TELEMEDICINE

ATA **The American Telemedicine Association**
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600 Congress Avenue
Austin, Texas 78701

Melanne S. Verveer
Deputy Assistant to the President and
Deputy Chief of Staff to the First Lady, Issues
The White House
1600 Pennsylvania Avenue, NW, Room 2/WW
Washington, DC 20500

The American Telemedicine Association

May 19, 1994

Dear ATA Colleague:

I am happy to report to you that the American Telemedicine Association is finally up and running! This letter will bring you up to date on the activities of the ATA. Also included are several other items for your information.

PUBLIC POLICY

At this point in the history of telemedicine and this country, it is essential that the American Telemedicine Association keeps a clear focus on public policy, though our charter and interests cover research, teaching, and service as well. Many important issues such as reimbursement for telemedicine and deploying high quality, low cost telecommunications services are public policy matters of the utmost importance to the delivery of healthcare. In this regard, the American Telemedicine Association is making solid progress. We offer a good answer, and it is being heard.

A prime task this first busy year has been to secure a position for ATA as the national voice of telemedicine. We have done that to a considerable extent. For example, as President, I testified before the House Subcommittee on Telecommunications and before the full House Agriculture Committee. (You'll be interested to know that in the Agriculture hearing, though only two of us were "telemedicine people," six of the other seven casually testified that telemedicine is the best way for them to execute their goals, including the incoming President of the Rural Health Association.) On May 2, ATA board members Jay Sanders, M.D. and Eric Tangalos, M.D. testified before a Congressional Subcommittee which oversees NIH. Additionally, I have appointments to several advisory or evaluation panels: NASA, Office of Technology Assessment, CBO's requested High Performance Computers and Communications team, and Advisory to Dartmouth's Koop Center. In another arena, the ATA is well respected within the Congressional Rural Health Coalition (with whom I have previously been dealing) and by a growing number of Senators. There are numerous legislative proposals dealing with telemedicine issues, most propose more demonstration projects. Several of the health reform proposals also mention telemedicine.

I recently met with Melanne Verveer, one of Mrs. Clinton's aides, who was asking for information and suggestions about telemedicine. She was quite attentive and expressed genuine interest in our problems and concerns.

An ad hoc steering committee on telemedicine and health care informatics has been formed by several members of the House and Senate. Staff from Sen. Conrad (D-ND), Sen. Rockefeller (D-WV), Rep. LaRocco (D-ID), Rep. Synar (D-OK), and Rep. Lambert (D-AR) have formed the nucleus of the group. They are informally meeting to discuss current legislation before Congress, current telemedicine projects and initiatives, and to share other information of interest to members. An early meeting was held at NIH, and a series of three brown bag lunches have been held on the Hill. ATA members have been actively involved in these meetings. Attached is a summary of their last meeting.

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REIMBURSEMENT

After conferences between Rural Health Coalition members and HCFA administrative staff, it was decided that Congress is the appropriate body to deal with the issue of reimbursement for telemedicine. Recently, the Medical College of Georgia received approval for Medicare reimbursement for telemedicine services. They are also receiving reimbursement from Blue Cross/Blue Shield. My call to HCFA's Assistant Director produced the answer that there was "no national policy and that Congress will handle it". Despite this statement, HCFA is proposing a series of three year pilot demonstrations and will be exchanging information with private payers before they give any recommendations to Congress. At this point, HCFA is reimbursing for teleradiology but considers the experience with telemedical diagnosis and consultations inadequate to consider reimbursement. There are several Congressional Representatives and Senators helping with the issue. The strategy is to have general telemedicine included in the health reform legislation, but to address reimbursement as a separate issue, with the hope of avoiding entanglement in the legislative battles. We are currently writing language on reimbursement for Congressional staff to review and will welcome any suggestions.

If any of you call your regional HCFA representative and/or the insurance carrier for your area regarding payment for a telemedical project's service, using standard CPT codes plus a suffix identifier, please let me know the answer. The Texas Blues are "considering a discussion."

TELEMEDICINE PROJECTS

The establishment and growth of ATA has coincided with growth in the number of telemedicine projects. There are active telemedical services/medical education projects in Texas, Washington, New York, Pennsylvania, Massachusetts, Arkansas, Alabama, New Mexico, California, Oregon, Kansas, Oklahoma, Montana, Wisconsin, Florida, Ohio, Georgia, Iowa, West Virginia, Alaska, and Minnesota. The following have systems in the works: New Hampshire-Vermont-Maine (Koop Institute), Arizona, and Hawaii. I hear also that Idaho and South Carolina are either planning or are active. Please be aware that this list is, in some instances, word-of-mouth. A more comprehensive list will soon be available.

There are doubtless more....ATA will support you in every possible way. I would like to know where you are and what is happening. If past experiences are a guide, you are swamped with multifaceted decisions, daring vendors, and dollar demands! An e-mail or fax will do nicely. It is, after all, meaning and information we are after here, not data! (That comes later.) Our e-mail is the following 71754.2763@compuserve.com. Our fax is 512/480-2248.

NEW REPORT

A new report funded by NASA's Division of Aerospace Medicine and Occupational Health is a compendium of current telemedicine projects, federal programs, and funding opportunities for telemedicine. This will provide a tremendous contribution to the field. A copy is included with this mailing.

ASSOCIATION MANAGEMENT

We have benefitted greatly from assistance that is currently being provided by Issue Dynamics, Inc. IDI is a multipurpose Washington firm that operates as a consumer and government affairs and association management firm working with both non-profit and for-profit groups, specializing in telecommunications.

Their initial support has been donated through their work in the telecommunications field. They have produced membership recruitment material and have provided ATA with tremendous political contacts in Washington. They have been monitoring many of the developments in national public policy related to telemedicine and have provided a presence for the association in Washington. All actions have been first rate.

MEMBERSHIP RECRUITMENT/SERVICES

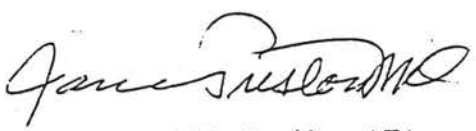
Membership recruitment is, of course, in order every day. IDI has sent the first recruitment mailing and they posted a notice on the internet as well. Membership is growing! Please be aware of colleagues who can receive benefit from our work and give benefit to our work. Enclosed in this mailing is a copy of the new brochure and individual membership application form. Please feel free to distribute these items to others who might be interested in joining the association.

This is your first ATA news service which will soon grow into a newsletter. We are in the process of developing other publications and services to support the membership.

ANNUAL BUSINESS MEETING

The next Annual Business Meeting will be held in Spring of 1995. We will meet this time at the Mayo Clinic. At the Mayo meeting we can give significant input to the Consensus Conference on the Delivery of Medical Services to the Underserved. It is important that ATA members who are at the Underserved front have an opportunity to give their views at this Consensus Conference. Details about the structure and agenda of the Business Meeting will be forthcoming. We are planning to take advantage of other invitations elsewhere in the interim or future.

Colleageally yours,



Jane Preston, M.D., President, ATA

Attachments

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May 4, 1994

MEMORANDUM

TO: Jane Preston

FROM: Jonathan D. Linkous

RE: Meeting of the Telemedicine and Health Care Informatics Steering Committee

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This is a summary of speaker comments during a meeting held on April 29, 1994, of the House-Senate Telemedicine and Health Care Informatics Working Group. The session's topic was "State and Federal Policy Issues and Barriers to Implementation". The session covered most of the major policy issues affecting the deployment of telemedicine. Making presentations at the meeting were:

- Helen Smits, M.D., Deputy Director, HCFA, Department of Health and Human Services
- Gene Hopper, Director, Oklahoma Medical Information Network, University of Oklahoma Sciences Center
- Marilyn Cade, AT&T and The National Health Care Industry Consortium
- John Silva, M.D., Chairman, Information Systems Working Group for the White House Task Force on Health Care Reform
- Jay Sanders, M.D., Director, Telemedicine Center Medical College of Georgia

Each speaker was asked to summarize the key public policy issues they see as barriers to the deployment of telemedicine. Appearing below is a summary of each person's comments.

Helen Smits discussed the fact that HCFA does not reimburse for telemedicine because of their long standing policy of reimbursing only for physician - patient interactions that occur in the same room, on a face-to-face basis. HCFA currently pays for

teleradiology and will probably follow standards that are now being prepared by the College of Radiology regarding such transmissions. She feels that there is currently not enough data on telemedical consultations and considers the most appropriate next step is to evaluate a series of pilot sites as well as exchange information with private payers regarding telemedicine activities. They are in discussion with Congress about the appropriate number of sites for investigation. They expect to report back to Congress in a couple of years.

Jay Sanders briefly described his projects in Georgia and suggested several major issues that must be resolved with telemedicine. Sanders administers the only project in the country receiving Medicare reimbursement but stated that reimbursement was not necessarily the largest problem facing telemedicine today. The largest barrier is the enormous cost involved in transmitting telemedicine signals over LATA boundaries. He stated that the most important action that could be taken to help telemedicine is to eliminate the system of LATAs. The second major issue is state medical licensure of telemedicine when transmissions are conducted over state boundaries. The third issue he pointed out was the danger of over-utilization and duplication of telemedicine in the future with competing medical institutions.

Gene Hopper concurred with Sanders on his description of the problems and added that there is also a major need for collaboration between the large organizations now entering the field of telemedicine.

John Silva described many of the technical problems facing the deployment of telemedicine. These included: the need for a national information infrastructure; creating operability standards for different telemedical equipment and industry standards for transmission of images; overcoming concerns with patient privacy; and making telemedicine more affordable. On this last point, Silva emphasized the need for multiple uses of transmission lines and equipment among health, distance learning, and telecommuting applications.

Marilyn Cade described some principles for the telecommunications industry and policy makers to follow in deploying telemedicine: ensuring equal access to telecommunications by everyone; ensuring there is competition between technologies; and ensuring that technology applications are compatible.

The American Telemedicine Association

May 19, 1994

Dear Colleague:

The following are the meeting minutes from the American Telemedicine Association's Annual Meeting conducted at the Mayo Clinic in Rochester in 1993.

Our association is continuing to experience steady growth with a total of 59 individual members and 5 corporate members. The treasury is fiscally sound, with a balance of $6,939.80 as of March 31, 1994.

As you know, telemedicine is continuing to show rapid growth in the U.S. In a recent publication, entitled "Telemedicine, Assessing the Kansas Environment", a total of 23 organizations participating in telemedicine were listed.

In our role as the primary national telemedicine organization, ATA is in a unique position to influence the growth and development of telemedicine. In this regard, Dr. Preston has asked me to establish an interim task force to begin developing ATA policy on issues of critical importance to telemedicine. The role of this task force will be revisited during our second annual meeting and endorsed or modified as deemed appropriate by the membership. It was felt that this activity was too important to delay until the annual meeting.

I would like to encourage broad participation across the ranks of our organization, and have included a sign up sheet to solicit your help. The exact mechanism by which the task force will work will be determined by the number of participants, however, the likely approach will be of minimal cost to the ATA by use of e-mail, phone conferences, and little or no travel.

Dr. Preston has appointed interim chairs for the task force as follows:

A. Committee on Policy and Clinical Standards
Co-chairs - Jay Sanford, M.D./Don Stewart, M.D.

B. Committee for Technical Standards
Chair - Jay Wheeler, M.D.

The primary objective of the task forces will be to develop draft policies and framework for clinical and technical standards. This should provide us with an opportunity to deal more substantively with these issues in 1995.

Please contact me at 202/358-2219 or by e-mail at (dstewart@gm.olmsa.hq.nasa.gov) if you have any questions.

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(512) 480-2247, Fax (512) 480-2248

Since ATA is a relatively new organization we are looking at developing a logo, certificates of membership, and stationary. We will forward the membership certificate to you when it becomes available.

Finally, you will find enclosed a fact sheet. To effectively build a database on the membership of the association, several pieces of information are necessary. The second enclosure is a short biographical sketch of the member. New members will provide this information on their applications.

Thank you for your help. I look forward to working with you over the coming year.

Cordially,

Donald F. Stewart, M.D.
Secretary-Treasurer

The American Telemedicine Association

Committee Sign-Up

Name _____

Committee on Policy and Clinical Standards ___

Committee for Technical Standards ___

Other interests or comments:

_____

_____

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_____

Please return to:

Donald F. Stewart, M.D.
Manager, Aerospace Medicine
Code UOA
NASA Headquarters
300 E Street, SW
Washington, DC 20024

The American Telemedicine Association

Membership Data Sheet

Name _____

Address _____

_____

_____

_____

Phone _____

Fax _____

E-Mail _____

Educational Background

____ BS

____ MS

____ Ph.D.

____ M.D.

____ Other - specify: _____

Experience/Interest in Telemedicine

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Telemedicine and Information Technologies in Health Care

Project Tracking Document

-- a work in progress --

with support from

National Aeronautics and Space Administration
Division of Aerospace Medicine and Occupational Health

Compiled and Maintained by

Center for Public Service Communications
1600 Wilson Boulevard, Suite 500
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May, 1994

This "working" document is compiled and maintained by the Center for Public Service Communications with funding support from NASA's Division of Aerospace Medicine and Occupational Health through subcontract with Lockheed Engineering & Sciences Company. It is in a continual process of being updated. Information in this document has been collected from a review of literature and informal telephone interviews with administrators and key participants involved in telemedicine and health care informatics projects in the United States and throughout the world. Although the Center for Public Service Communications attempts to verify all information, neither NASA nor the Center warrant its accuracy. With this understanding, further reproduction of the information contained within this document is permissible on condition that the source is cited. Readers are also encouraged to approach agencies and institutions directly for detailed information on their respective programs.

It is expected that the information collected in this document will increase the public's understanding of the variety of programs and initiatives involving communications and information technologies in health care delivery. This information is expected to be of particular use to NASA in testing and evaluating technologies and clinical protocols for responding to medical crises on shuttle and space station missions.

Additional information for possible inclusion in future generations of this document are continually being sought. Please contact John Scott or Neal Neuberger at the Center for Public Service Communications.

