinion about whether this work constituted medically-supervised administration of ionizing radiation. Department of Health (DOH) said such is the case. The staffing consideration was having trained clinicians onsite to provide medication and train the radiological technologist to move the fluoroscope and administer substances intravenously. YVR partners need to be trained in equipment use, for which there was a short learning curve.

Costs for PMH's site were $80,000 and $98,000 at YVR. Telecommunications costs of $13,000 are shared. YVR also has annual service costs of $12,000.

A procedure may begin with YVR receiving clinical information by FAX. YVR radiologists talk to the technologist onsite, who is wearing a phone headset, to set up the procedure. The patient's experience does not change, except that the radiologist's response is much faster. Physicians are able to immediately determine if an emergency exists.

In 1994, YVR did 230 live video transmissions. This is about 12% of the video medical consultations done in the U.S. annually. YVR is now doing 250 video consultations yearly.

YVR has the capacity to receive live ultrasound from PMH but they have found that static images work as well, except in emergency cases. All participants benefit from teleradiology practice. At other small regional hospitals in the area in 1994, there was a 15-20% decline in radiology business. PMH saw a 5.2% increase in their volume, and no patients were transported for fluoroscopic examinations or emergency ultrasounds. PMH is now accredited for mammography, and their clinicians have greater access to radiologists. No patients were transferred inappropriately. PMH paid for its investment in 14 months. All equipment was paid for without grant money. Some 50% of all government telemedicine grants do not result in any telemedicine in their first year. Patients benefit from decreased travel time and greater scheduling convenience. Area residents like to support their local health care facility.

Telefluoroscopy has proven to be a cost-effective and reliable method of providing continuous fluoroscopy availability in the rural hospital setting. The future of the teleradiology specialty as being one of the brightest in telehealth. A 1995 Journal of the American Medical Association (JAMA) article on telemedicine stated 80-90% of telemedicine activities undertaken thus far are teleradiology. The fact that HCFA is reimbursing teleradiology

services makes it a sustainable enterprise. Many other large institutions use their T1 live video for administrative conferences rather than telemedicine. The 1995 JAMA article estimated 50% of non-teleradiology uses were administrative teleconferencing.

T1 lines are necessary for live video, as there would be less motion tolerance with lower capacity lines. YVR is working to make the technology less intrusive and simplified for the hospital-based technician. Almost all radiology examinations will be done with digital images in the future. YVR is working toward archiving their digital images on the local area network.

The Legislature should take up several issues. Barriers to interstate practice should not be set up. Once information is digitized, it no longer is bound by traditional state boundaries. National medical licensure should be considered, noting specialty boards already operate this way. Malpractice should be handled through the national practitioner databank so states' concerns can be met. Washington is positioned well to be a net exporter of health care services, so the state should not put up roadblocks. A limited license approach for interstate telemedicine practice in Washington should be adopted. As technology is changing quickly and uses are dependent upon physical setting, there should be restraint in setting up new standards and regulations. The further people are from sites for traditionally delivered services, the less restrictive the state should be. Medical specialty areas should set the standards for telemedicine technology in their own area, e.g., pathologists set the standard for required pathology image resolution.

The state can encourage telemedicine by addressing telecommunications tariffs. In Georgia the cost of T1 service for telemedical use anywhere in the state is $400. In California, ATM with bandwidth even greater than T1 connections will be available for $4,000 per month per site. The other issue of infrastructure is geographic availability. The State Board of Health might benefit from talking to UTC, though economies of scale will not be realized in rural areas. The state needs to figure out a way to bring high-speed transmission lines to rural areas. Using satellite links would not get around the need for T1 lines since data must be transmitted to the uplink facility. As more hospitals are linked, a remote consulting physician is able to remain in that role even if the patient has been transferred. A large managed care facility with many remote sites would be able to keep its equipment running all the time. The reduced cost of physicians not spending billable hours driving from site-to-site increases economies of scale.

Colonel Duane Jeffers, M.D., Chief, Clinical Informatics Division, Madigan Army Medical Center--Project SeaHawk

Project Seahawk is an effort to link Madigan with smaller hospitals at McChord, Bremerton, and Everett via telecommunications, with the Veterans Hospitals joining in. $7 million was allocated to Project Seahawk as a result of collaboration between Congressman Norm Dicks

and Alaska Senator Ted Stevens. $6.5 million is allocated to equipment and installation in federal facilities around Puget Sound, with $4.5 million earmarked for teleradiology. $400,000 is allocated to communications infrastructure.

The purpose of the Project Seahawk telemedicine setup is to examine a patient remotely. There is a robotic camera controlled at the receiving end, allowing the practitioner to change view at will. There is high fidelity audio and an x-ray digitizer. The same equipment exists at the remote site. Several companies manufacture this type of equipment, which allows a wide range of information to be exchanged: video, still images, text, and audio. Potential applications include: provider and patient education, administrative meetings, diagnosis and consultation. The equipment may be used in interactive mode or information may be stored for later use in triage or followup situations.

No telemedicine has been performed in the Project's first year. The primary obstacle had been congested ISDN lines in the Puget Sound region. The Project is switching to asynchronous transfer mode technology which gives them dedicated rather than party lines. Part of their problem was the large amount of bandwidth required, the equivalent of 12 phone lines, to support all the devices. The Project is set to go online in October 1996.

Realistic skepticism should be maintained. Most telemedicine projects have not been self-sustaining and ended when their funding ceased. At this point, the Project's success or failure is entirely theoretical. Madigan has a wide geographic responsibility that is increasing while their human resources are declining, so theoretically this system could work. The Navy is also involved. In the military community, people choose to travel long distances to receive services at Madigan, whereas in the civilian community people like to receive services near home. Project SeaHawk is an attempt to alleviate this problem by getting Madigan out into the community.

The U.S. Department of Defense is defining telemedicine as clinical rather than educational. Telemedicine as a whole may not be as economically viable as teleradiology, but the military sees telemedicine as more of a readiness issue, i.e. providing medicine on the battlefield.

Melicent Whinston, M.D., Medical Director, Community Health Plan of Washington

Community Health Plan (CHP) of Washington represents 21 health centers in 20 counties and 500 primary care providers in 21 counties across the state. CHP uses teleconferencing as a method of communicating with providers without incurring excessive travel expenses. CHP uses the Washington Interactive Television Network which has 15 sites statewide. CHP uses 8-10 sites on a monthly basis to broadcast interactive video conferences. Topics covered include: risk management and managed care, clinical guidelines, mental health issues, children with asthma, new diagnostic and treatment methods, diabetes, chronic disease management,

formulary review, high-risk obstetrics, and clinical considerations of Caesarean section. It is sometimes difficult to schedule all providers. Videotapes are made of each conference and made available to non-participating providers, allowing them to benefit from other practitioners' questions. CHP has found teleconferencing an effective method of communicating with providers and is a recommended telemedicine modality for any network spread out over a wide geographic area.

Lee Palagyi, Policy Consultant, Washington Utilities and Transportation Commission, and Staff Member, Federal/State Joint Board on Universal Service

Washington is 1 of 8 states included in the Federal/State Joint Board on Universal Service (JB) which was created as a result of TCA. UTC Chairperson Sharon Nelson serves on the JB, which was assigned the task of making policy recommendations to the FCC regarding universal service. TCA includes a provision that health care providers in rural areas should have access to services similar to those available to urban providers and at reasonably comparable rates. One of JB's tasks was to make a recommendation on implementing that specific section. TCA was the first time the universal service concept was placed in federal statute, specifically that all citizens should have access to a basic package of telecommunications services at reasonable rates. TCA calls for comparability of rural/urban rates. In addition, the universal service concept was expanded to include rural health care services, and school and education services in both urban and rural areas.

JB determined that only telecommunications used for health care would be eligible for discount under universal service. FCC created an Advisory Committee on Telecommunications in Health Care, which brought together 40 interested parties from the health care community to make recommendations. The Advisory Committee recommended support for services using bandwidth up to 1.544 megabits/second or the equivalent of a T1 line. This would ensure capability for telemedicine services of greatest utility to health care providers. JB received only 8 comments on health care issues, from over 40,000 pages of comments submitted. Based on the limited comment, JB did not feel there was enough evidence to make specific recommendations related to telemedicine, except that services eligible for support would include charges for originating and terminating services where necessary (as for cellular service), and that the definition of services to be supported be reviewed in 2001 to ensure pace is kept with technological advancements. JB called for further comment on health-related issues before the FCC makes its final decision in May 1997.

JB addressed how to implement comparable rate mechanisms through support to telecommunications carriers. JB defined rural areas as those including non-metropolitan areas as specified by the federal Office of Management and Budget. Health care providers in those areas would go to any telecommunications provider in the region and request service. The health care provider would submit a request with the quoted rate for the service in the area to

the federal universal service fund administrator. The administrator would determine what the highest published rate is in the nearest large city, and provide the local carrier with the difference between this and the higher rural rate quoted. The health care provider would only have to pay the rate which would be charged to an urban provider. If the service requested is not being offered in the area, the telecommunications carrier would have to develop a cost-based quote to be approved by the appropriate state commission. The carrier would then receive either an offset to its contribution to the universal service fund, or a refund after several years. The highest urban rate was chosen to avoid carriers jacking up their rates and receiving funds for providing services to urban health care providers as well. Resale of services by a health care provider would be prohibited. Providers are encouraged to aggregate service purchases with other entities, e.g., schools and libraries also eligible for federal assistance.

TCA is expansive in its definition of health care provider, including: public or nonprofit post-secondary education institutions offering health care instruction; teaching hospitals and medical schools; community or migrant health centers and rural health clinics; local health jurisdictions; community mental health centers; not-for-profit hospitals; or consortia of the above. JB targeted rural providers, even though urban providers such as hospitals may also serve rural residents.

JB contemplates availability of approximately $500 million per year for subsidizing these telecommunications services, though cannot justify endorsing such an expenditure at this time as the scope of services to be supported is not clear. JB did not endorse allowing health care facilities to spend funds to build facilities which use telecommunications technology.

Steve Sulzbacher, Ph.D., Attending Psychologist, Children's Hospital & Medical Center Outreach Clinic – Washington State Children's Community Health Access Project, and Professor, Departments of Pediatrics and Psychiatry, University of Washington School of Medicine

Children's Hospital & Medical Center Outreach Clinic - Washington State Children's Community Health Access Project (WSCCHAP) provided 28 telemedicine consultations in 1996 in Yakima, Spokane, Benton-Franklin, Grays Harbor, and Lewis Counties. WSCCHAP's system uses technology to fulfill outreach needs which would otherwise be difficult to meet. Telemedicine is seen as a tool to be integrated into an existing system for serving children in rural and remote settings.

Since 1993, WSSCHAP has conducted 117 outreach clinics and provided 1,616 consultations to children with special health care needs. Most of the clinics were conducted at local health departments/districts, others on Indian reservations, farmworker clinics, and more recently, via interactive television hookups to private physicians' offices. To date, the clinics have been

supported by federal grants which are becoming harder to get. WSSCHAP is looking at ways to provide the current level of consultation and get reimbursed for teleconferencing.

When WSSCHAP practitioners undertake teleconsultations, they identify themselves as consultants to the local health care provider so it is clear the consultants are not providing direct patient care. This model developed in consultation with the UW Attorney General. The model is consistent with WSSCHAP'S mission to provide consultation on special needs which must be managed locally. The region -- incorporating Washington, Alaska, Montana, Idaho, and Wyoming which are included in UW School of Medicine's WWAMI program – has the most permissive legislation for cross-state medical consultation of any area in the country. Of these five states, only Washington has a medical school. Cross-state credentialing issues should be approached carefully. UW currently provides telemedicine consultations with Alaska, Montana, and Idaho, and will soon do so with Wyoming. The legal situation may change when payment is being received for specific services to the patient, rather than consultation to a local physician who initiates the transaction. The operating assumption is local health practitioners are faced with a problem outside the realm of their expertise. Rather than sending the child to Children's Hospital, they can utilize telemedicine. In theory, it is really no different than using telephone consultation.

WSSCHAP still requires experts coming to communities for outreach clinics. Telemedicine can be used for three functions. The triage function is used to decide if an in-person consultation will be necessary. Comprehensive examinations can be conducted via telemedicine, though perhaps less effectively than in person. It can also be used for significant followup. Costs can be reduced for families who might otherwise have to travel one day or more for a 1/2 hour followup visit. This is particularly important for indigent families or when a caseworker or nurse would also have to accompany the patient. All telemedicine really does is reduce time and distance.

Psychology and psychiatry are uniquely suited to telemedicine because physical examinations are not needed. Observation of patient interactions are necessary, and this can be well accomplished through video conferencing. Children are often brought to Seattle to sit in front of a computer terminal for a computerized psychological test. This could readily be done at a remote location. Difficult-to-test children may interact more comfortably via teleconferencing than in person.

WSCCHAP uses existing ISDN or T1 lines. However, they have begun to use inexpensive systems which run on plain old telephone lines (POTS), with a $700 card and camera added to personal computers. Technology utilizing POTS is getting better and cheaper, facilitating 2-way interaction between families and providers in a single room at the same time. There are rare conditions, e.g., those picked up through the newborn screening program, where parents will often travel to many locations, both in- and out-of-state, for multiple opinions. Through telemedicine, various practitioners can consult with the family at the same time.