The Center for Public Service Communications was founded in 1990 so that government and private sector educational, scientific, health and humanitarian organizations would be able to more successfully apply new communications and information technologies to their programs. Now in its fourth year, the Center has grown to become a major support contractor in the area of telemedicine, disaster management and humanitarian assistance to U.S and international agencies including NASA, U.S. Agency for International Development and the United Nations. The Center is a member of NASA's Telemedicine Implementation Team and was actively involved in the Armenia and Ufo projects. The Center for Public Service Communications also supports NASA as coordinator of production elements of the current NASA/Russia telemedicine project.

Telemedicine and Information Technologies in Health Care:
Project Tracking Document

-- a work in progress --

I. Major Existing Federal Grant and Other Assistance Programs and Activities in Telemedicine and Health Care Informatics

Interagency Efforts

White House Information Infrastructure Task Force

Formed to articulate and implement the Administration's vision for the National Information Infrastructure (NII), the task force consists of high-level representatives of Federal agencies which play a role in the development and application of information and telecommunications technologies. The Information Infrastructure Task Force (IITF) is chaired by the Secretary of Commerce, and much of the support work is done by the staff of the Department of Commerce's National Telecommunications and Information Administration (NTIA).

There are three committees:

1) Telecommunications Policy Committee
2) Information Policy Committee
3) Applications and Technology Committee -- which is developing, demonstrating and promoting applications of information technology in several areas including health.

The Task Force's Committee on Applications and Technology has recently completed the second draft of a Health Care White Paper, titled "Putting the Information Infrastructure to Work," which discusses Telemedicine and other related issues.

The Applications Committee is chaired by Arati Prabhakar, Director of the National Institute of Standards and Technology (see NIST section relative to their activities).

High Performance Computing and Communications

The HPCC program fully supports -- and is closely related to -- Administration efforts to accelerate the development of the NII. The Program and its 10 participating agencies provide basic research and technological implementation to support NII initiatives.

HPCC is a large government-wide effort across a variety of disciplines with $1,096 million allocated for FY 1994. The Advanced Research Projects Agency (ARPA) has the largest HPCC budget with $343 million in funding. NASA's allocation is $123 million, and NIH's is $71.1 million. The 10 HPCC agencies are:

- Advanced Research Projects Agency, DOD
- Department of Energy
- Department of Education
- Environmental Protection Agency
- National Aeronautics and Space Administration
- National Institutes of Health, DHHS
- National Institute of Standards and Technology, Dept. of Commerce
- National Oceanic and Atmospheric Administration, Dept. of Commerce
- National Security Agency, DOD
- National Science Foundation

The National Library of Medicine provides the physical facilities and program coordination for the government-wide High-Performance Computing and Communications National Coordination Office HPCC. HPCC is one of the efforts being coordinated by the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) under the White House Office of Science and Technology Policy.

The five HPCC components are:

1) High performance computing systems
2) National research and education network
3) Advanced software technology and algorithms
4) Information infrastructure technology and applications
   (see separate discussion of telemedicine related activities of the National Institutes of Health)
5) Basic research and human resources

Aspects of Telemedicine and medical informatics may be addressed under one or more of these topics by various participant HPCC agencies.

In 1993, as part of the HPCC effort, NLM announced a research and development contract program, called "Healthcare Applications of High Performance Computing and Communications" and solicited proposals in each of the following areas:

- Testbed networks for linking hospitals, clinics, doctor's offices, medical schools, medical libraries, and universities to enable health care providers and researchers to share medical data and imagery.

- Software and visualization technology for visualizing the human anatomy and analyzing imagery from X-rays, CAT scans, PET scans, and other diagnostic tools.

- Virtual reality technology for simulating operations and other medical procedures.

- Collaborative technology to allow several health care providers in remote locations to provide real-time treatment to patients.

- Database technology to provide health care providers with access to relevant medical information and literature.

- Database technology for storing, accessing, and transmitting patients' medical records while protecting the accuracy and privacy of those records.

From among the more than 130 proposals received and peer-reviewed, twelve research contract awards totalling $30 million over three years have recently been awarded which will create and evaluate testbed networks and prototype telemedicine systems in West Virginia, Pennsylvania, Indiana, Illinois, Iowa, Kansas, Oregon, and California.

Lee Holcomb and Paul Hunter represent NASA on the HPCC Subcommittee which is chaired by Dr. Donald Lindberg of NLM.

Small Business Innovative Research (SBIR) Program

SBIR is designed as a method of helping small businesses compete for federal research and development awards. By 1997, 2.5 percent of each agencies R&D budget must be used for the SBIR program.

Through announcements and requests for solicitation, agencies either specify topics for consideration or, in some instances, invite unsolicited proposals. Funding of up to $850,000 is available to firms of less than 500 employees.

A check of pre-solicitation announcements from eight agencies reveals only a couple of telemedicine related projects at the Department of Education in the area of development or adaptation of telecommunications, electronic networks, multimedia, and management information systems and software to assist persons with disabilities in need of rehabilitation or special education.

Individual Agency Efforts

Department of Agriculture

Rural Electrification Administration (REA)

On March 29, 1993, the Distance Learning and Medical Link Grant Program was authorized under REA of the US Department of Agriculture. This program provides grants for distance learning and telemedicine projects benefiting rural areas. Grant recipients are schools, hospitals and medical centers which will "encourage, improve, and make affordable the use of advanced telecommunications and computer networks to provide educational and medical benefits to people living in rural areas and to improve rural opportunities."

For purposes of this program, a medical link is defined as "a telecommunications link to an end user through the use of eligible equipment which electronically links medical professionals at separate sites in order to exchange medical information in audio, video, graphic, or other format for the purpose of providing improved health care services primarily to residents of rural areas."

Congressional interest in the future of REA explains in part the involvement of this Agriculture Department division in the field of Telemedicine. House Agriculture Committee members have ensured the viability of the REA "Distance Learning and Medical Links Programs." The grant program received $5 million in FY 1992, $5 million in FY 1993, and has appropriations of $10 million for FY 1994. Run through the Office of Rural Development Assistance, the availability of grant money for this year was announced in Vol. 58, No. 37 of the Federal Register on February 26, 1993. A final rule became effective on March 1, 1993. The program is designed to "provide grants to rural community facilities, such as schools, hospitals, and medical centers, to encourage, improve, and make affordable the use of advanced telecommunications and computer networks to provide educational and medical benefits to people living in rural areas and to improve rural opportunities".

On November 5, 1993 the REA announced the awarding of 28 grants to educational and medical organizations in 26 states to provide advanced telecommunications technology.

The grants vary from $25,000 to $500,000 and include 17 that are in excess of $400,000.

Programs funded for FY 1994 related to health care applications are:

- Arkansas: Baptist Medical Center to establish 67 mile teleradiology link with the Center's flagship facility -- $49,780
- Idaho: A dual education and medical communications system linking eight counties and schools to permit exchange of medical information -- $500,000
- Indiana: Permit instant transfer via fiber of still and video images and data between hospitals and clinics in seven rural locations -- $183,000

- Kansas: Facilitate managed care by sharing clinical records and toxicology information, teleradiology and distance medical education between several hospitals -- $498,000

- Louisiana: Health, community and continuing education project via distance learning and medical technology -- $499,000

- Michigan: Consortium of hospitals, universities and schools for dual technology systems and programs in medicine and education -- $373,894

- Missouri: Medical link system to permit rural physicians to receive lab results as soon as they become available -- $180,000

- Montana: Two way interactive video to deliver medical and mental health services, continuing medical education, and community development activities with a focus on five medical and mental health facilities in eastern Montana -- $482,910

- North Dakota: Medical link of 32 consortium institutions connecting, physicians, doctors, nurses, hospitals and other rural allied professional via satellite -- $97,472

- Nevada: Statewide educational and medical communications system for teleconferencing, audio-computer graphics and computers led by the University of Nevada Reno and its medical school -- $400,000

- New York: Establish a dual communications system for medical and learning needs connecting two community hospitals with nine outreach centers -- $494,755

- Oklahoma: A consortium of high schools and vocational technical schools planning a variety of educational, community and medical uses -- $477,700

- South Carolina: A teleradiology link to bridge gaps in service by linking a rural hospital with a facility in Savannah -- $25,000

- South Dakota: A partnership of educational and health care organizations to provide distance learning and medical links in the north central area -- $500,000

- Tennessee: A mixed educational and medical link program via internet -- $486,215

Department of Commerce

National Telecommunications and Information Administration (NTIA)

The Administration Policy Statement in the Federal Register, Vol. 58, No. 181 on September 21, 1993 for NTIA makes clear that better use of information technology and the development of health care applications for the NII can make an important contribution to health care reform. The statement lists four areas of NTIA interest within health care:

- Telemedicine
- Unified Electronic Claims
- Personal Health Information Systems
- Computer based patient records

Commerce Department provisions in appropriations for FY 1994 include $26 million in funding and directive language with respect to the NTIA information infrastructure grant program. The law includes language which specifies that funds may be used for the provision of educational, cultural, health care, public information, public safety or other social services. The conference report on the legislation includes examples from North Carolina and Florida of healthcare-related projects Congress finds worthy of support.

Specifically, NTIA's NII grants program makes funds available to plan for and demonstrate the advantages of an information infrastructure to permit interconnection and interoperability between and among user communities. Interim program notices specify that within health care, grants will focus on:

- Distribution of health-related information on a community-wide basis
- Development of standard formats for basic medical records and sharing of computer-based patient records
- Provision of basic medical care in rural areas using telemedicine connecting primary care providers with experts located in more urban areas
- Improved emergency services
- Educational and training experiences targeted at primary care providers in rural areas

Applications for funding must be received by May 12, 1994 and grants will be selected under a peer review process. Awards will be announced by the end of September 1994.

In addition to its grants program, NTIA is co-chairing a telemedicine interagency working group with HHS's Office of Rural Health Policy. Pending authorization legislation by Rep. Markey would also create within NTIA a clearinghouse on telemedicine.

It should also be noted that the Secretary of Commerce serves as chair of the Administration's interagency Information Infrastructure Task Force (discussed separately).

National Institute of Standards and Technology (NIST)

The Advanced Technology Program at NIST promotes economic growth by accelerating the development and commercialization of promising new technologies. ATP is a rapidly growing federal effort with a nascent interest in technology applications in health care.

The program received $69 million in FY 93, $199 million in FY 1994 and it is rumored that the President's budget request for FY 1995 is $451 million, increasing to over $700 million in the third out-year which is FY 1997. To date, it is not possible to identify any specific amount which has been available for projects in telemedicine or medical informatics. The only remotely related project to date has been in the area of kinematics.

In her dual role as the Director of the ATP and chair of the IITF for the White House Ms. Prabhakar has recently been interested in soliciting the views of the technology and health care applications industry to determine the level of economic impact which a NIST effort in the area of health care might have. There are strong indications that NIST is leaning towards the establishment of a major project with respect to health care information systems. The possibility of establishing overarching systems to achieve integration of networks within hospitals has been broached by one of the major health care industry consortia interested in working with NIST.

On February 23, the Advanced Technology Program held a major workshop on "Focused Programs in the Application of Information Technology to Health Care. A determination of specific areas of NIST interest with respect to health care is expected shortly.

Department of Defense (DOD)

Advanced Research Projects Agency (ARPA)

In early February 1994, ARPA announced two major programs relevant to telemedicine. The Advanced Biomedical Technology program will focus on medical support for the battlefield, with emphasis on technologies with dual commercial and military benefits. Emerging sensor and information technologies in the areas of remote sensing, secure broad bandwidth communications, tele-operation, advanced imaging modalities, virtual reality and simulation to help reduce battlefield casualty rate through early intervention are of particular interest to ARPA. Proposals in the specific component areas of remote advanced diagnostics, remote therapeutic intervention, and medical simulation submitted by March 31, 1994 will be considered in the initial review process.

In addition, ARPA is soliciting proposals for research in and development of an intelligent agent-based clinical associate software system (CLASS) and instrumented pilot demonstrations in Ambulatory Care and Combat Casualty/Trauma Care. The stated program vision is to greatly improve the tools that support decision-making by clinical users and patients/consumers. Deadline for applications is March 25, 1994.

In an example of the Advanced Biomedical Technology program, ARPA has sponsored research and development which would, in the field, lead to a combined use of telemedicine and remote surgical techniques. Under the Medfast or "Remote Telepresence Surgery System", personnel status monitors allow for immediate location of wounded soldiers (using GPS) and monitoring of physiological signs via telemetry to MASH units, rear echelon medical facilities or stateside military hospitals. At the same time, surgeons would be "brought to the front lines" by communicating with a Medfast vehicle equipped with telepresence surgical tools including real time 3-D images of the patient, and instrumentation which allows remote manipulation of surgical tools with realistic hand sensation from a distance.

Using a broadband global grid communications system and digital interfaces, ARPA believes that in the near future it will be possible to dissolve time and space in a manner that allows "a surgeon in every foxhole" with almost instantaneous access to information straight from the battlefield including complete medical history, real time vital statistics, video of the patient, and any available diagnostic images. The implications of these developments for surgical care in remote areas in the U.S. are also being explored.

United States Air Force

The AKAMAI project based in the Office of the Command Surgeon, Hickam Air Force Base in Honolulu focuses on making time and distance barriers in the Pacific irrelevant to providing timely and accessible healthcare using various telemedicine technologies.

In the seminal stages of planning, programming and executing a vision of ubiquitous telepresence throughout the Pacific theater for Federal healthcare beneficiaries, AKAMAI (which means the best of in Hawaiian) will expand on a current virtual radiology system linking USAF and Army Hospitals and clinics at five sites in South Korea. A similar arrangement would link Tripler Army Medical Center on Ah with the USAF clinic at Hickman, the US Navy Clinics at Makalapa (Pearl Harbor) and Kanehoe Marine Corps Air Station and Troop Medical Clinic Schofield Barracks (Wshiawa).

Also being created is a fully digital radiology department in a deployable International Standards Organization (ISO) shelter which can be moved to sites needing radiology support in a disaster situation. The filmless shelter will use multi-path communications technologies such as INMARSAT, VSAT, conventional terrestrial and submarine phone cables, microwave and others.