Jay Sanders, M.D., President, American Telemedicine Association and Chief Executive Officer, The Global Telemedicine Group

Based on his 30 years of experience, Dr. Sanders believes after peaking 5-10 years from now, telemedicine will soon disappear. Primary care physicians will request fewer telemedicine consultations because they will have greater expertise. Consultants will have greatly expanded primary care physicians' access to relevant continuing education and medical information previously confined to subspecialties. Primary care physicians will be better able to diagnose and treat specific conditions themselves. The University of Tromsö, Norway set up a telemedicine ear, nose, and throat clinic for primary care physicians. Over the last 4 years, there has been dramatic reduction in transport costs and an increase in the level of primary care physicians' capability because they are better educated in dealing with specific conditions previously referred to specialists. The Norwegian Government returned some of the funds saved in health care costs to the university.

Telemedicine is a stepchild of medical informatics. Development of the electronic medical record is much more critical than telemedicine, and limited funds should be directed toward it. Before the fully integrated electronic medical record is achieved, telemedicine will have migrated toward the more user-friendly Internet. Electronic mail (E-mail) is rapidly becoming multimedia rather than just text-based. Primary care physicians and internists will be able to access infectious disease or neurosurgical information through multimedia E-mail. In a cardiology consultation for example, the primary care physician will E-mail the cardiologist with text of the patient's history, still picture of the electrocardiogram, video clip of the echocardiogram, and audio clip of heart sounds. Such multimedia E-mail is currently available, and consultations can be conducted live over the Internet, without store-and-forward technology needed. Telemedicine will migrate into the electronic record via a primary care practitioner's desktop multimedia platform. Providers will no longer need to go to a special telemedicine room in a hospital. Medical E-mail will be as convenient as the telephone.

All telemedicine does is transmit information used in a medical context. The key element is management of that information. The most critical part of telemedicine is knowing that the information managed is correct. Many people are asking how to acquire information, how to process, transmit, synthesize, store, and retrieve it -- but little is being done to ensure information integrity is maintained and that the information is correct.

Trying to define telemedicine has received more attention than it deserves. There have been discussions about telemedicine as a new specialty which should require certification. This is similar to calling the operator of a stethoscope a stethoscopist and requiring certification for its use. The stethoscope changed the way information was transmitted: patient heart sound is transmitted from chest to the physician's ears. The function of telemedicine -- information transmission -- is no different than the stethoscope's.

Industries in the U.S. are trying to find ways of bringing their services to the point of need. Achieving this goal in the health care industry should be the highest priority, though relative to other industries, it has received little attention. When individuals become ill, they must go to their doctor's office or the hospital instead of the doctor coming to them. An experiment is being conducted in Georgia to bring health care into the patient's home via a platform no more complicated than a television. In 5 years, the television will be a multimedia platform connecting to the Internet, providing video conferencing, and will be used as a personal computer, FAX, and telephone. People will access education, entertainment, goods, and services all at point of need.

Bringing health care into the home has been relatively simple. The Medical College of Georgia looked at its chronic disease patient population which was constantly being readmitted through the emergency department. Hospital administrators confirmed that those same patients were the greatest consumers of health care resources. The list included patients with chronic obstructive pulmonary disease, severe asthma, ischemic cardiomyopathy, Type 1 diabetes, and end-stage liver disease. A medical team determined what diagnostic instruments would be needed in the home: EKG, stethoscope, pulse oximetry, vital signs, bloodtesting, and in certain cases digital spirometry. The in-home unit developed incorporates all these instruments into a television platform.

The home-telemedicine units are in 25 homes of patients in the greater-Augusta area, a major nursing home, and home of the nursing home medical director. Patients are being examined and monitored in their homes and hundreds of consultations provided. Nurses and nurse practitioners used a standard patient protocol. If a single intensive care unit admission is avoided for a patient with pulmonary edema or status asthmaticus, $20,000-$25,000 can be saved. Telemedicine technology can also change the balance of power in the health care industry. Patients can access a wider array of physicians and services. The primary care physician is no longer constrained by geographic availability of subspecialists. Practitioners can see patients in their own home environment. This allows physicians to prescribe changes in the patient's environment rather than just medication.

The present state of continuing medical education (CME) is inadequate. $100s of millions per year are spent on CME in the U.S., which provides neither continuity nor education. No study has ever clearly demonstrated a physician participating in CME changes practice patterns or modifies patient outcomes. The reason for this is that CME is conducted in a lecture hall at a teaching university rather than at the moment the information is needed. Typically the lecture subject is what interests the lecturer rather than the listener. Even if it might fit the physician's needs, the lecture occurs well after the information was needed so the patient has already been referred. Information is not retained because it does not occur at time of need. Physicians learn the most as interns because as they examine patients, their questions related to the patient's condition are immediately answered. Usually CME does not occur in this format, but it can through the telemedicine consultation.

Georgia's telemedicine system started with a connection to the Dodge Family Hospital, a rural 75-bed facility. Based on preliminary results from the Hospital, in May 1992, Georgia committed $50 million to develop a telemedicine and distance learning infrastructure. $9.8 million was devoted to the health care network; $20 million went to communications infrastructure; and $20 million to a comprehensive distance education system. Georgia created a 59+ site system including 3 academic medical centers: Medical College of Georgia in Augusta; Emory University Medical Center in Atlanta; and Eisenhower Medical Center at Fort Gordon. The tertiary care centers are networked with 9 community hospitals, identified as secondary hubs. These 9 centers can handle all medical conditions the academic centers can except transplantation and expert burn therapy. Each primary and secondary hub is networked with 3 or 4 primary care facilities in their geographic area. The infrastructure is seamless -- a patient at any site may be examined by a doctor at any other site.

83% of patients seen through telemedicine would have been sent to the secondary or tertiary care center in the absence of telemedicine. The cost of a rural hospital bed in Georgia is $800/ day but at the Medical College of Georgia the cost is $1,300 per day. Keeping a patient in the rural hospital saves $500 per day on average. Other costs involved in moving a patient include: loss of productivity, a sicker patient, and transportation. When 83% of patients are kept in lower cost facilities there are positive impacts on both the health care economy and quality of care. The system functions with off-the-shelf technology and works equally well if the patient and consultant are 130 miles apart or 13,000 miles apart.

Rural hospitals in Georgia are experiencing decline just like the rest of the U.S. The federal Health Care Financing Administration (HCFA) has funded a study to find out if telemedicine has slowed the rate of decline. If a rural hospital increases its number of filled beds from 20 to 21 per day, that hospital nets an additional $150,000 annually. Part of the reason Georgia started its program in rural communities was to help rural hospitals remain open. In many small communities these hospitals are the economic engines, so the community declines along with the hospital. Larger hospitals like Emory receive fewer referrals, but their markets expand.

Telemedicine is advantageous not only from an information, but from a relationship-building perspective. Teaching hospital faculty feel they are back delivering services to the community. Telemedicine lessens professional isolation of rural physicians and medical academics. Medical educators learn what rural doctors face on a daily basis.

Georgia's telemedicine system began by addressing rural health care problems similar to Washington's. The required telecommunications infrastructure was in place so the system expanded to enhance the trauma network, connect with public health and area health education facilities, and provide health services for the Georgia correctional system. Medical College of Georgia students serving rural apprenticeships and primary care physicians are electronically hooked up to the academic medical centers.