In addition, Navy plans on expanding its current videoteleconferencing capabilities between Kwajalein Atoll and Tripler Army Medical Center throughout the Pacific using digital imaging technologies.

United States Army

The US Army conducted an extended demonstration of use of Mobile Satellite Services to transmit X-rays and other medical images from Somalia to Walter Reed Army Medical Center in Washington during Operation Restore Hope starting in February of 1993. Physicians of the 86th Evacuation Hospital in Mogadishu sent still digitized images and telephone transmissions from a portable "Standard A" Inmarsat terminal. At Walter Reed, the consultative system was linked to both MEDLINE, through the MEDLARS at the National Library of Medicine and through Composite Healthcare System (CHCS), the computer network of the Department of Defense.

In Somalia, Apple powerbooks loaded with multiple software packages were linked to a camera based on a single charge couple device (CCD) which is capable of capturing a single 1524 X 1012 pixel image and stored on a built-in hard drive. Color images are said to be excellent for consultative purposes, and the entire package is lightweight and portable.

At Walter Reed, the system used a more extensive Quadra 950 Apple computer. The system has since been deployed successfully in Zagreb, Croatia and Landstuhl, Germany in May of 1993 with similar links to Walter Reed.

Tripler Army Medical Center, in Honolulu, Hawaii, is the only federal tertiary care hospital in the Pacific Basin. It supports 200,000 Department of Defense and veteran's beneficiaries residing in the Hawaiian Islands. It provides referral level support for another 200,000 DOD and VA beneficiaries residing in the Western Pacific as well as DOD personnel "forward deployed" in this region. It supports the residents of 9 US-affiliated jurisdictions in the southern and western Pacific area (American Samoa, Guam and the former Trust Territories). Tripler is one of the ten most automated hospitals in the United States.

Distance, time and cultural barriers all must be overcome to improve medical care for this diverse group of people. Telemedicine and medical information management are ideal tools to address these barriers and importantly can be tailored to the uniqueness of these different groups. Tripler is developing itself to serve as a Pacific Basin focal point to this end.

In January 1993, Tripler developed a link with the US base on Kwajalein Island (2200 miles distant), a part of the K. atoll, in the Marshall Islands. To date, over 120 consultations have been carried out in 16 medical specialties. Patients have included soldiers and their dependents, Army civilian employees and Marshalese nationals from the neighboring island of Ebeye, the most densely populated island on earth. Air fare costs from the atoll to Hawaii is $2,000, round trip. Within the near future expansion is planned to other DOD bases in the Hawaiian Islands, US bases in Okinawa, Guam, mainland Japan and Korea.

In January 1994, Tripler organized the Pacific Consortium for Telemedicine. This brought together representatives of DOD, other federal, state, non-profit, and private organizations and those interested in providing care in the Trust Territory region. Further, Tripler has met with Ministers of Health from several independent Pacific Island states, at their invitation, to begin arrangements for telemedicine programs. Off-island health care consumes 30% to over 70% of the health care budgets of many emerging states in the Pacific. Telemedicine -- with its increased access to specialty consultatnts also knowledgeable about local customs,

problems, and sensitivities -- offers a real hope of gaining control over these budgets. In addition to teleconsultation, connectivity with Tripler offers its Pacific basin customers access to other health care-relevant information and service. Medical maintenance, tumor board support, quality assurance-related activities, teleradiology and telepathology are services currently in the planning phases.

United States Navy

On October 16, 1993, the Navy conducted the first two-way, full motion live video teleconference linking several shore command centers with the USS George Washington. The conference was conducted by Chief of Naval Operations Adm. Frank Kelso.

Medical Diagnostic Imaging Support

Developed by Loral Siemans for the Department of Defense, the MDIS teleradiology system is designed to demonstrate filmless radiology in military medical hospitals, electronic transmission of digital images via satellite, and the use of the most recent standards in digital image transmission.

Department of Energy (DOE)

DOE's Office of Scientific Computing and DOE laboratories have been involved in a number of projects related to medical imaging. DOE is particularly interested in enhancement and recovery of images. Work is occurring at Sandia, Lawrence Berkley, Lawrence Livermore, and Los Alamos. In all cases, collaboration with academic health centers is part of these projects.

Initiatives include extracting information from images, data fusion of PET, CAT, and X-Ray images and automated artificial intelligence projects involving remote transmission. In addition, efforts to improve treatment planning for cancer therapy are being studied using super computers at DOE labs to analyze large amounts of data used for better targeting of radiation beams.

Department of Health and Human Services

Agency for Health Policy and Research

The Agency for Health Policy and Research has undertaken a number of activities and projects related to telemedicine, as has its predecessor, the National Center for Health Services Research and Technology Assessment.

Due to limited resources, the agency has had to broaden its otherwise narrow view of telemedicine to include electronic sharing of information for purposes of supporting patient or provider health care decisions, or enhancing quality, or reducing cost, or otherwise improving the process of providing care, either through communication with other providers or via computers.

The agency is supporting parallel research in the field of medical information systems. In the context of health care reform there is considerable interest in determining if new information systems may be coupled with emerging telemedicine systems in a cost-effective manner.

Areas of inquiry include development of large scale clinical and library databases, electronic medical records, improved workstations and computer interfaces including voice access, medical decision support systems, expert systems, computer-based guidelines, electronic information dissemination, patient and provider education, and applications for rural health care, as well as home health care for the elderly and disabled.

Through its Office of Science and Data Development, AHCPR promotes the coordination of the developers of patient care data standards and the analysis of privacy issues regarding researcher access to patient care data.

A sample of project involvement over the years include:

- o 1967 Medical Systems Development Laboratory, one of the original building blocks of the National Center for Health Services Research which became the Agency for Health Policy Research
- o 1973 Development of Evaluation Protocols for NASA STARPAHC system
- o 1975 Supported seven closed circuit TV systems to support physicians in various (mostly rural) areas
- o 1976 Supported University of Pennsylvania project to foster advanced life support by telemetry
- o 1983 Supported projects titled "The Effect of Telemetry on Advanced Life Support Care" and "Telehealth in Anesthesia: Model for a Network"
- o 1990 Cosponsored a conference with MITRE Corp. on "The Expanding Role of Telecommunications in Health Care -- TeleHealth 2000
- o 1993 Provided technical assistance to the Office of Rural Health Policy and Health Resources and Health Services Administration in reviewing and refining a telecommunications proposal from the University of West Virginia, and in the planning of a Telecommunications Workshop sponsored by the ORHP

  Funded a research project ($330,910) entitled "Controlled Trial of Telephone Care in Medicare Patients" with Dartmouth University

Overall, the agency is interested primarily in "outcomes research" as opposed to systems development like activities.

Centers for Disease Control and Prevention (CDC)

CDC manages the "Wonder" system that allows researchers to ask "what if" questions online from anywhere in the country while studying disease patterns. The Codman database allows researchers to study the preventable hospital discharges by a geographic information system (GIS). The Vietnam Trauma Database allows researchers to visualize thousands of data points in a six dimensional cyberspace to reach a level of conceptual understanding not feasible with traditional databases.

Food and Drug Administration (FDA)

FDA's Submission Management and Review (SMART) program is designed to help develop a consistent electronic approach to the review of drug, biologic and medical device applications. Nomenclature and coding issues are jointly being resolved in cooperation with the biomedical industry, clinicians, World Health Organization and European Community. Uniformity of patient care data should similarly result from standardization of other submission related elements.

National Institutes of Health (NIH)

In 1994 NIH -- led by the National Library of Medicine -- will support the development of HPCC technologies for health care with emphasis on the following applications:

- Testbed networks for linking hospitals, clinics, doctors' offices, medical schools, medical libraries, and universities to enable health care providers and researchers to share medical data and imagery; and

- Collaborative technology to allow several health care providers in remote locations to provide realtime treatment to patients.

Two-to- five research and development projects in each of these areas will be supported via an NIH agency announcement.

The Senate Appropriations Subcommittee on Labor, Health and Human Services notes in its report accompanying FY 1994 appropriations to DHHS that this is of "the highest priority" and that: "This concept holds great potential, especially in rural areas, to greatly improve the quality, access, and affordability of health care. It can reduce need for travel in rural areas and provide needed backup and access to specialists for primary care health professionals in these underserved areas."

NLM has many specific NII related projects underway. The Library's on-line databases and databanks are the most widely used medical information resources in the world. Internet is rapidly becoming an important vehicle for delivering various NLM services. NLM also sponsors intramural research to create prototype systems which will serve as network-accessible resources for telemedicine systems in several areas. The Unified Medical Language System (UMLS) project focuses on linking patient records to parameters set out in practice guidelines and data contained in scientific literature. A comprehensive collection of 2-D and 3-D images derived from CT and MRI data are being collected as the basis of a new generation of workstations for teaching human anatomy to health professions as part of the Visible Human Project. Computer-based patient record systems are also a priority of the NLM's National Information center on Health Services Research and Health Care Technology. In addition the NLM and the National Science Foundation are working together to help ensure that academic medical centers, hospitals and libraries of the National Network of Libraries of Medicine an make effective use of NII.

The National Cancer Institute's Physicians Data Query (PDQ), provides physicians and patients with information about the availability of treatment protocols for different disease stages. PDQ is continually updated with the latest information by panels of clinical cancer experts. NCI is also supporting the development of national broadband network capabilities for sending digital mammography images in order to obtain rapid and expert radiologic consultation.

There are several other NIH Medical Databases which may be found through the Library of Medicine via Grateful Med. National Library of Medicine also provides on-line clinical alerts (highlights of important findings). Further, there is a Bulletin Board System linking the National Library of Medicine and users of Grateful Med.

A listing of available medical databases includes:

MEDLINE: References to and abstracts of journal articles

AIDSLINE, AIDSDRUGS and AIDSTRAILS: databases devoted to HIV-related info

BIOETHICSLINE: ethics & related public policy in health care & biomedical research

CATLINE: records of books and AVLINE: audiovisuals,

CHEMLINE and CHEMII: chemicals dictionaries

HEALTH: information about the organization and delivery of health care services

CANCERLIT: references to cancer literature

TOXLINE and TOXLIT: toxicological information

DIRLINE: a director of some 18,000 information resources,

SERLINE: information on biomedical journals

PDQ -- a database produced by the National Cancer Institute with information about cancer including clinical trials, and a physician directory

TOXNET -- databases (including HSDB, RTECS, TRL and CCRIS) of toxicological information.

National Disaster Medical System (NDMS)

(To be added)

Office Of Disease Prevention and Health Promotion

The New Media Projects (NMP) group within the National Health Information Center will explore a range of information exchange and options for access to information by public health and health communication intermediaries. Broadly, the NMP's goals are to stimulate development, evaluation, and diffusion of innovative communication and multimedia technologies for health promotion and disease prevention; and to provide opportunities for Public Health Service agencies to work with technology providers and applications developers to explore new health communication approaches for public information and education.

Activities currently planned by ODPHP through the NMP group include a database of information on technology-based health communication applications, a quarterly newsletter, and a Secretary's Award for outstanding health communication products. The group will also organize forums for representatives from the public and private sectors to address the policy, organizational, and technological issues associated with the electronic dissemination of health information. The first of these exhibits is being held in cooperation with the National Demonstration Laboratory for Interactive Information Technologies at the Library of Congress. The NMP group is particularly interested in encouraging public-private partnerships for the development of health communication applications and the evaluation of such applications demonstration projects and in field trials of new technology platforms.

Together with the National Library of Medicine, ODPHP has help to sponsor field demonstrations of the "Community Services Workstation", a client centered computer based system designed to serve as one stop shopping health and human services. An integrated system using computer, fax, telephone, VCR and centrally stored and distributed data -- authorized members of case management teams can help clients search a variety of databases relating to areas like food assistance, housing, drug treatment programs, vocational training opportunities and health care services.

In addition, teleconferencing services would allow professionals to conduct integrated case management sessions on behalf of individual clients. Tested in Texas and Washington D.C., it is envisioned that these laboratory prototypes will be widely disseminated after having been expanded to include client record systems, the ability

to screen new clients, and additional information concerning local service providers. An advisory committee of federal agencies including representatives of the Centers for Disease Control, Health Resources and Services Administration, Center for Drug Abuse Prevention, Office of Management and Budget, Federal Communications Commission, and the National Telecommunications and Information Administration. has been appointed to assist in the development of workstations for other areas of the country. See also section on Howard University.

Office of Rural Health Policy (ORHP)

In March, 1994 the ORHP announced availability of $4 million in additional funding for projects under its Rural Telemedicine Grant Program. The program will provide a baseline of information for conducting a systematic evaluation of telemedicine systems serving rural areas, and facilitate development of rural health care networks through the use of telemedicine. A central goal of the program is to demonstrate how telemedicine can be used as an effective tool in the development of integrated systems of health care.

Applications for up to $500,000 are being accepted until May 20, 1994 with projects starting on September 30, 1994. Eligible applicants include multi-specialty entities, small rural hospitals and rural primary care practitioner offices or clinics. Required services which must be provided over proposed telemedicine systems include -- teleradiology, cardiology, dermatology, mental health and/or substance abuse, obstetrics and gynecology, orthopedics, subspecialties of pediatrics, and resuscitation of trauma patients. Applicants are required to demonstrate cost participation.

It is also anticipated that some additional telemedicine grants may become available through the ORHP Rural Outreach Grant Program which was established to promote innovative health services delivery in rural areas.

The Office of Rural Health Policy has previously funded several rural telemedicine projects. Included among these is $800,000 in continued funding for the West Virginia University Mountaineer Doctor Television project. The project, designed to use T-1 lines for compressed video transmissions linking a hub site with three remote sites is also supported by the Appalachian Regional Commission. MDTV conducted its first continuing education program and its first telemedicine consultation in July 1993. Nursing students in Petersburg, West Virginia, are also to be able to attend classes in their own home. Three additional remote telemedicine sites will be added over the next year.