The Medical College's Department of Pediatrics and its preventive health care division took advantage of the distance learning program so rural K-12 students now receive instruction in nutrition, safe sex, and dangers of smoking. The program currently goes into selected schools but has the capacity to go into all 360 active distance learning sites.

Eisenhower Medical Center approached the Medical College after the establishment of the civilian telecommunications infrastructure to piggyback on the system. They offered the state money to put a tertiary care site at Fort Gordon so now military personnel anywhere in Georgia can walk into a civilian medical center and see a subspecialist at Eisenhower Medical Center.

Many sites do not require telemedicine 24 hours/day, 7 days/week so the Medical College put together a mobile van housing telemedicine. Many smaller prisons in the corrections system are served by the van. The Department of Corrections loaned a mobile van to serve the 10,000 military personnel bivouacked in Atlanta for the 1996 Summer Olympics. Soldiers' sickcalls were performed by military subspecialists at Eisenhower Medical Center across the state. The Olympic Village site for athletes was plugged into Emory University and a televeterinary site connected Conyers, site of equestrian events, with the University of Georgia's School of Veterinary Medicine.

Telecommunications infrastructure is a community resource which may be used for telemedicine, education, commerce, banking, and libraries. Once the infrastructure is in place, many different kinds of activities may take place using it. There are concerns about privacy and confidentiality. The current medical records system is not very secure, but if electronic records are broken into, the number of people with access increases dramatically.

Many physicians say the reason they do not use telemedicine is the inconvenience of leaving their office. Desktop telemedicine stations will alleviate the need for a physician to leave the office. Georgia also provides Category 1 CME credit if the primary care physician stays in the room during a teleconsultation. Soon from desktop personal computer, physicians will access dynamic, interactive medical databases and knowledge servers. Medical expertise will be exported abroad. Academic medical centers are rapidly setting up systems to export medical services for the purpose of increasing revenue.

A consortium is currently considering placement of health care kiosks in drugstores, hotels, and malls using desktop technology. People spend an average of 15-20 minutes in a pharmacy waiting for the prescription to be filled, and many people use pharmacists as their first tier of medical information. Many pharmacists may be unqualified to give such information. Asthmatic patients, waiting to have their aerosolized steroid refilled, may be able to access a richer medical database from a kiosk. A more sophisticated system would allow asthmatic patients to access a nurse who could adjust medication as appropriate. Immediate patient access to health information will create more educated patients and greater immediate access

to health interventions. 50% of heart attack casualties die outside the hospital because people are worried about the inconvenience, expense, wait involved in receiving services, and think their pain is heartburn. Electronic access for patients will increase their willingness to seek health information.

Telemedicine itself has nothing to do with the system of state licensure though it is illuminating how archaic the system is. No one was concerned about changing the system before because doctors were physically constrained within their states. Physicians do not treat specific conditions differently state-to-state. Medical textbooks are national. The health care industry is developing national practice standards so there should be national licensure. The state licensure system protects the health and safety of the state's physicians rather than the patients. States have unequal laws for CME and confidentiality. Penalties and disciplinary actions taken for violations of practice acts are different. Physicians within each state are concerned about interstate competition.

The FCC will likely approve a requirement that rural-based health care practitioners be provided with local Internet access. Multimedia Internet activities will constitute the major portion of future telemedicine activities.

There are many open legal questions as few precedents have been established. There are currently 8 malpractice suits in the U.S. in which telemedicine is involved. However, telemedicine itself is not the cause of any of these. No suits have been directed against telemedicine probably because there has not been enough revenue generated to make it advantageous to lawyers. St. Paul's Insurance, the largest U.S. malpractice insurer, has decided not to raise premiums on their physicians doing telemedicine. Prior to conducting a teleconsultation, permission to record the transmission is acquired from the patient. Then the entire session is recorded. These recordings will be the physician's best defense in malpractice cases. In the southeastern U.S., 80% of malpractice suits lost by physicians result from doctors' lack of documentation.

Recordings become a part of the patient's medical record. In Georgia, they may be used for educational purposes at the Medical School but not published. With paper records confidentiality is virtually non-existent. Billing clerks, those with access to nurse station charts, and insurance company employees all have access to patient records. Telemedicine adds encryption to the information. The problem is that if the encryption is broken, millions of people will have access to the information. The National Library of Medicine recently awarded a grant for development of a level of encryption that will sustain medical record privacy to everyone except the very experienced hacker. Privacy and access concerns must be balanced.

It is critical to tailor technology to the particular needs of individual sites, which was not done in Georgia. Leasing rather than purchasing equipment should be encouraged and upgrades

included in leasing agreements. Use of federal or state funding should be discouraged, as it is important to consider financial viability from the beginning so that projects will be sustainable. Rather, government can encourage telemedicine ventures through access to no-interest loans.

Thomas W. Pendergrass, M.D., M.S.P.H., Children's Hospital and Medical Center, and President, Washington Chapter - American Academy of Pediatrics, and Washington State Medical Association Telemedicine Workgroup Chair

The Washington State Medical Association (WSMA) workgroup was convened in response to a request from the WSMA House of Delegates and the Interspecialty Council to review issues related to telemedicine in Washington. It is charged with providing recommendations on regulatory and legislative matters. Members include representatives of: WSMA, family practitioners, Virginia Mason Medical Center, State Board of Health, Medical Quality Assurance Commission, emergency medicine, and House of Representatives.

There are many aspects to focus on: technological infrastructure, protection of the public, and regulation. Technological changes are coming rapidly, increasing the capability of telemedical interactions. The first meeting focused on the operational aspects of interstate practice, e.g. implications of a physician in Idaho delivering care in Washington using telemedicine. Current statutory requirements would be that physicians can practice without a Washington license as long as they do not have permanent offices in the state. Washington does not have a reciprocal agreement to this effect with Idaho, Alaska, Oregon, or British Columbia. For the overwhelming majority of patient encounters, licensure is not an issue. When there is a disputed outcome, jurisdiction becomes important. A real challenge will come when physicians who have their Washington licenses removed begin practicing through telemedicine in another state. The workgroup believes some kind of cross-state licensure, either regionally or nationally, is important. They will continue to monitor and evaluate proposals.

There is a wealth of health-related information available on the Internet but it is a "buyer beware" environment. There is no assessment of the quality of medical information available. Several instances have been reported of material being placed on a university's Internet server, implying university approval when there was none. Major Internet servers, networks, and institutions are looking at the issue. The workgroup takes the position that there should be some organization to review, assess quality, and credential various sites. This would not warrant legislative action.

Telemedicine requires patients and physicians to make fairly major behavioral changes. Older adults may be required to manage a multimedia platform at home. They may not have the skill to deal with a unit which fails. The electronic medical record will require physicians to think and write in a standardized manner, restraining language and content. Providers find themselves in a difficult position when records do not contain needed information. The

workgroup recommends continuing investigation of the electronic medical record. Improving public health is an area in which telemedicine has great potential even though public health is no longer in the business of direct service delivery.

Washington has a variety of Internet and telemedicine communications providers operating at a fairly high level. Washington State University and the University of Washington (UW) are spurring new technological advances. The medical community is currently looking at how comfortable it is with distance consultation. There may actually be more eye-to-eye contact in telemedicine consultations than in an office visit. Current office encounters were often unsatisfying to patients.

The challenge is to ensure that the availability of technology does not drive the system. Rather, needs should lead to the development of technological solutions. While the telephone is a very effective tool and televideo will provide more information in the encounter, they will never provide as much information as human contact.

Brent Stewart, Ph.D., Associate Professor of Radiology and Director of Imaging Informatics, University of Washington School of Medicine

UW School of Medicine is a regional medical school with telemedicine connections with rural communities in Washington, Wyoming, Alaska, Montana, and Idaho (WWAMI). WWAMI states encompass 30% of the U.S. land mass and about 3% of the population, making it an ideal laboratory for rural and remote telemedicine. The School runs a decentralized program of medical education to a network of teaching affiliates throughout the Northwest, as well as a teaching program for first year medical students in Laramie, Wyoming; Bozeman, Montana; Pullman, Washington; and Anchorage, Alaska. Through the teaching program UW has established relationships with the 5 states. There are currently 14 family practice residencies within the WWAMI region. The rural sites are mostly staffed by generalists. Referral outflow of patients has hurt some rural hospitals, many of which are the economic backbone of their communities. Another problem contributing to rural physician isolation is that most are trained in large multispecialty urban centers. About 1/2 of UW Medical School graduates go into primary care.

The UW MedCon system has been in place for 20 years using plain old telephone system (POTS) technology. MedCon utilizes an 800 number and logged 20,000 consultations in 1995 alone. MedCon use is free for WWAMI primary care physicians consulting with the UW School of Medicine. For the past 3 1/2 years, WWAMI has developed a rural telemedicine network as a natural extension of MedCon and organized by the Community Health Services Department (CHSD). Rural areas are provided with university-based specialty consultations via low-cost systems. The sites selected to participate in the WWAMI telemedicine project had high utilization of MedCon, needed the resource, and were interested in the project.

UW had a successful telemedicine program in the 1970s using the National Aeronautics and Space Administration's (NASA) ATS-6 satellite, but it was not cost effective. Important aspects of developing a sustainable telemedicine project include: utility, reliability, affordability, and accessibility of services provided. Many telemedicine programs currently exist, with costs as low as $10,000 for a video conferencing system. Little is spent on evaluation. A portion of the federal Office of Rural Health grant received by UW will be directed at a 1997 evaluation of WWAMI's telemedicine programs.

WWAMI telemedicine sites include: Colville, Washington; Pomeroy, Washington which will be added; Driggs, Idaho will be added in 1997; Petersburg, Alaska which will probably be discontinued; Bozeman, Montana; and Thermopolis, Wyoming which will be added in 1997. Hub sites are located at Harborview Medical Center, Portland Trauma Center, Children's Hospital and Medical Center's emergency department, and Roosevelt Outpatient Clinic. Each site has a 3-year-old multimedia video conferencing system including: radiographic digitizers, digital stethoscopes, and a video camera with remote control panning capacity and connecting to a microscope and otoscope. The system uses an ISDN connection to transmit: high resolution still images, audio/video clips, interactive imaging, and text. The entire unit cost $15,000 in 1994, but would cost less today.

WWAMI received an $8 million contract from the National Library of Medicine (NLM) to extend use of the electronic medical record being developed at UW. WWAMI's goal is to develop a regional health information infrastructure and virtual academic medical center to support primary care practice. Education and delivery of academic resources is best accomplished through the Internet because people already know how to use a web browser. The electronic medical record is being tested at the UW Medical Center. The current version will be easier to evaluate because it is Internet-based, which will also allow it to be easily extended to WWAMI sites. WWAMI also has telemedicine research grants from NASA and the Advanced Commission's Projects Agency (DARPA), the Department of Defense (DOD)'s research arm dealing with advanced technology applications.

Stephen Carter, M.D., Clinical Associate Professor of Radiology, University of Washington School of Medicine

UW School of Medicine is involved in a new project developing a handheld telemedicine ultrasound device. The advantage of ultrasound is it does not use radiation and provides real-time video images. This makes telecommunications transmission more complicated, as the images are not static. Development is a cooperative project funded by DARPA. While development is geared toward battlefield applications, a goal is to get these devices into people's homes. The device is currently supported by a vehicle from NASA's Jet Propulsion Laboratory acting as a mobile terminal. The vehicle looks very much like a Medic One transporter and houses a satellite antenna which has capacity to transmit while moving. Ultrasound images have also been successfully transmitted from seagoing vessels.

There are several aspects involved in developing this device, which is a cooperative project using government, academic, and industry resources. ATL, the private partner, is charged with miniaturizing the ultrasound unit, (normally the size of a washing machine.) Another aspect is being able to transmit either via wireless or wireline. The objective is to get high quality diagnostic equipment to the patient regardless of location: a farmer pinned under a tractor, a motorist involved in a freeway accident, or a soldier on a battlefield. The device will allow a UW ultrasound expert to guide examination while the patient is being evaluated. DOD's primary interest is in finding a way to detect internal bleeding during the first 'golden hour' after injury.

The device's use for diagnosis at sea was not initially anticipated. UW has been contacted by the Navy and Exxon because evaluation of medical emergencies at sea is difficult. It is also difficult to transport a patient off a vessel beyond helicopter range. The ultrasound device could also be used on board commercial aircraft. Airlines incur tremendous expenses from unscheduled landings for medical emergencies like pregnancies or heart attack. Onboard ultrasound would allow an inflight airplane to contact a specialist to determine immediacy of the emergency. At a nursing home, the device could prevent unnecessary transportation to a hospital. NASA wants to use the device onboard a 1999 manned launch. In natural disaster situations such as earthquakes, the device would be very helpful, especially if the local hospital were incapacitated.

Margot Nelle, Director of Rural Health, Washington State Hospital Association and Vice President, Washington Health Foundation, and Karim Slifka, Assistant Director, Washington Health Foundation Rural Initiative

The Washington State Hospital Association (WSHA) has done little in the realm of telemedicine to date, but rural hospitals have increased their interest and are beginning to participate in teleradiology and video conferencing. The Washington Health Foundation (WHF) has been awarded a grant to evaluate the financial viability of telemedicine in rural communities. Technology costs to date have limited some communities' ability to access telemedicine.

WSHA will conduct a joint survey with the State Board of Health regarding urban and rural hospital telemedicine activities in Washington to be completed Spring 1997. The survey will ascertain what hospitals currently include in their telecommunications inventory and what barriers hospitals face. New WHF staff have been given the responsibility of educating rural hospital members and policy staff on telemedicine. Reimbursement, licensing issues, and federal and state legislation will be tracked.