Health Care Financing Administration (HCFA)

HCFA is interested in pursuing efforts to determine the safety and effectiveness of various telemedicine applications. At the same time, the agency is under considerable pressure from Congress to immediately establish payment policies with respect to telemedicine. As a result some short term targeted assessments have been undertaken: Site visits to several facilities throughout the country have been made by HCFA representatives; The University of Colorado has been contracted to develop a framework to analyze the effectiveness of telemedicine in its different forms; and, recently, HCFA entered into a $700,000 cooperative agreement with the Iowa Health System to hook a hub facility to hospitals in each county seat throughout the state for evaluative purposes.

During deliberations on the FY 1994 appropriations measure, the Senate had earmarked $7 million specifically for telemedicine projects within HCFA. Included in the total was $2 million for continuation of the Midwest rural consortium project to demonstrate the effectiveness of linking hospitals to existing statewide fiber optics networks, and $1 million for two demonstration projects to develop, pilot test, and evaluate payment methodology for telemedicine consultations. The Conferees on the bill removed the directive language, but left an appropriation of $5 million which is generally understood to be used for these purposes. A mid-January general grant solicitation contains reference to the availability of funding for projects in telemedicine. HCFA also has committed to providing Congress with a report in the near future, but no full scale coverage guidelines.

Department of Veteran's Affairs (VA)

The VA has funded several telemedicine projects over the years using commercially installed systems in the $200,000 - $500,000 range. In addition they have developed several "in-house" capabilities which, using their own communications infrastructure, allow them to link up 171 medical centers throughout the system.

The VA has extended its text-based hospital information system for medical records called the Decentralized Hospital Computer Program (DHCP), to handle new data types including imaging capabilities. The system is unique because it of the variety of data it handles within an existing hospital information system. Individual workstations can capture and display digital images. There are approximately 60 public domain software modules supporting functions such as admissions, pharmacy, laboratories, medicine, order entry, health summaries, engineering, purchasing and finance. Both the Department of Defense and Indian Health Service have modified some of this software for their own uses.

Images may also be obtained directly from other systems, such as commercial radiology Picture Archiving and Communication Systems (PACS). Approximately $8 million is budgeted for PACS within the VA system.

Baltimore VA Medical Center has purchased a commercial PACS radiology system and will be operating in a filmless mode. The system will interface with DHCP to allow display of images on workstations throughout the hospital. The costs to that institution are approximately $900,000.

In addition, the VA is in the process of testing an extension of its electronic mail system to handle binary data types such as images, video, voice and scanned data across its entire network. One of the goals is improved staffing and distribution, and peer review.

National Aeronautics and Space Administration (NASA)

Division of Aerospace Medicine and Occupational Health

NASA pioneered Telemedicine with the monitoring of Mercury and Gemini astronauts (including metabolic rate monitoring during extravehicular activity) and the downlink of in-flight medical data from Skylab.

During the past 40 years, the agency has continued its active interest in Telemedicine. In the 1960s NASA positioned three geosynchronous satellites which helped provide a testbed for health care applications in remote areas of the world. ATS 1 and 3 provided support to the first experiments in Telemedicine in Alaska under the auspices of the Indian Health Service. The project help link remote villages for teleconsultation. Between 1973 and 1978, a project initiated in part as a testbed for space technology brought telemedicine to the remote Papago Indian Reservation in the Sonora Desert of Arizona.

In 1975 NASA made satellite communications history when it repositioned ATS-6 over India to demonstrate applications in education, agriculture and health care for rural development assistance using direct broadcast television at S-Band NASA's interest in international communications is further evidenced by its search and rescue efforts in cooperation with Canadian, French and former Soviet governments (COSPAS/SARSAT); telemedicine demonstrations in the developing world; educational networks in the Pacific Basin PEACESAT) and, more recently, technical assistance in mitigating the devastating effects of the eruption of Mt. St. Helen, the Colombia, South American mudslides, and earthquakes in Mexico and Armenia, USSR, and a gas explosion near the Ural city of Ufa, USSR.

Today, in follow-up to the "Telemedicine Spacebridge" for the Armenia earthquake and Ufa gas explosion victims, a US/Russia Joint Working Group on Space Biology and Medicine maintains two- way audio/two-way video links between four major U.S. hospitals and the Ministry of Interior Hospital in Moscow. U.S. participant hospitals in an eighteen session demonstration are University of Texas School of Medicine at Houston; the LDS Hospital at Salt Lake City, Utah; the Uniformed Services University of the Health Sciences at Bethesda, Maryland, and Fairfax Hospital at Fairfax, Virginia.

This "Telemedicine Demonstration Project" was inaugurated in November 1993 at the Hart Senate Office Building on Capitol Hill by Senator John (Jay) Rockefeller (D) West Virginia. The international video circuits are routed over the WSDRN (Loutch) former military satellite. NASA's Lewis Research center in Cleveland functions as the U.S. gateway for all audio and video signals, and programming coming from Russia is received at Lewis and "turned around" to a U.S. domestic Ku band satellite for receipt by participating U.S. clinical sites. Lewis also provided standards conversion (from PAL to NTSC and NTSC to PAL) and encryption on the U.S. side to ensure patient privacy.

During the Senate inaugural, the Hart building was also connected, via a terrestrial T-1 (1.5 Mbps) line with a rural clinic in West Virginia to participate in a live pediatric cardiology consultation in order to demonstrate compressed video technology.

II. Legislation Effecting Telemedicine and Health Care Informatics Policy

Measures Pending in Congress

Senate Bill S-4

Senate Bill S-4 introduced by Senators Hollings, Mitchell, Rockefeller, and 18 cosponsors is designed to promote the industrial competitiveness and economic growth of the United States by strengthening and expanding the civilian technology programs of the Department of Commerce. The legislation had previously been introduced in the 102nd Congress by then Senator Gore.

Its purpose is to ensure the widest possible application of high performance computing and high-speed networking. The legislation would allow:

(1) Expand Federal Support for research and development on applications of high-performance computing and high-speed networks for (among other things) improving the provision of health care by furnishing health care providers and their patients with better, more accurate, and mote timely information.

Section 6 of the bill specifically identifies applications for health care. It requires that:

> In accordance with the Plan developed under section 701 of the National Science and Technology Policy, Organization and Priorities Act of 1976, the National Institutes of Health, and particularly the National Library of Medicine, in cooperation with the National Science Foundation and other appropriate agencies, shall develop technologies for applications of high-performance computing and high-speed networking in the health care sector. Such applications shall include, but not be limited to the following:
>
> (1) Testbed networks for linking hospitals, clinics, doctor's offices, medical schools, medical libraries, and universities to enable health care providers and researchers to share medical data and imagery;

(2) Software and visualization technology for visualizing the human anatomy and analyzing imagery from X-rays, CAT scans, PET scans, and other diagnostic tools;

(3) Virtual reality technology for simulating operations and other medical procedures;

(4) Collaborative technology to allow several health care providers in remote locations to provide real-time treatments to patients; and

(5) Database technology for storing, accessing, and transmitting patients' medical records while protecting the accuracy and privacy of those records.

There are authorized to be appropriated to the National Library of Medicine for the purpose of this section, $20,000,000 for fiscal year 1993, $40,000,000 for fiscal year 1994, and $60,000,000 for fiscal year 1995.

In addition, section 607 of the bill discusses Applications for Libraries; with a subsection that addresses Development of Databases of Remote Sensing Information Images. It calls for the National Aeronautics and Space Administration to develop databases of software and remote sensing images to be made available over computer networks like Internet. For purposes of this section there are authorized to be appropriated to NSF $10,000,000 for fiscal year 1993, $20,000,000 for fiscal year 1994, $ 30,000,0900 for fiscal year 1995, $40,000,000 for fiscal year 1996, and $50,000,000 for fiscal year 1997. Further, the legislation contains authorization levels for NASA in the amount of $10,000,000 for fiscal year 1993, $20,000,000 for fiscal year 1994, and $30,000,000 for fiscal year 1995.

An amended version of the bill, which would especially change authorized levels of appropriations, passed the full Senate on March 16, 1994.

Senate Bill 1088 (The Rural Telemedicine Development Act of 1993)

Senate Bill 1088 was introduced by Tom Harkin (D-Iowa) on June 10, 1993 and referred to the Committee on Agriculture, Nutrition, and Forestry.

Among its provisions, the bill would establish three grant programs to encourage the establishment and linkage of rural telemedicine networks nationwide. The legislation would help rural providers address personnel shortages; cut costs by enabling patients to receive services locally whenever possible; reduce paperwork costs; improve coordination and efficiency in health care delivery; and furnish rural providers with access to equipment, specialists, and education.

Under this Act, the Secretary of Health and Human Services would award grants to eligible entities for the purpose of encouraging the initial development of rural telemedicine networks as well as for the purpose of linking such networks together using advanced telemedicine systems.

The companion measure H.R. 3249, was introduced in the House by Rep. Neal Smith (D-Iowa) and referred to the Energy and Commerce Subcommittees on Health and on Telecommunications and Finance in October.

Senate Bill 1143 (Rural Health Improvement Act of 1993)

Introduced on June 22nd by Senator Baucus (D-Montana) with 4 co-sponsors, this legislation includes provisions which would establish a grant program for use by rural health care networks to use interactive telecommunications systems.

The legislation was referred to the Senate Finance Committee.

Senate Bill 1494 (Health Care Information Modernization and Security Act of 1993)

Introduced by Senators Bond (R-Missouri), Riegle (D-Michigan), and Burns (R-Montana) on September 24, 1993 the legislation would create a committee of Government representatives and of the private sector to help identify essential information that must be included as part of any health information systems. Representatives of Defense, Veterans Affairs, Agency for Health Care Policy and Research, National Institutes of Standards and Technology, National Telecommunication and Information Administration would be included on the "health Care Data Panel" which would hold hearings and secure information from federal agencies. Working with the American National Standards Institute, the panel would select and establish data and transaction standards, conventions, and requirements that permit electronic interchange of any health care data the panel determines necessary for the efficient and effective administration of the health care system.

The panel would then work individually with the various federal and state agencies to develop standards relating to financing, quality, and public health.

Senate Bill 1757 (President's Health Reform Legislation)

Introduced on November 22, by Senator Mitchell (D-Maine) and 29 co-sponsors, the legislation includes provisions which allow the Secretary of HHS to make discretionary grants to Academic Health Centers for the establishment and operation of information and referral systems to provide services of such centers to rural regional and corporate alliance health plans. In addition several grant, loan and other bill provisions would be available to expand access to health care for the purpose of linking "providers in underserved areas with each other and with regional health care institutions and academic health centers through information systems and telecommunications".

H.Con.Res. 69 (Sense of Congress Resolution With Regard to Rural Health Care Needs)

Introduced on March 23rd by Representative Stupak (D-Mich.) and 70 co-sponsors, this resolution expresses the sense of Congress that health care reform should give attention to rural health care issues. Among its provisions, the resolution would encourage telecommunications consortia and other measures to ensure rural access to emerging medical technologies.

HR 101 (Action Now Health Care Reform Act)

Introduced in January by Rep. Michel (R-Ill) and 71 co-sponsors, HR 101 is an omnibus reform bill which requires that projects under the bill's provisions include demonstrations on telecommunications between rural medical facilities and other medical facilities with useful expertise or equipment. It also mandates that grants demonstrate the application of comprehensive information systems in continuously monitoring patient care and improving patient care.

Finally, this Bill authorizes grants for (1) communication links between plan and provider information systems: (2) regional or community-based clinical information systems; and (3) developing and testing, for comprehensive data set and the specification and presentation of individual data elements.

HR 443 (Emergency Medical Services Amendments of 1993)

Steve Gunderson (R -Wisc) re-introduced a bill to enhance rural EMS services. A component of this bill calls for development of a program "to enable patients and health professionals in rural communities to link-up with medical specialists in larger health facilities for consultations regarding life-saving treatments." This particular provision is also expected to find its way into the omnibus health reform legislation now being considered in the White House.

Representative Gunderson has also included a provision in H.R. 192, The Farm and Rural Medical Equity Reform Act of 1993, which would establish a grant program for rural health care networks to enhance the delivery of health care through the use of interactive telecommunications systems.

HR 1757 (National Information Infrastructure Act of 1993

Representative Boucher's legislation (D-Va) which would expand on the High Performance Computing Act of 1991, providing a coordinated federal program to develop and disseminate applications for high-performance networking and high-speed networking in education, libraries, health care, and provision of government information.

The Department of Health and Human Services, in particular the National Library of Medicine, National Institutes of Health, and the Centers for Disease Control would serve as the lead agencies implementing activities including clinical information systems (testbed networks for linking hospitals, clinics, medical libraries and universities; software and visualization technology; virtual reality technology; collaborative technology to allow remote real-time treatment of patients; database technology for access to medical information literature and for storing, accessing and transmitting patient's medical records), health information to the public, and health delivery systems and population data sets. Passed by the House in September of 1993.

HR 2232 (Improving Access To Health Care Through Telecommunications Act)

HR 2232, the "Improving Access to Healthcare Through Telecommunications Act," introduced originally in the 102nd Congress by Rep. Glenn English (D-OK) and co-sponsored by 44 members from mostly rural states.

The Bill would provide, through the Rural Electrification Administration, grants for the acquisition and operation of interactive telecommunications systems through rural health care consortia. $10 million would be authorized with no single grant exceeding $1 million.

Health care consortia eligible for grants would include tertiary care facilities, rural referral centers, teaching institutions or institutions of post secondary education serving not less than three rural hospitals clinics community health centers, migrant health centers, mental health departments, or similar facilities.

The Bill would permit no more than one grant award per state, with possible exception for applicants proposing service to two or more states.

Not more than 40% of the funds provided under the grant could be used to purchase telecommunications equipment.

The legislation is part of a larger rural development package introduced by members of the House Rural Health Caucus. The Caucus' overall objective is rural development, and HR 2232 is viewed as part of this effort.

To the extent that health care facilities help define communities, the legislation is seen as an important part of preserving the integrity and economic vitality of rural America.

Grant applications would be submitted to the state offices of rural health, or other similar appropriate agency. Determining an individual state's agenda and goals for rural health development is identified as a key determinant of grant success.

Specific applications referenced in the legislation include: consultations between providers in remote areas and those in larger facilities; the transfer and analysis of x-rays, lab slides, and other images; the development of innovative health professions education programs; and development and evaluation of automated claims processing, transfer of automated patient records, and related activities.