WSHA is also interested in enhanced telecommunications links among its members. WSHA and WSMA are conducting a joint feasibility study to determine if a collaborative wide area

network (WAN) can be developed. The WAN would support interhospital and hospital/ physician communication by linking all existing local area networks. The vision is quite broad and over time might include health plans and others. WSHA is also exploring ways of getting medical services to point of need, e.g. telemedical kiosks and other ways to get information to patients in non-medical satellites. Telemedicine could also link hospitals and physicians to relevant state databases. Rural hospitals believe telemedicine is an important technology for increasing access and quality of care, and want to ensure availability of necessary infrastructure.

Ron Seymour, INPHO (Information Network for Public Health Officials) Project Manager, DOH Management Services Division, Department of Health

Washington is 1 of 12 states funded by CDC for INPHO. The vision of INPHO is to provide timely, relevant, accurate information to public health officials, and to be able to disseminate it quickly. INPHO provides a single communications solution for public health agencies, and includes mail services, access to the Internet and World Wide Web, and development of shared infrastructure throughout the state. DOH is partnering with local health jurisdictions and counties to share resources. The UW Health Sciences Library has been training staff on how to use the tools made available through INPHO. The UW Northwest Center for Public Health Practice is working to tailor training to the uses of technology.

DOH has worked with the Department of Information Services (IS), Association of City and County Information Services Managers, and other groups to put together a shared governmental network. Internet services are being shared with other agencies, including: Aging and Adult Services, Mental Health, Support Enforcement, and court administrators. A recent study in Snohomish County showed 64 data lines running from Olympia to that County for different state agencies. When the shared network project is completed, there should be only 1 or 2.

18 counties are now connected into the network, covering 85% of Washington's population. Several more are scheduled for connection in the coming months. One application is automated support to local health jurisdictions for birth certificates, which can be delivered through the system in 30 seconds. Aggregate hospital discharge information is also being made available. An Internet listserver has recently been put up for the Washington State Association of Local Public Health Officials, which is used for topical conversations and for getting information quickly to local health jurisdictions.

The next phase is to connect up the remaining counties and determine how to use electronic signature technology to authenticate who gets access to the system. Then work will begin to connect up other networks, hospitals, and non-governmental agencies. INPHO is also exploring cross-state connections.

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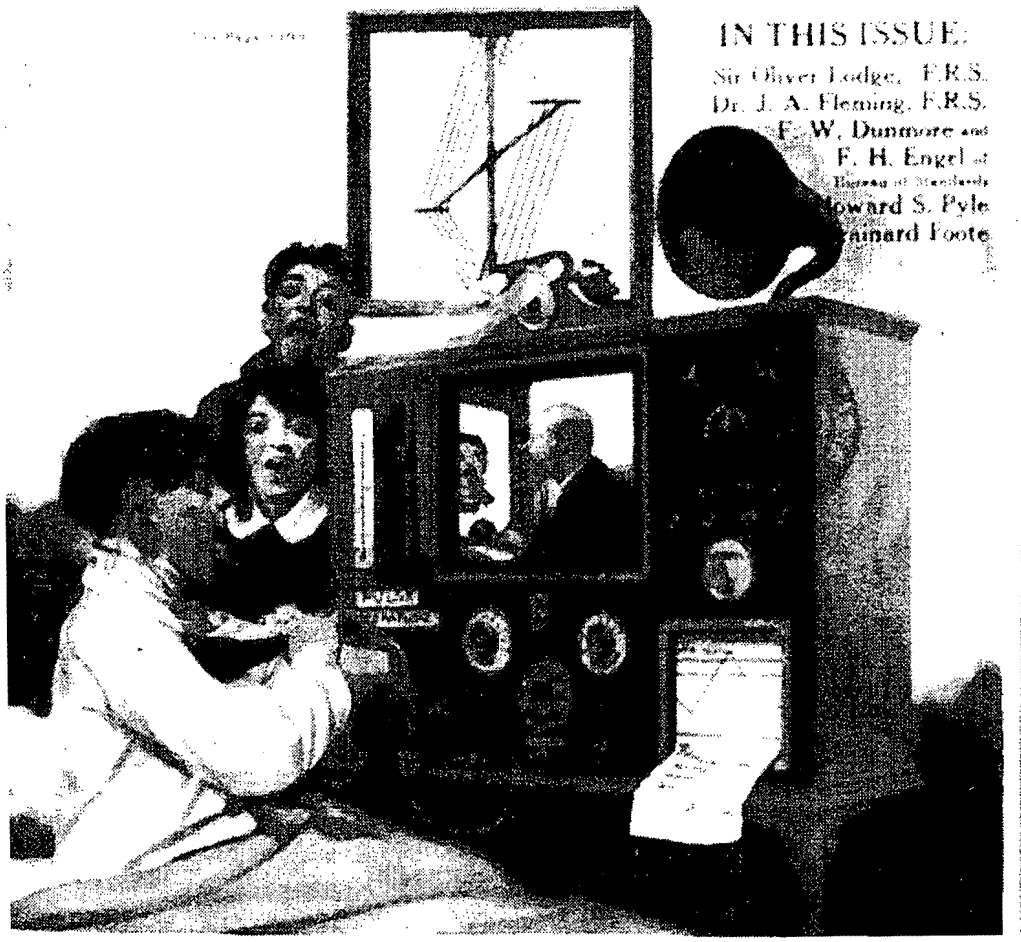

you wanted these before you met w/the Secretary. they are very rough, but an okay start.

HHS SAFETY NET PROPOSAL

SUMMARY

This initiative establishes a grant program providing funds to public and private entities to enhance the ability of safety-net providers to provide comprehensive, coordinated health care to a greater number of uninsured people. Funds would be available to assist safety-net providers to develop and expand integrated systems of care, and within such integrated systems, to address service gaps so that more uninsured have access to a continuum of health care services.

QUESTIONS

1. To some extent, the safety net is working to save itself, which is part of the reason why HHS has been able to find so many local models that work. Why would we invest when States and local communities are often willing to shoulder this burden?

2. How would our existing grant programs coexist with these new grants? Would they be getting their standard grant funds (through HRSA or other parts of PHS) and then be eligible to receive additional funds through this new grant for the same services? (There is a part of the proposal that states that HHS would not provide funds to supplement existing resources, but I am curious as to how we would ensure that to be the case -- it gets very fuzzy at the local level.)

3. It sounds like grant money would subsidize the provision of services "within an integrated system of care". What exactly does that mean?

4. Grant funds can be used to develop data systems. What kind of information would these systems collect? Would they collect outcomes information? Process information? Would they be standardized nationally, so that we could get national data about the impact of this initiative?

5. Grant funds should be used to establish systems of care that effectively manage patients with multiple needs across treatment settings. Does that mean that only systems that can offer a full range of services (primary, secondary, tertiary care) can be funded? Will systems have to offer social support services as well?

6. Safety net providers are technically providers who have a legal responsibility to provide care regardless of the patient's ability to pay. Will grant funds be limited to those providers, or will the definition be broader? Who can participate in this grant program? How would they be asked to "demonstrate their committment to the provision of care to uninsured people"?

problem statement and other info.

Safety Net Proposal

BACKGROUND ON THE SAFETY NET

Pressure on the safety net is increasing. Regional safety net systems face high demand for services. Approximately 43.4 million people in the United States were without health insurance coverage during the entire 1997 calendar year, and the number of uninsured is increasing rapidly, up 1.7 million from 1996. Although CHIP and Medicaid can potentially provide coverage to many of the 11 million uninsured children, roughly 32 million adults remain uninsured. Over half of those have incomes below 200 percent of the poverty level. Since the majority of Medicaid programs do not provide coverage to adults unless they are significantly below the poverty level, these individuals have no option but to rely on the safety net for care.

The safety net is financially unstable. The implicit cross subsidy of care for the uninsured is eroding as a result of the Federal, State, and private industry efforts to provide low cost care for a defined population that excludes the uninsured. States are increasingly enrolling their Medicaid beneficiaries in managed care plans in order to cut costs, forcing safety net providers to compete with other local providers to serve the only segment of their patient base that provided stable funding. In addition, many public health departments are moving away from the delivery of personal health care services to population based services. These changes mean that local sources of funding are becoming increasingly important to the financial viability of the safety net, making these providers vulnerable to an economic downturn threatening their financial health.

Financial concerns have reduced the range of services delivered by safety net providers. Although little quantitative information exists regarding the impact of safety net responses to market changes on care to the uninsured, a number of studies indicate that safety net providers have not reduced their committment to care for this population. However, their attempts to reduce costs as a result of financial pressures may have reduced comprehensive services delivered to the low-income uninsured. For instance, a review of FQHCs in States that were implementing mandatory managed care demonstrations found that they significantly reduced the range of services provided to patients.

Care delivered by safety net providers is often uncoordinated and fragmented, and providers cannot be held accountable for health outcomes. Many safety net providers do not have automated data systems that accurately track the services delivered to individual patients, forcing them to rely on written records and making it difficult to evaluate program quality and to determine the most efficient way to allocate limited resources. In addition, most safety net providers do not have compatible data systems, making it impossible for primary, secondary, and tertiary safety net providers in a region to effectively coordinate patient care. There is also insufficient provider capacity in some specialties, including mental health and substance abuse.

If the safety net collapses, access to critical tertiary care services are compromised. Large public hospitals, an integral piece of the safety net in their communities, are often the only source in a region for trauma care, burn units, neonatal intensive care units, and other specialized services that not cost effective but are critical to all of the residents in a service area. If these institutions succumb to the burden of uncompensated care costs, both the insured and uninsured residents of the service area will be forced to seek these essential health care services elsewhere.

DETERMINANTS OF SAFETY NET VIABILITY

The following four market and policy characteristics are often considered integral to safety net providers' ability to continue providing care to low income populations.

Level of demand for services. Three factors determine the level of demand for safety net services: the structure of the private insurance market and the resultant coverage of the low income population, the eligibility standards in the State's Medicaid program and the availability of other subsidized insurance programs for the low-income uninsured, and the percentage of the population with special health care needs or chronic illness. It is important to note that community level data tracking these factors are unavailable, and so it is difficult to determine the level of demand for safety net services for individual regions or localities. In addition, the distribution of demand across providers within a particular community may vary considerably. For instance, studies indicate that publicly owned hospitals tend to bear a higher share of uncompensated care market than private safety net hospitals.

Medicaid managed care penetration. The impact of Medicaid managed care on safety net providers differs based on the proportion and type of the Medicaid population covered by mandatory enrollment policies and the State program design features, some of which are specific to safety net providers. In addition, reports suggest that not just the proportion, but the rate of growth in the proportion of Medicaid managed care enrollees has a significant impact on the vaibility of the safety net, since a rapid increase in managed care gives safety net providers little time to adapt.

Level of commercial market competition. The factors that contribute most to the level of competition include the penetration of private managed care, the concentration of market share among providers, and the presence of for-profit providers. Safety net providers across the country have indicated that the penetration of managed care in the private market has resulted in an increase in price-based competition. In addition, there has been a general increase in competition on the basis of non-price aspects of care, including consumer choice of providers and non-medical amenities.

Federal and State financial support for the safety net. Federal and State subsidy programs for both ambulatory and inpatient care providers are used by institutions to cover the Medicaid shortfall as well as to cover the cost of the uninsured. In addition, these funds can free resources to be used for infrastructure upgrade and the development of ambulatory care capacity, information systems, and managed care capacity.

ADDITIONAL INFORMATION ON SAFETY NET PROVIDERS

- **Public Hospitals.** Of the nation's 6,500 community hospitals, about 1,400 are "public" in that they are owned and operated by states, cities or counties. Most public hospitals also offer services to the community at large that are often underfunded by private insurance, such as trauma care, burn centers, neonatal intensive care units, poison control units, emergency psychiatric care and disaster response teams. Between 1980 and 1990, urban public hospitals accounted for approximately 7 percent of all hospitals, but provided 19 percent of all emergency room visits and 18 percent of outpatient visits, nearly half of which were provided to patients who were uninsured.

- **Community Health Centers and Migrant Health Centers.** The national network of nearly 600 community and migrant health centers provides comprehensive, case-managed primary and preventive care. With 2,500 delivery sites, the centers are key outpatient components of the health care safety net. Located primarily in inner-city and rural areas with shortages of health care professionals, they serve an estimated 9 million people each year. Community health centers are thought to provide care to about 20% of those they could serve, while migrant health centers serve only about 14% of migrant and seasonal farm workers.

- **Family Planning Clinics.** More than 4,000 clinics in this federally funded program, provide primary care, cancer screening, sexually transmitted disease prevention services, and family planning services to approximately 4 million women and teenagers. Approximately 85% of clinic clients have incomes under 150% of poverty.

- **Ryan White AIDS Program.** The federal Ryan White CARE Act provides a variety of health care and social services, including testing, risk reduction, counseling, transmission prevention and clinical care through 136 projects with 500 delivery sites serving an estimated 80,000 patients who have AIDS or are HIV-positive.

- **Public Health Departments.** Local governments spent $13.7 billion in 1992 on public health, which includes a wide variety of services primarily aimed at preventing the spread of communicable diseases and educating people about personal health risks ranging from child immunizations to home health care to rat control. Public health departments also deliver some personal health care services, including maternal and child services.

- **Rural Health Clinics.** Largely privately owned and operated, the nearly 2,500 federally designated rural health clinics provide critical access to health care services for some 4 million patients each year. These clinics are paid by Medicare and Medicaid under special rules, reflecting the fact that 70% of their patients are insured under one of the two programs and that the clinics frequently are the sole source of medical care in the community.