More broadly, the initiative would help facilitate the development of communications systems through local and regional common carrier networks (though no funds may be used to operate a common carrier system). In fact, one of the priority criteria for awarding grants is identified as "the undertaking by a local telephone exchange company or other business and nonprofit organizations to provide, in cash, equipment, or services, a share of the costs of establishing and operating such a system." In particular, sponsors of the Bill have said they will be responsive to applications that take advantage of fiber optic technology.

Status of the legislation is unclear given Representative English decision to resign seat in Congress to assume the position as head of the National Rural Electric Cooperative Association.

HR 2639 (Infrastructure and Public Broadcasting Facilities Assistance Act of 1993)

Introduced by Rep. Markey (D-Mass) on July 14, 1993 and passed by the House on November 8, the bill would, among its provisions, require assistance through the Commerce Department for telecommunications and information infrastructure development, including the enhancement of uses for health care providers with emphasis on interconnection and interoperability of providers.

HR 3070 (Rural Telemedicine Development Act)

Introduced on September 14 by Rep. Larry LaRocco (D-Idaho), and co-sponsored by eight members, the bill would establish three grant programs to encourage the development of telemedicine networks in rural areas. Links would be used for clinical purposes, to promote recruitment and retention of physicians, and to help increase education and training opportunities.

The first grant program would provide seed money towards the creation of rural health care networks using telecommunications technology.

The second program would help strengthen the link between existing networks. And the third would provide grants to hospitals and providers to link existing fiber optic telecommunication systems.

The legislation was referred to the House Energy and Commerce Subcommittees on Health and the Environment, and Telecommunications and Finance.

On February 24, 1994 Representative LaRocco introduced a second bill, H.R. 3909, which would further promote federal agency activities with respect to rural telemedicine and health data interchange systems

Legislation Enacted or Pending in State Legislatures

(to be added)

III. An Overview of Projects Using Various Technologies Throughout The United States

Projects at Academic or University-Based Health Centers

The University of Arkansas

Since 1992, the University Arkansas for Medical Sciences (UAMS) has maintained a interactive video network "IVN" within its division of the Office of Educational Services for 24 hour a day programming through a multipoint switch to facilitate trauma cases, diagnostic consultations as well as routine education and business communications between sites.

Satellite and local television programming can be fed to the "IVN" company office and every major hospital in the greater Little Rock area, the cable system and convention center may also be linked. IVN maintains 5 satellite dishes for down link programming. Presently five IVN sites with multipointing capabilities to six other sister and allied campuses and two rural hospitals are included.

The entire state wide compressed video system, STARNET, is compatible with VideoTelecom equipment and multipoint switching equipment. The system uses a T1 line backbone with some fiber, and Southwestern Bell will be installing fiber to most "IVN" existing and proposed sites by 1997.

The Georgia Center for Advanced Telecommunications Technology

The Georgia Research Alliance has established the Georgia Center for Advanced Telecommunications Technology to coordinate educational & diagnostic assistance to rural areas.

Medical College of Georgia

Links the Medical College in Augusta, Georgia with the Dodge County Hospital in Eastman via T1 for an interactive program of cardiology, dermatology, pathology, radiology, urology and orthopedics consultation. The State of Georgia is exploring ways in which it can use a $50 million set aside -- resulting from BellSouth -- for telemedicine (and distance learning).

The Medical College of Georgia is also linked with Augusta Correctional Medical Institute and the Milledgeville Correctional Institute to provide remote consultation for prisoners.

Indiana University

The Regenstrief Institute for Health Care has conducted randomized controlled trials at Wishard Memorial Hospital in Indianapolis on experimental groups of attending physicians that wrote orders on microcomputer workstations after having been shown 1) prior test results for their patients 2) computer predictions of abnormal results if another test was ordered, and 3) test prices at the time test orders were placed. The trials demonstrated reductions in outpatient test ordering costs. A further trial showed cost reductions of $887 per admission when inpatient orders were written on workstations with screen information concerning cost-effective ordering, though some additional physician per patient time was required. .

University of Kansas Medical Center

KU uses video compression technology (Compression Labs, Inc.) to link three sites -- the Medical Center, Kansas University School of Medicine in Wichita, and the Western Area Health Education Center in Hays -- in an interactive telemedicine network. Specialists in the areas of cardiology, endocrinology, neurology, allergy, and oncology have used the network. In one particular test a neurologist examined 10 patients with Parkinson's disease according to a Unified Parkinson's Disease Rating Scale at the Hays clinic. A second neurologist performed the same evaluation at the KU Medical Center using the interactive compressed video system. Findings showed no statistical difference in the two evaluations.

Southwest Louisiana Health Education Center

Providing services to rural swampland communities, SWLAHEC was asked two years ago by the State of Louisiana to help in promoting the idea of a telecommunications project which might eventually help save rural hospitals and accessibility to practioners. Since then, SWLAHEC has been working to gain acceptance by meeting with providers, health care facilitators, and conducting a statewide survey on the possibilities of a telemedicine network in Louisiana. Overall, an estimated 8,000 individuals will be surveyed, with the results projected to provided needed background information concerning formation of a system.

Maine Rural Health Center Clinical Support Network

In 1991, The Maine Ambulatory Care Coalition, the Maine Dartmouth Family Practice Residency, Eastern Maine Medical Center Family Practice Residency and 26 health centers formed a consortium through the Office of Rural Health's Rural Health Outreach Demonstration Project to develop and implement a network to increase access to continuing medical education and to reduce professional isolation of rural health center clinicians.

Originally, comprised of physicians, the network has been expanded to include nurse practioners and physicians assistants. Seventy-two clinicians now participate in monthly teleconferences, fax-based consultations, and organized access to the NLM's Grateful Med software, modems, training, and information resources at each health center.

Teleconferences have been effective for wide geographic delivery of continuing medical education programs in a time limited manner. A user-friendly fax-based consultation network assists in consultations, transfers of patient care and transmitting of monitoring strips including EKGs, fetal monitor strips for immediate feedback in urgent situations.

Training is currently taking place for clinicians with one and a half to two hour sessions offered at each center by the project coordinator and a medical librarian from Togus Medical library. One CME credit is awarded for the training through the NLM.

Upon completion of the ORHP three year grant, the project will be partially continued through a small grant from the Bureau of Primary Care while other sources are being sought.

Massachusetts General Hospital

In participation with other New England hospitals, Massachusetts General Hospital is involved in a telemedicine trial using T1, T3 and optical fiber technology developed by NYNEX (the New York-based Bell Operating Company). The trials, each with a specific focus, involve interactive broadband transmission of a variety of media among. In addition to Massachusetts General, the NYNEX trial include Harvard's **Brigham and Women's Hospital, The Childrens Hospital and New England Medical Center.**

The Mayo Clinic

Via satellite, the Mayo Clinic links its clinics in Rochester, Minnesota, Scottsdale, Arizona and Jacksonville Florida. Mayo is one of the longest running operational (as opposed to test/demonstration project) "commercial/private sector" telemedicine systems. The system has been used extensively for radiology, pathology, ultrasonography, catheterization imaging, transmission of echocardiograms and ultrasound. Recent interests are in the areas of acoustic analysis, transcranial doppler examination, clinical speech pathology, remote dialysis monitoring. In October of 1993 May held an international symposium on Telemedicine. Over 400 participants were included in three-way programming and plenary sessions from three specially equipped lecture halls. A consensus conference of issues facing telemedicine was also part of the symposium.

Eastern Montana Telemedicine Project

The Eastern Montana Telemedicine Project (EMTP), at Deaconess Medical Center in Billings is the center of a six-site, six month trial initiated in September of 1993 to demonstrate two-way interactive videoconferencing technology and its impact on rural Montana communities. The project involves several distinct areas: direct and consultative medical and mental health services, continuing medical and higher education, and an exploration of community development applications within each of the rural communities on the network.

Services provided will include: 1) direct delivery of patient services during scheduled specialist telemedicine clinics; 2) Consultations upon request by primary care or mental health professionals, including medical, surgical and psychiatric specialties; 3) routine and emergency x-ray interpretation; 4) consultative interpretation of pathology slides, endoscopy video, otoscopy etc.; and 5) consultative performance and/or interpretation of echocardiograms, electrocardiograms and other medical imaging.

Ongoing education and training programs are also being provided for rural physicians and other personnel. It is anticipated that medical and educational resource enhancements will be of benefit to local businessmen and community social service organizations.

The trial uses V-TEL media conferencing equipment and a dedicated DS1 network leased from US West Communications Inc. Components of the media conferencing system include: video; audio; document; computer; and time conferencing.

The project includes a service area of fourteen counties which either surround or are served by participating rural facilities. Many of the counties are considered "frontier". The project is funded in part by a $482,910 grant from the REA. Additional personnel support is provided by Deaconess hospital, US West, Kentrox and V-TEL.

Evaluative efforts in cooperation with the University of Montana, Business and Economic Research Department will focus on the financial impact of telemedicine and videoconferencing technology on rural communities. Cost-effectiveness and user satisfaction data will be collected on each videoconference conducted as will projections of annual cost/benefit comparisons extrapolated from the limited experience which the trial presents.

University of Nebraska Medical Center

The Health Resources On-Line or "Synapse" program is a computerized information service provided to regional physicians by the University of Nebraska Medical Center. Synapse allows physicians to link together and with data bases for the following support services: information access, electronic mail, medicaid eligibility database, multi-specialty bulletin boards, patient education materials database, drug information service, continuing medical education programs, and quick medical reference. Provided statewide free of charge to physicians who posses their own computer, modem and communications software.

Nevada Rural Hospital Project Teleradiology Network

The Teleradiology Network of the Nevada Rural Hospital Project was launched in March 1990, with funding from a HCFA Transition Grant. Nine rural Nevada hospitals now have 24 hour access to four radiologists at the University of Nevada. Radiologists provide initial interpretation based on transmitted images and, after receiving the original films, provide formal interpretations.

Using computers, X-ray cameras and a dedicated phone line, images are transmitted from the rural hospitals to a receiving unit monitored 24 hours a day by a radiologists. Sending and receiving physicians may view images simultaneously. Benefits to the system have been found to include reduction in costs by eliminating unnecessary patient transfers; increased access to radiologists and diagnostic accuracy; increased support for rural physicians and the potential for use as a recruitment tool for physicians.

University of North Carolina

One of five high-speed testbeds organized by the Corporation for National Research Initiatives (whose president is Dr. Robert Kahn who founded ARPANET) has a super computer radiation treatment program linking a super computer, image processing, and medical workstation. These tests rely on fiber optic cable for transmission.

The school also is testing the Medical Information Communications Applications program designed to conduct research into remote consultation.

East Carolina University School of Medicine

East Carolina University School of Medicine and its Center for Health Sciences Communications (CHSC) have been involved with distance learning for four years and telemedicine for over a year. Since 1989 the department has scheduled courses and seminars, developed teaching techniques and managed videoconference operations through the NCREN (formerly CONCERT) network. This is a microwave based, two way, statewide video network with three discrete channels of audio, video and data. The network links over 30 sites at 11 institutions. During the past year ECU School of Medicine has participated in 313 CONCERT network programs.

ECU also now operates a dedicated telemedicine link between ECU School of Medicine and the hospital at Central Prison in Raleigh. Using compressed video over T1 lines and a portion of the NCREN network, the link was established in August of 1992 to provide emergency consultations, but has since been expanded to include 25 physicians across a range of medical disciplines providing a variety of specialty consultations. Use of a digital stethoscope, graphics camera and miniature hand held dermatology camera aid in remote patient examinations.

Since January 1993, CHSC has been operating a telemedicine and distance learning network between ECU and remote sites in Roanoke-Chowan Hospital in Ahoskie and Coastal Carolina College in Jacksonville. The system has been used to develop enhancements, and network management techniques, as well as testing a variety of Codecs, multiplexers and other hardware. Moreover, a number of applications including video conferences, continuing medical education programs, in-service courses, lectures, and university college credit courses in subjects like Radiologic Technology have tested.

University of North Dakota Distance Learning Project

A fiber optic two-way audio and video interactive network has been established at fourteen sites and will graduated its first BSN, social work, and medical technology students in the Spring of 1993.

Currently the University is working to compliment this system with a satellite system which links 32 sites in a receive-only mode. The system also includes one-way video for educational purposes and would interface with the fiber optic system to create a flexible system with virtually an unlimited number of users.

University of Oklahoma Health Sciences Center (with support from Apple Computer and DOE)

The Oklahoma Medical Information Network (OMIN) is a pilot state-wide Telemedicine project which will use high-speed electronic network (via T1-1.544 megabits phone lines allowing linkages between rural physicians and medical specialists at OUHSC. The project will also provide instant access to on-line information available at the medical library including Medline, medical databases and continuing education programs.

The telemedicine project will last three years and a regional medical facility at Stillwater to remote sites in: Hugo, Frederick, Stillwater, Konowa, Guymon and Boice City. The interactive video network will be used for such applications as teleradiology and telepathology. A second phase will provide medical information services and opportunities, such as electronic mail and transfer of files, on-line access to medical information resources and libraries, health sciences electronic bulletin boards, clinical databases, expert system diagnostic tools and continuing medical education. A third phase will include video for teleconferencing, telecardiology, teleoncology and the linking of urban experts in trauma care to rural facilities.

OHSC is also assisting in the development of the Oklahoma Telemedicine Network, an open statewide system using Community Development Block Grant Fund to support participation of 46 rural hospitals for two years with additional participation of more than 20 privately funded hospitals. Using existing technologies, the network has chosen multimedia electronic mail, access to the Internet, and teleradiology hardware and software as the means of supporting rural hospitals in their decision making processes. As part of the network, the University is working to bring the following additional services on-line for participating institutions: access to the State's Medical Library, access to the National Library of Medicine, ophthalmology services, cardiology services, pathology services.