Telemedicine

A fuzzy picture

By John Morrissey

So far, high start-up costs, low volume make teleconsults pricey

Telemedicine may be demonstrating its viability as a tool to diagnose and treat people in rural areas, but it has a long way to go in proving it's practical for medical practice.

A recently released study for the federal Office of Rural Health Policy found that the combination of high start-up costs, steep transmission fees and low volume made the typical electronic consultation an expensive session.

But the study also found anecdotal evidence that once telemedicine programs are in operation for several years, they can attract enough participation to bring down costs and improve access to care.

The study by Abt Associates, a Cambridge, Mass.-based research and consulting firm, targeted 353 rural hospitals and 205 associated medical facilities—from rural clinics to urban medical centers—participating in telemedicine programs as of early 1996. Abt identified those facilities from an initial screening survey it conducted in mid-1995 of all 2,472 nonfederal hospitals outside metropolitan areas (Feb. 12, 1996, p. 26).

The 558 facilities with established programs were questioned in detail about how they use the capability.

Of the 499 facilities responding, 340 reported using telemedicine only to send or receive diagnostic images such as X-rays and computed tomography scans.

Of the 159 others that used telemedicine capabilities more broadly, such as for interactive consultations with specialists, two-thirds were using their equipment fewer than four times a week.

usage

Low volume, combined with start-up and transmission costs, ballooned the median unit cost of a "teleconsult" to $1,181 for a central "hub" site and $476 for a connected "spoke" site, not including any reimbursement to clinicians.

price

Key facts and findings on telemedicine in rural America

According to a snapshot released last month that was taken in early 1996 on behalf of HHS' Office of Rural Health Policy:

- Telemedicine networks had an average of 9.3 participating facilities and planned to increase that to 13.
- The average equipment purchase, excluding telecommunication switches and new lines, ranged from $134,378 for outlying "spoke" sites to $287,503 for central "hub" sites.
- Annual transmission fees ranged from an average $18,573 for spoke connections to $80,068 for hubs.
- The average number of combined clinical and nonclinical sessions was 24 per month, with a median of 1.1.
- Fewer than one in four hub facilities had successfully negotiated payment with insurance carriers; many had not yet undertaken such negotiations.

Source: Abt Associates

problems

Telemedicine is supposed to make medical expertise more accessible in rural areas. But managers are discovering they first must make their programs more accessible to physicians trying to manage whirlwind schedules, says Andrea Hassol, Abt senior researcher and co-author of the study.

how it wor

When clinicians at both ends of a telemedicine connection operate at a fixed location, such as in emergency medicine, a teleconsulting capability can be worked into the routine (April 1, 1996, p. 47).

But in general practice, a rural doctor juggles a schedule that can cover broad territory and change at a moment's notice because he or she is perhaps the only physician in town to handle a first-priority medical case, Hassol says.

Yet a teleconsulting appointment requires a rural doctor to coordinate schedules with a patient and a distant consulting physician and then assemble at a precise time in front of the camera and video screen.

Physicians typically have a hard time staying on schedule under normal conditions, Hassol notes. And they spend much more of their time practicing out of an office building rather than at a hospital, even at a tertiary medical center, she says.

But telemedicine equipment usually is in a hospital, which means busy specialists and rural doctors are pulled from their normal schedules and locations to keep the appointment.

In addition to the inconvenience, many physicians are reluctant to take risks with a new practice medium for which no clinical standards have been established, the report says.

An exception is radiology, which is visually oriented, not usually dependent on having a patient present and

bolstered by standards of practice established within the specialty. But Hassol says no other specialty has compiled the research and standards necessary to encourage telemedicine.

As a result, "there's nothing to let (specialists) know if what they're doing is acceptable or not," she says.

After radiology, cardiology was the most common clinical application of telemedicine, followed by orthopedics, dermatology and psychiatry.

The tools are there for those who want them. The study found most telemedicine operations were taking full advantage of available technology, including full-motion interactive video for live interviews, meetings and educational sessions.

But the initial investment is high, and line charges add significant ongoing expense (See chart, p. 118).

Hassol said the technology requires high-performance telecommunication lines such as fiber optics that have to be dedicated to the network at costs ranging from $1,000 to $4,000 a month, in addition to usage charges of at least $25 per hour.

Hospitals gave financial support to a majority of sites, and federal and state grants were common sources of funding for telemedicine programs, the report says.

While initial figures laid out in the report seem bleak, they summarize an application of technology in the earliest stages of development. More than 40% of the telemedicine programs surveyed had been providing teleconsults for one year or less.

The report says telemedicine systems improved with age, increasing their utilization as facilities gained experience.

Telemedicine also figures to become more attractive once health-care networks become responsible for the health of rural enrollees under managed-care contracts, Hassol says.

The power of telemedicine to bridge distance is demonstrated in a small way by the report's examination of Allina Health System's network of 15 facilities linked by telemedicine equipment.

In Elbow Lake, Minn., near the North Dakota border, a physician and his heart patients "meet" with cardiac specialists at Allina's Abbott-Northwestern Hospital in Minneapolis, conducting presurgery consultations in a two-way video session.

For decades, the doctor had been sending heart patients to Fargo, N.D., an hour away. But now he sends them all to Allina's specialists.

Through the video sessions, he now feels he knows the specialists in Minneapolis and has learned a lot just by listening in, Hassol says.

And although patients have to travel farther, "when they get to the big city, there's going to be a face that they've seen before." ❑

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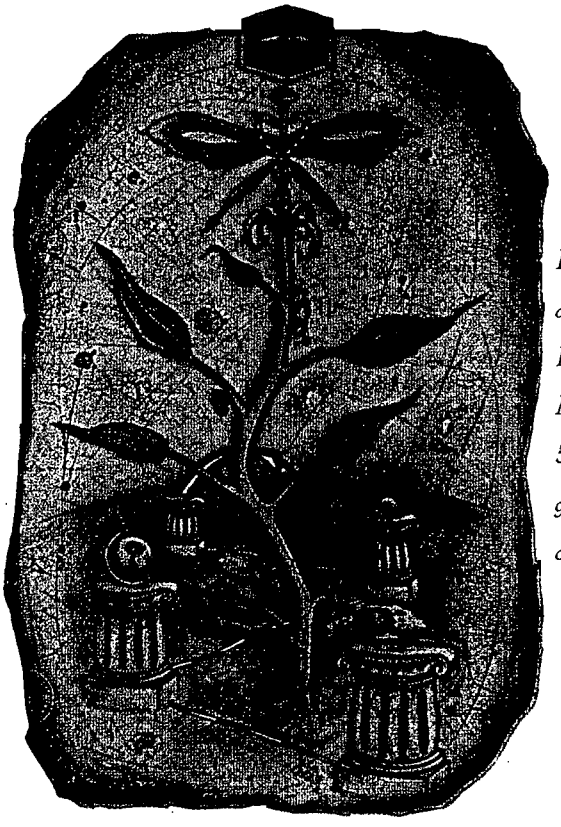

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