Eastern Oregon Human Services Consortium

On October 1, 1991, the Consortium was awarded a 36-month grant of approximately $700,000 by the Rural Health Outreach Grant Program of the Health Resources and Services Administration for the purposes of demonstrating an interactive model of mental health care in a rural area. The RODEO NET (Rural Options for Development and Educational Opportunities) project links 13 rural counties in Oregon and is designed to improve care for mental health patients using the State's two-way interactive television network. The system is also used for crisis response, case consultation, and pre-admission and pre-discharge screening

The statewide telecommunications system ED-NET which encompasses three networks - Network I, Network II, and COMPASS are all used by RODEO NET. Network I provides live, interactive one-way video, two-way audio services to 45 downlinks in the consortium area, Network II provides two-way video, audio and data services utilizing digitally compressed video among 10 studios in the project area, and COMPASS is a local "dial-up" computer data network providing a variety information services in direct support to Network I and II.

RODEO NET uses all three networks to provide training of mental health providers. In addition mental health crisis response teams use Network II to help keep persons with mental illness in need of drug and other interventions from having to leave their communities, and patients use COMPASS for community support groups and networking.

Rhode Island -- Brown University

Brown University currently operates a fledgling compressed video link with its partner in Moscow, the Space Research Institute (IKI). At this time, any user wishing to participate in, or originate, a teleconference using the Brown University and IKI network is welcome to do so if they are willing to use the facilities located at Brown in Rhode Island and at IKI located in Moscow. The cost for this service is approximately $400 per hour, plus additional charges for studio staff and equipment. Currently, Brown and IKI use the satellite link for ad hoc conferencing. Brown is negotiating an agreement with Russian satellite authorities for a full-time transatlantic 128 kbps satellite link, using a Russian Gorizont satellite.

Brown is also negotiating with MCI, in the United States, to link its facilities with the national commercial fiber optic system. When this happens, any site in the US can lease a dedicated or dial-up connection to Brown at 112 kbps and will then be able to conference with IKI at any time, 24 hours per-day.

If Brown decides to link to the MCI fiber system, the approximate cost to users of the Brown/IKI network will be $400/hr (includes uplink, downlink, and satellite) plus cost of the domestic fiber connection which can be leased in two ways:

> -- For dedicated service (temporary lease) estimated MCI costs include $1,500 for installation of line, a monthly rate $1,200 (MCI will not contract for less than one month), and usage charges of $60 per hour for actual time used. There is a 30-day minimum charge for dedicated service.

-- For dial-up service estimated MCI costs include $1,500 for installation of line, a monthly charge of $180, plus a usage charge of $60 per hour for actual time used.

Additionally each site will need digital conferencing equipment. For this, Brown has selected the PictureTel codec (coder/decoder) and recommends that users lease equipment rather than purchase. One "bare bones" package (required for each site) is estimated to cost $18,500, including one codec, one camera, one 20" monitor, and associated electronics. The lease costs are estimated at $400/month.

University of South Carolina School of Medicine -- "Winnsboro Telemedicine Feasibility Demonstration Project"

The School of Medicine has assembled several corporate sponsors (Bell South, GTE, General Data Communications, INAS and CAE-Link), to conduct a telemedicine demonstration which examines the value and cost-effectiveness of telemedicine implementation and maintenance in the Midlands area of South Carolina. The project linked a primary health center and hospital in Winnsboro to the University at Columbia with the goals of demonstrating:

1) Assessment of accurate costs of implementation, and identification of any technical problems which may exist when using multiple carriers to an urban medical center.

2) Hands-on experience for health care professionals and students with telemedicine technology and a study of usage patterns by various disciplines to obtain feedback on the value of telemedicine in health care delivery.

3) The feasibility of implementing telemedicine in the Midlands.

Participants included health care providers in Winnsboro, emergency medicine and other medical specialists from the University, faculty and staff of USC Colleges or Schools of Nursing, Library and Information Science, and Engineering, and USC health professions students.

Texas Tech University Health Sciences Center

Three separate TTUHSC demonstration programs , MedNet, KARNET and Techlink, under the umbrella group "HealthNet" provide technology-based rural outreach services in a comprehensive effort to address the needs of rural health care practitioners. Specifically, the capability of these communications systems is to provide a local source of continuing education, to provide clinical oversight and consultation in patient care, and to provide institutional services and resources is being examined.

MedNet, a system based on multiple technologies, including compressed digital video, teleradiology, and other data transmission technologies supports video consultations between family physicians, nurse practitioners and physicians assistants serving as primary care providers in rural West Texas and medical specialists at all of the campuses of the TTUHSC. Support is also provided for the transfer of patient management information and diagnostic data. MedNet also evaluates and certifies telemedical training and evaluates equipment.

This project has been used as a model for House Bill 2232 (described elsewhere). Authors of the legislation have looked critically at the program due to the use of grant funds primarily for hardware. As a result, HR 2232 imposes limitations on use of grant funds for equipment purchase. MedNet has been originally funded by an Office of Rural Health Policy (of HHS) three-year, $1.9 million grant.

Texas Tech is also affiliated with KARENET (Kellogg-Affiliated Remote Environments Network) which is a on line computer network that allows rural physicians telephone or modem access to current protocols/procedures, health care research, and medical instruction.

The TechLink telecommunications system links four campuses of TTUHSC through compressed video/audio/data technologies. Techlink is being used to provide educational and administrative communications in an attempt to maximize utilization of faculty, reduce faculty travel, enhance educational programs at a undergraduate and graduate level.

In addition, the Rural Health Satellite Network is being used (live one-way video and interactive audio) to provide continuing education programs to physicians, nurses and allied health professionals at over 50 rural hospitals and clinics.

The Texas Telemedicine Project

Has been designed to create and test the economic feasibility of interactive video for health services. It involves a clustering of service sites in an economically depressed rural area sixty-five miles from its support group of clinical diagnosticians and treatment programs. It also provides a "living lab" of implementation in an actual situation that highlights human and technology issues. The project has been designed to help open the door for a dispersal of expertise of all kinds into rural communities, as well as bolstering the reconvening of family and neighbors.

Utah -- Intermountain Health Care

A system of 24 hospitals in Idaho, Utah, and Wyoming, Intermountain Health Care Inc. has budgeted $50 million to help link its facilities through an advanced clinical information system for all of its hospitals. A network of T-1 lines and microwave presently used to link affiliates for financial and other administrative purposes is being expanded to include the new HELP (Health Evaluation through Logical Processing) computer based patient record system to bring nearly all patient data to bedside terminals, offering access to lab results, medication orders, patient monitoring equipment, images and the notes of physicians and nurses. Among other features the system includes an Automated Antibiotic Consultant software program found to suggest the appropriate antibiotic 94 percent of the time.

Where installed, the HELP system which helps warn physicians about potential hazards, has already been credited with helping to reduce postsurgical infection rates, medication errors, adverse drug reactions and lengths of stay, among others.

The University of Washington School of Medicine

The University of Washington School of Medicine has a state-of-the art medical and telecommunications infrastructure and expertise in medical imaging. The University's Department of Radiology has a history in teleradiology dating to 1978.

The School of Medicine serves a 4-state area through the WAMI (Washington, Alaska, Montana, Idaho) program which comprises 26% of the US land mass, yet contains only 2.6% of the US population. A primary goal of this project is to expand the availability of high quality medical care to a broader patient population and to allow consultation and second opinions when required. The project employs use of teleradiology technology, including Computed Tomography (CT) and Magnetic Resonance Imaging (MRI), to evaluate the advantages of diagnosis and treatment at rural facilities vs. referral to tertiary hospitals. A specific activity that is evaluated as a part of this project is the examination of fetuses during pregnancy in remote or rural communities in the medical school's service area. This type of evaluation is expected to facilitate rapid appropriate management of medical care, avoiding unnecessary maternal anxiety, travel, and expense and allow timely treatment, when necessary under the supervision and with the support of world class specialists. A goal of this specific phase of the project is to extend high quality prenatal care to more patients.

Beginning in 1995, upon the 100 year anniversary of Roentgen's discovery of X-rays, the University of Washington in collaboration with NASA Lewis Research Center, the Jet Propulsion laboratory in Pasadena, and private industry including GE and 3M will demonstrate a portable hybrid satellite/land connection with remote areas including Asia. The Advanced Communications Technology Satellite (ACTS) will be used to help transmit digital medical images (CT, MRI, Ultrasound, Mamography) from Mobile Terminal Vans located in Washington, Idaho, Montana, Oregon and Hawaii. The Hawaii mobile unit will for instance receive images from Asia, relay them via ACTS to a fixed station at Lewis Research in Cleveland (consisting of AMT equipment and the high burst rate-link evaluation terminal, HBR-LET) and then route them via the Internet to the University of Washington Medical Center in Seattle. Once images are received at the UW Radiology Department, they will be available for softcopy review and will also be printed on a high-quality laser printer. Comparisons will be made using both diagnostic criteria (subjective) and engineering (quantitative) analysis, and evaluations made under differing weather conditions at multiple sites. Compression techniques will also be evaluated to determine effects on image quality and a look at the usefulness of portable teleradiology at lower data rates.

In addition, the University of Washington is conducting a project through its Regional Medical Library contract program with the National Library of Medicine to explore the efficacy of Internet connections and resources in community hospitals. Seven community hospitals in five Western states have been targeted for the program. The pilot is part of a multi-disciplinary project which also includes a research component exploring the use of a client/server model to access anatomical images in a wide area network environment, and a clinical component which would address the problem of providing DNA diagnostic laboratory information to clinicians in community practice.

West Virginia University Health Sciences Center

The University of West Virginia has received an $800,000 grant for each of two years from the Office of Rural Health Policy and $28,000 from the Appalachian Regional Commission for the Mountaineer Doctor Television program. In the first phase, three rural sites at Davis Memorial Hospital, Wetzel County Hospital and Grant Memorial Hospital were linked to the Robert C. Byrd Health Sciences Center at WVU's Morgantown campus. In a second phase, three additional sites will be linked to a hub being developed at the Charleston Division of the Byrd center in conjunction with the Charleston Area Medical Center.

Interactive audio and video communications provide 24-hour medical consultations, emergency assistance, continuing education to health professionals in rural areas, and student and resident educational programs.

MDTV conducted its first continuing education program and its first telemedicine consultation in July of 1993 and the program became fully operational the next month. Consultations with specialists now include Dermatology, Neurology, Rheumatology, Adult and Pediatric Cardiology, Emergency Medicine, Infectious Diseases, Neuro-radiology, and Forensic Medicine. The schools of Medicine, Pharmacy, and Nursing are all regularly using the system for educational programs.

The system uses two-way compressed video over T1 lines, and includes cameras and monitors at each of its sites for available 24-hour-a-day transmission of images and high quality audio for use of electronic stethoscopes.

West Virginia University Concurrent Engineering Research Center

Supported by the NLM and ARPA, the "Collaboration Technology for Real-time Treatment of Patients" project is designed to show that effective health care can be achieved by applying modern computer technology to improve the collaboration among diverse and distributed providers. A consortium of computer system developers, practicing rural physicians, community care groups, health care researchers and tertiary care facilities is working to deploy a set of software systems to demonstrate physicians using patient records from distributed

sources; primary care physicians consulting with remote specialists in the areas of perinatology, radiology and cardiology, facilitated with computer support for X-rays, EKG, MRI, voice-annotations and other multimedia information; and community care networks consisting of a collection of primary care and specialized care providers collaborating to meet a community's health care needs.

Specific services using available technologies both research and commercial off-the-shelf systems will support: unified access to patient records, referrals, consultations, follow through, immunization tracking, and data extraction for outcomes analysis.

Applications in Home Health Care, Wide Area Health Care Educational Programming, Organizations and Health Care Informatics Across Institutions

American Hospital Association

Contracts with Westcott Communications in Texas to coordinate programming for hundreds of its member hospitals.

American Rehabilitation Education Network (To Be Added)

American National Standards Institute (ANSI) Health Care Informatics Standards Planning Panel (HISPP)

Voluntary private sector standards development organization supported by the federal Agency for Health Care Policy and Research and the Food and Drug Administration, ANSI has been working to develop medical coding standards for both health care administration and clinical care.

To date administrative health data standards have advanced much faster than clinical standards under various HISPP subcommittee efforts.

American Telemedicine Association

An organization of physicians and allied health professionals established to promote professional, ethical, and equitable improvement in health care delivery through telecommunications technology and enhanced broad-based community telecommunications applications. The association's objectives include promotion of research and education, assistance in the development of telemedicine policy and standards, provision of education to public and professional organizations and acting as a clearinghouse for telemedicine information and services.

Clinical Telemedicine Cooperative Group (CTCG)

Organized by the Center for Advanced Telemdicine Research at Oregon Health Sciences University and including participation by Kansas University Medical Center, East Carolina University, the Eastern Montana Telemedicine Project, the University of Kentucky, RODEO NET and others, CTCG is a means of pooling data from many telemedicine projects simultaneously with a goal of measuring the utility and cost-effectiveness of clinical telemedicine interventions. Patterned after Southwest Oncology Group's methodology, CTCG's objectives include: using common protocols for gathering data, achieving economies of scale in data management, processing and analysis, pooling cases to achieve statistically valid results on a wide series of specialties and cases in a short period of time. Over time, the CTCG will provide an infrastructure of necessary research and administrative support to its members, so that they can more easily undertake evaluations of their own telemedicine systems.

Communications and Computer Applications in Public Health (CCAPH)

Communications and Computer Applications in Public Health (CCAPH) is a Berkeley, California-based association composed of 800 members interested in health informatics. Over the past few years CCAPH has been working with policy makers and health sector representatives to consider key issues surrounding health-oriented telecommunications in order to draft recommendations regarding the contribution of health communications and computer applications to health care reform.

CCAPH was planning a health applications demonstration, introduced by C. Everett Koop, M.D., at Dartmouth Medical College on June 17. They are planning further demonstrations on Capitol Hill in the areas of telemedicine, personal health information systems, and medical virtual reality and telepresence in late summer and early fall.

Comprehensive Health Enhancement Support System (CHESS)

Developed at the University of Wisconsin for people in their homes who may be facing health crises, CHESS is a P.C. based system which offers a range of personnel health information, support services and problem solving tools with modules concerning early stage breast cancer, AIDS, sexual assault, adult children of alcoholics, and stress management.

Computer-based Patient Record Institute (CPRI)

CPRI was created in 1991 to promote and coordinate the development of computer-based patient records systems in the United States. The CPRI is composed of representatives from the health care user community including physicians, hospital, computer system vendors, and universities is presently working in four areas to review issues relating to Codes and Structure; Systems Evaluation; Confidentiality, Privacy, and Legislation; and Professional and Public Education. Is also working with the Microelectronics and Computer Technology Corporation's HOST program. (Separate section)

Healthnet

A computer bulletin board system for rural health advocates in Washington State, providing 24-hour access, 7 days a week, electronic messaging, medical information services, continuing education listings and medical library services. The program is sponsored by the Washington State Department of Health, Western Washington Area Health Education Center, Area Health Education Center at Washington State University Spokane, and the University of Washington and is funded in part by a grant from the Office of Rural Health Policy.

File topics maintained include: a Calendar of Continuing Education, Grant Opportunities, Legislative updates and action alerts, State and Federal Programs, Fact Sheets about rural health programs in Washington, Conference Dates and information about Washington State Office of Rural Health, Area Health Education Centers, WAMI Rural Health Research Center, Washington Rural Health Association, Alliance and WRHA Newsletters, Job Opportunities, and Providers interested in Washington State.

Georgia Hospital Association

The GHA has established a multi-site interactive audio conferencing capability using **(more info)** The system offers continuing education, professional meetings and administrative conferences to 120 hospital members of GHA. Continuing medical education courses are conducted in cooperation with four Georgia medical colleges.

Harvard Community Health Plan

Provides 24 hour a day access via an interactive data base which guides Burlington HMO members through a series of interactive questions about their condition and makes suggestions about measures they may take, and, if necessary advises them regarding the need for further medical attention. The system also allows access to general health care information at home.

Healthcare Information Network (To Be Added)

Healthcare Telecommunications Corporation (To Be Added)

Hospital Satellite Network (To Be Added)

Howard University

The Health and Human Services Coalition of the District of Columbia consisting of 40 public and private health agencies and service providers, has been working with Howard University, Rice University, Baylor College of Medicine, Macro International Inc., United Seniors Health Cooperative and Bell Atlantic Corporation on the Community Services Workstation (CSW) project for interdisciplinary case management. Designed as "one stop shopping" for health and human services, integrated teams of case managers and providers are able to assist clients in accessing information from a variety of sources. The system uses Integrated Services Digital Network links including PCs at each location with sound cards, video-graphics boards and videoconferencing circuitry, tied to Unix workstations with 15 gigabyte hard drives. Agencies including United Way and DC Metro have made instantly accessible data available concerning social and other needed support services. The project is being developed with, and carefully monitored by several federal agencies for its nationwide implications. See Office of Disease Prevention and Health Promotion section.

Internet

The Internet began in 1969 as a Department of Defense experiment aimed at helping researchers trade information by computer. It continues to receive about $30 million in federal subsidies annually from the National Science Foundation, but most of its money comes from states, universities, and individual users.

One of the Internet Networks is the National Science Foundation Network (NSFNET) which provides access to millions of scholars and researchers in over 1000 institutions across the United States. Over 650 colleges and universities are connected representing 80 percent of the nation's student population and 90 percent of the nation's federally sponsored research. **S 1067** proposes the National Research and Education Network.

Microelectronics and Computer Technology Corporation

MCC in Austin Texas is sponsor of the Healthcare Open Systems and Trials (HOST) Program in partnership with the Computer-based Patient Records Institute. Designed to accelerate the deployment of open, interoperable and integrated systems in healthcare, HOST is working on solutions to problems caused by the proliferation of non-standard, non-interoperble systems, competing vendor claims of reliability and connectivity and lack of hard data upon which to base technology or investment decisions. The program will conduct a series of community-wide trials of health information networks and enabling technologies to test and validate the emerging technology in the area, and to demonstrate the potential benefits of widespread deployment of networks. HOST is a non-profit organization operated as a broad-based consortium, with members representing the full spectrum of interested parties and stakeholders.

North Carolina Health Care Information and Communications Alliance

By Executive Order of the Governor, the non-profit public/private sector alliance is being established to create an environment in which providers as well as commercial technology developers can analyze and test alternative methods of using information to support health care decisions. Through North Carolina's ATM/SONNET Information Highway, the Alliance will create a high speed communications testbed which will link a broad range of activities in a geographically dispersed health care delivery system including the full range of clinical settings. Objectives of the program during its first four years include: development and installation of fully integrated digital hospital information systems in five regional medical centers to serves as the basis of a statewide system, operation of regional telemedicine networks, development of the framework for GIS analysis of health care, link major medical centers in a distributed data base, develop standards for computerized patient records, and develop a range of services facilitated through the alliance through contractual agreements. The program will also include an evaluation core which addresses patient care processes, patient care outcomes, organizational dynamics, implementation impacts, utilization and cost impacts among others.

Vanderbilt Center for Medical TV (To Be Added)

Voluntary Hospital Association

Is using compressed video extensively for various applications among its regional health care systems and divisions to reduce travel costs of meetings, improve communications among VHA regions, national offices and other health care organizations. VHA also plans to help extend medical services to rural communities served by its members and to provide services to community groups.

Workgroup for Electronic Data Interchange

A consortia of major health care insurers, providers and government representatives established to assist the Secretary of Health and Human Services on establishing the Electronic Data Interchange (EDI), WEDI issued a study in October of 1993 which projected that more than $42 billion could be saved by the year 2000 through wide adoption of EDI standards and implementation of EDI technologies. WEDI which also exists to help confront obstacles to EDI through marketing, education and lobbying efforts, now serves as a resource to the National Association of Insurance Commissioners and state governments to coordinate state and national efforts on administrative simplification. Also interfaces with ANSI standards development programs.

WEDI has sponsored several EDI demonstration projects to test different transaction standards including:

- An AT&T implemented system to permit exchange of legibility information between the company and its insurance carriers
- A Virginia EDI network linking government offices, 30 insurers, 165 hospitals and thousands of physicians including a physician referral system in 32 sites.
- A New Jersey Health Care Information Network designed to use standard EDI.

IV. Telemedicine Projects/Interests in Other Nations

European Economic Community

Toulouse, France plays host to the European Institute of Telemedicine, designed to encourage the development of European telemedicine networks for health care, training and research. The institute is part of a European move to encourage ongoing collaboration with the 12 members of the European Community (EC). Interactive

telemedicine sessions have been tested at the institute with hospitals in Athens and with several hospitals throughout France. In general, among EC members, telemedicine systems appear to be linked within countries, and not yet actively between them.

Currently, the AIM Project (Advanced Informatics in Medicine), based in Brussels, Belgium, has been organized by the European Economic Community (EEC) to standardize medical imaging protocols there. It is designed to promote the applications of advanced communications to health care and medicine, and to define minimum standards for the development of health care information systems that could interoperate. Interoperability would increase effectiveness, reduce development and implementation costs, and provide the industry with the common European-wide standards for the coming internal market.

France

In addition to the Telemedicine Institute, France is concentrating on systems to track communicable diseases. In 1984 the country launched a national information system to track trends in communicable diseases called the French Communicable Diseases Computer Network (FCDN). Using a powerful computerized national information system (IS), the FCDN collects data on seven common communicable diseases and their remedies. Various national and other European health agencies, such as the European Center for the Epidemiological Monitoring of AIDS, regional health observatories, and a network of general practitioners can exchange information on the FCDN.

Because the French national telecommunications company had already distributed free Minitel systems to all telephone users, in order to promote videotex use, FCDN also uses a videotex approach. The FCDN has set up a videotex server that can be accessed by all partners, and a set of related tools is available to those who update epidemiological information. In order to add the data management and analysis functions to the IS, a regional database management system was installed, and desktop publishing was incorporated.

Hungary

In Hungary, health care officials are trying to collect and use basic information concerning the delivery and financing of health services throughout the Hungarian health system. Hungarian physicians are now trying to determine the fields for which telemedicine could provide support, such as emergency care and accessing medical databases.

Italy

Italy's experience with telemedicine dates back to 1970, to an cardiophone experiment at the University of Rome. In 1982 the national telephone company and the Ministries of Scientific Research and Health began a formal telemedicine project, aimed at helping in emergency medicine. Telemedicine is currently being used successfully in cardiology, pathology, and radiology, and plans to use it on a large scale for telemonitoring of dialysis sessions and in obstetrics is underway.

Scandinavia

The Norwegian Telemedicine Project was begun in 1988 with the goal of providing equal access in health care for all Norwegian citizens, some of whom live in sparsely populated areas lacking medical expertise. The project links medical experts at The University Hospital of Tromso, located above the Arctic Circle, and rural hospitals in northernmost Norway, such as in Kirkenes and Harstad, about 400 kilometers away from Tromso. The interactive video system is based on a network transmitting at 2 mbps, and has been used on a regular basis for consultations in dermatology, otorhinolaryngology and psychiatry. It is also used for echocardiology, radiology and pathology, and trials in microbiology, gastroenterology and neurosurgery have shown promise.

In addition to Norway, other Scandinavian countries -- Finland and Sweden -- are testing teleradiology systems. Finland, whose decentralization of primary health care has increased demand on radiological services, is testing a microcomputer-based teleradiology system.

The system uses a 512 x 512 x 8 bit image matrix with image-processing capabilities. Images from 372 conventional roentgen examinations were digitized and transmitted by a 64 kbps telephone line from a rural health center in Kangasala to Tampere University Hospital.

As of August 1991, Sweden was experimenting with four mini-PACS installations and about 12 teleradiology systems are in use.

In 1990 the Nordic countries and Japan held a symposium in Tokyo to discuss why the switch from film-based radiology to digital radiology using PACS had not occurred in great measure in those areas.

Other European Countries

Other EEC countries which are involved in telemedicine projects, either medical informatics systems or more straightforward teleradiology or telepathology systems, include the United Kingdom, Germany, the Netherlands, Portugal and Spain. In Portugal, for example, telepathology is used because pathology departments don't exist in many district hospitals. Spain is using a home monitoring system for diabetics and is studying implementing a perinatal control system. The University of Athens in Greece has begun a mailing list on the Internet to exchange ideas on telemedicine services.

Canada

Memorial University of Newfoundland at St. John's helped pioneer Telemedicine through the Canadian Space Program in 1977 on the heels of successful U.S. NASA efforts at the Papago Reservation. Following these developments, the University established a teleconferencing system in 1979 linking nine communities across the province. Today 220 sites in 120 communities are linked via a combination of four wire (dedicated) and two-wire (dial-up) facilities which allow simultaneous programming using standard telephony equipment. The two wire bridge allows inclusion of external resource people in conferences, permits access to other teleconference networks and provides a link for international programs.

The network is staffed by 12 people, is financially self-supporting and in 1992 carried 6,000 hours of programming.

Over the years, Memorial University has participated in a number of international collaborative efforts in regions and nations including East Africa, and the West Indies.

Australia

Australia has an extensive medical radio communication networks in the world to serve its outback population. The North-West Telemedicine Project involved five towns where the majority population was Aboriginal. The satellite-based telemedicine project from Queensland meant fewer patients had to be evacuated by the Royal Flying Doctor Service. The country has used teleradiology successfully, in places such as the Royal Melbourne Hospital in Parkville, Victoria.

Japan

In Japan, one of the leading countries in the development and utilization of PACS technology, there is a high demand and general acceptance. There are three PACS organizations in Japan, each serving specific purposes in the PACS field. Japan also has a national committee for standardization of image communications. The

considerable involvement of the Japanese government and industry has been important in the development of PACS as in other areas of telemedicine.

The pilot PACS project of Hokkaido University Hospital is financed by the government, as is the one at Kyoto University Hospital. The Kyoto Prefectural University of Medicine developed the world's first HDTV-based telemedicine system. Kyoto is a Tokyo teaching hospital that uses ISDN to receive high resolution images of frozen pathology sections on an HDTV monitor. The pathologists at the university can then analyze the frozen sections by remotely controlling the automated microscope at the rural hospital.

In addition, several teleradiology trials are occurring in Japan. A trial between the Kanagawa Cancer Center and the Kanagawa Children's Medical Center showed that the image quality of a teleradiology system using a digital CCD camera, personal computer and telephone line was diagnostic for most abnormalities on radiological images, including plain radiographs. The system was thought to be useful for radiological consultation between hospitals in the same city as well as between distant areas. Similar results have been reported by the Gunma University Hospital.

Image Management and Communication Systems (IMACS) Abroad

Some European and other countries have begun experimenting with Image Management and Communication Systems (IMACS). Some consider IMACS to be a next-generation PACS; others consider it a new name for PACS, emphasizing image management and integration with other information systems. IMACS are considered patient-oriented systems, in that they are coupled with several medical devices to receive the image data and alphanumeric data from administrative systems, and to transmit that information to other places.

In Trieste, Italy, for example, a PAC system was installed in the radiology department of the Hospital of Cattinara with a remote connection to the Maggiore Hospital, aimed at assessing PACS technology. In 1991 the Trieste PACS project began developing into the Trieste IMACS project, connecting the major hospitals in the metropolitan area. An experimental high-capacity optical archive for long-term storage of diagnostic images and data will be activated in order to integrate the short-term optical archives located in each hospital and allow each hospital to access images and data from the central archive.

Planners expect to develop an integrated system for management of diagnostic images and other data coming from various sources and departments, such as clinical laboratories, pathology, or endoscopy.

International Experiments with Smart Cards

Ontario, Canada, is experimenting with smart cards to reduce unnecessary hospitalizations due to medication contraindications. Greece, which is sponsoring the Greek Telemedicine project at the University of Athens Telemedicine Center, is experimenting with smart cards within the Hellenic Red Cross services to create a portable Health Care File. The file would act as a data base record, and would aid in emergency situations as well as in day-to-day care. Information contained on the card would include personal identification, personal health history, family history, life style and life habits, and current medical problems.

The EC's AIM program is funding several smart card demonstration programs, and is developing standards for an electronic medical record and distributed architectures.

V. **Funding by Source** (To Be Added)

Government Agency Announcements, RFPs
Private Organizations, Foundations, Universities

VI. **Review of Literature in the Field** (To Be Added)

VII. **Review of Communications Technologies, Services, and Modes of Transmission** (To Be Added)

VIII. **Review of Clinical Instrumentation** (To Be Added)

IX. **Survey of Telemedicine Evaluation Projects** (To Be Added)

X. **Promising Applications in the Field of Telemedicine and Health Care Informatics** (To Be Added)

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Hearing on TELEMEDICINE: AN INFORMATION HIGHWAY TO SAVE LIVES

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
UNITED STATES HOUSE OF REPRESENTATIVES

MAY 2, 1994

Eric G. Tangalos, M.D.
Associate Professor of Medicine

EXECUTIVE SUMMARY

Deployment of Telemedicine

It is important to America that national communications policy encourages technology providers to deploy service and support where it is most needed. The promise of telemedicine is to serve the underserved. It must be clearly understood that there will be additive costs to delivering care to those who presently receive none or very little. This includes service to our inner cities, the home bound and the isolated. The family practitioner or public health nurse in the underserved area are the people to who need to learn more about telemedicine and begin to guide its development. Telemedicine applications must be consumer driven. The practice of medicine quickly adjusts to new technology and has already embraced all of the hardware and software that goes with electronic data interchange. However, our public which is usually excited about any breakthrough product, has yet to understand the process whereby telemedicine can provide access and deliver care.

Impediments to Care

The information explosion has surpassed the capabilities of our current regulated communications network. Limitations on the business opportunities of the telephone companies -- whether bans of long distance service, research, design and manufacturing, or interactive video services -- result in patients and healthcare professionals not having the full range of products and services that should be available to them. One of the most difficult hurdles to surmount is connectivity, between local and long distance carriers. The current interLATA restrictions greatly reduce flexibility, responsiveness and creativity. A major barrier to the utilization of telemedicine is the current failure to reach the end user with information about its potential applications.

Policy Issues for Congress

How quickly telemedicine is deployed will be determined by Congress in its support of research, demonstration projects and a national policy which either promotes collaboration or drives private competition. It should also be by congressional mandate that telemedicine projects provide a point of service option for all patients and health plans. By encouraging open systems that compete on quality and cost and are not defined by hard geographic boundaries, we can create a much more robust network with greater accessability and the freedom of choice. The partnerships to make telemedicine work

include the patient, the health care team, local regional and long-distance carriers, and a supportive political and regulatory community. The focus may be on access, but the means to deliver care have not been clearly elucidated. New technology that can be produced and deployed cheaply and effectively to meet economic performance standards will deliver the promise of telemedicine to health care reform.

Reimbursement

An underlying issue that must be addressed before telemedicine can be fully utilized is reimbursement for the medical care which involves advanced communication networks. Currently, only technology-based information transfer (e.g. - reading of transmitted radiological images) is routinely reimbursed by federally-funded health care programs such as Medicare. Many questions must be addressed before this coverage will be offered by regional carriers and third party payers. For example, can the usual requirement for "face-to-face" contact between physician and patient be modified? Is the quality of care provided via telemedicine up to standards of the medical community? The Health Care Financing Administration rightfully asks for outcome studies as it plans its strategy to pay for services but may hold telemedicine to greater scrutiny than what currently defines the daily practice of medicine. There is great hesitancy on the part of many providers to enter the practice of telemedicine given the uncertainty of how these services are to be recognized and reimbursed.

Medicine's Initiatives

The history of telemedicine is relatively short, dating back only to about 1959. As with many new technologies, it has struggled with changing (improving) technology, costs associated with new ideas, and acceptance of new approaches by people accustomed to set ways. As one reviews the literature, however, it is striking how the vast majority of patients and practitioners who actually experience telemedicine find it to be effective and useful. The major focus of these experiments has been on telemedicine as a vehicle for extending high quality medical care to people in remote areas to improve available care and minimize the travel time of health care providers. Rural states have taken the lead in establishing programs to serve the rural and underserved and are supported by federal agencies such as the REA. The Agency for Health Care Policy and Research helped fund a consensus conference carried out during the first *Mayo Telemedicine Symposium*. The consensus statement outlining the guiding principles for the use of telecommunications technologies in the delivery of medical care and information can be found in the body of this report.

TELEMEDICINE

CHALLENGES TO IMPLEMENTATION

Presented to the Subcommittee on Investigations
and Oversight
Washington D.C.
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It is ironic that despite dramatic advances in our ability to care for patients, our ability to translate that knowledge into an accessible, affordable health care system remains an elusive goal. As a result, millions of people have been unable to obtain even the most basic of health care needs. Socio-economic and geographical barriers for patients, compounded by educational isolation for physicians, underline the problems. Providing a patient health care where and when it is needed with an assurance of quality and an economy of cost clearly must be the objective of any health care delivery system. Since the present system does not satisfy these criteria, alternatives are needed. Telemedicine has been proposed as one of those alternatives. However, if telemedicine is to play a significant role, a number of implementation and operational issues will need to be addressed.

Licensure

It is anticipated that, based on the present individual state licensure system, a physician utilizing telemedicine to provide consultative services to a patient would have to be licensed in every state that the patient resided. Given the often burdensome process involved in obtaining state licensure it is unlikely that many physicians will pursue that avenue and, thus, potentially significantly limit the networking capability that this telecommunication system affords.

A number of potential solutions are proposed:

(1) individual state licensure for telemedicine should be converted to a national licensure similar to the military health care system. In fact, since physicians are required to take national examinations for licensure and certification it seems illogical to have a system of individual state licensure

in the first place. Perhaps, in order to assess the impact of such a change, a "national" license could be provided to those physicians who provide telemedicine consultations to patient populations that have been defined as "underserved":

(2) in the instance of a specialty consultation requested by the primary care physician, the referring physician retains responsibility for the care of that patient, and, therefore any "care" provided over telemedicine by the consulting physician in another state could be viewed as recommendations only;

(3) perhaps the most logical way to deal with state licensure requirements is to determine that the patient is, in fact, being "electronically transported" to the physician rather than the physician being transported to the patient.

Another licensure issue that surfaces when considering telemedicine consultations across state lines is whether the Federal Trade Commission would view this as interstate commerce.

Credentialing

Although issues similar to the licensing debate can be raised with reference to credentialing, it would appear that an opinion provided by the Joint Commission on Accreditation of Healthcare Organizations for the Medical College of Georgia telemedicine system could be uniformly applicable. The JCAHO determined that a physician at MCG who provided a telemedicine consultation of a patient at Dodge County Hospital (a rural hospital 130 miles distant from MCG) would not have to be credentialed at that rural hospital as long as any orders written in the patient's chart were by the referring physician at Dodge County Hospital. The consulting physician is not considered the physician responsible for the care of the patient.

Liability/Malpractice

Malpractice liability may prove to be one of the most vexing problems and could impede the general application of telemedicine. Obviously, any analysis of "what might be" will only gain validity from the outcome of precedent setting cases.

Although, to date, we have no evidence of any malpractice activity having been generated by past and present telemedicine initiatives, one can anticipate that as reimbursement becomes a reality, and as medical centers with "deep pockets" who become networked with remote sites are viewed in an "agency" relationship, more attention will be paid to this area by the legal profession. It also should be recognized that those telemedicine systems that utilize digital compression technology to transmit images will have a very special type of liability exposure, namely, that the "data" being reviewed by the consulting physician is not complete! Finally, the inability, at present, for telemedicine systems to allow for actual "hands on" examination of the patient will serve to foster the perception that a telemedicine consultation is incomplete or inadequate.

Clearly, a preventative approach to liability is the best defense. It must be stressed to the physician that if the visual/audio links do not provide adequate information transfer to allow for appropriate diagnostic interpretation none should be made. Videotaping of the entire consultative exchange will provide excellent record keeping and avoid the common pitfall of lack of documentation. Telemedicine systems that provide access to up-to-date references as well as the expanding library of "practice guidelines" now being introduced by the specialty societies will help to address the issue of whether the care provided by the

physician satisfied community standards. Perhaps the doctrine of "sovereign immunity" could be applied to those physicians/medical centers that offer telemedicine consultations to the underserved.

Confidentiality

The transmission of personal and sensitive medical information over communication lines clearly lends itself to electronic intrusion and exposure. Encrypting algorithms will need to be introduced but it is naive to think that even the most sophisticated code could not be broken. Once again legal precedent will determine the standard, but it is likely that if "reasonable and customary" efforts are taken to maintain the security of records this issue will not be difficult to resolve. In fact, if one examines the fairly open access to patient records that prevails in our existing system it can be expected that the electronic transfer of medical information may have more security.

Recordkeeping

As has been noted, videotaping will allow for more accurate, as well as, expanded capture of medical information. However, medical records will exist at both ends of the communication link, thus raising the question as to which record reflects the legal one. How are we going to "edit" the vast amount of information retrieved, and will deletion of "unimportant" components of the patient's history and physical examination be considered record tampering?

Technology - Design/Operation/Maintenance

Today any technology-based system needs to share the following characteristics: (1) adaptability to change; (2) ease of operation, and (3) minimal maintenance requirements.

Changes in communication technology and information processing and management are occurring at a more rapid pace than even the most optimistic predictions. It is essential, therefore, that any multicomponent telemedicine system have an open architecture and modular design that can adapt to upgrades with component replacement rather than system extinction. Technical expertise should be a prerequisite only for the integrator of the system not the people using it. System controls must be user-friendly and incorporated into a single control panel. Every effort should be made to convert the present configuration, in which a separate telemedicine consultative room is utilized, to a more flexible desktop multi-media platform that is accessible to the physician in his/her office. Portability must also be a prerequisite to allow for the deployment of transportable telemedicine units that can service multiple remote facilities on an "as needed basis." System maintenance needs to be the simplest task of all - modularity of system components, telephone dial-up maintenance assessment algorithms, and "strategic" redundancy need to be incorporated into the system design. Most importantly, the design of the system must be dictated by the needs of the end-users not those of the system architect. Functionality must control structure and the technology should have a transparent interface between users.

Operational personnel requirements are minimal. A single FTE at each site can manage system operation, scheduling of the consultations and preventative

maintenance responsibilities. If the base station system is situated in proximity to the emergency department, telemedicine consultations can be made available to the remote rural hospital on a 24-hour per day basis.

Technological Compatibility

It is imperative that equipment manufacturers strive for competitive similarities rather than proprietary constructs. Systems that can't "speak" the same language will never integrate with each other, and, thus, will paralyze network development. Witness the minimal use of facsimile machines prior to the introduction of a common language and the explosion in sales when a common alphabet was introduced.

Value/Economics

Telemedicine must be identified as a value added service to maintain its viability, and central to that objective, is that it be cost effective. Preliminary data from the MCG telemedicine system demonstrates that 81% of the patients who are seen over telemedicine have not required transfer to a secondary or tertiary care center. Given an average cost differential of $500 per day between the rural hospital bed ($800) and that at the Medical College of Georgia ($1300), even a 25% decrease in transfers would be a significant cost savings. Add to that the savings in transportation costs, increased productivity, and the decreased hospitalization days resulting from treating a patient at an earlier stage in their disease process, and it is apparent that the potential savings are significant. Consider also that the health care revenue generated is staying at the rural site thus enhancing not only the fiscal stability of that hospital but also the socio-economic fabric of that community. Finally, in contrast to most

new medical technology. telemedicine systems do not require major capital investments. and the cost of individual components continue to fall as the technology improves. Despite the relatively low cost. however. it is recommended that rural health care facilities. in order to conserve cash flow. lease the system over a three to five year time frame allowing the revenue generated by the anticipated increase in bed census and ambulatory activity to offset the leasing costs. (The leasing contract should provide for component upgrades so that the system always remains at the cutting edge.) Assuming that the average cost of a satellite site if purchased outright is about $160,000. it should be noted that an increase of a single patient to the average per day bed census represents a net cash flow of $150,000/year to the hospital. However. despite the reduced capital expenditure many rural hospitals will still not have the needed start-up funding. If that is the case. then it is recommended that government (local. state and/or federal) provide a loan to "pump prime" these facilities. As revenue is generated the rural hospital will then be able to assume the monthly leasing costs as well as payback the start-up loan.

Educational Value

Perhaps one of the most important applications of telemedicine that will significantly foster its implementation is its capacity to alter the state of professional isolation that now exists for the rural based physician. Telemedicine addresses each of the necessary characteristics of an effective CME experience namely that the information provided is (1) timely. (2) pertinent to the issue. (3) convenient to obtain. (4) repetitive and (5) up-to-date. By providing immediate access to colleagues at the medical center. telemedicine creates an "electronic umbilical cord" between the two facilities. and allows for

a real-time interactive educational experience for the referring physician. As importantly, it helps the academic based consultant to be more aware of, and sensitive to, the needs of the rural-based physician. An added fringe benefit is that, depending on the nature, format and comprehensiveness of the consultative interchange, it is possible to grant category I CME credits to the rural-based physician. The significance of obtaining these credits is underlined by the fact that in many states relicensure is dependent on having accumulated these credits and without this on-site opportunity afforded by telemedicine the process is both inconvenient and expensive.

Communication Costs

Telemedicine systems can interface with a variety of communication modalities (copper wire telephone lines, fiberoptic cable, microwave and satellite) thereby providing maximum flexibility for interconnectivity between sites. One problem with the use of telephone lines, however, is the complex rate structure that exists between LANs that create unrealistic communication costs. Although the introduction of ATM switching and fiberoptic cable will dramatically reduce per use cost, until those technologies are more generally available lower transmission costs for telemedicine will need to be structured to make it economically feasible for rural hospitals to participate.

Motivation for Providers and Patients

It is clear that a number of factors need to be in operation for both physician and patients to use the system, but, perhaps the most fundamental, is for the "users" to recognize a simple paradigm shift. One of the interesting aspects of telemedicine is the perception on the part of both physician and patient that

this technology is futuristic. In fact, it incorporates all "off-the-shelf" technology. The telecommunications, cameras, remote control optics and examination devices are utilized on a day-to-day basis by each of us simply in different settings. With the same technology that allows us to watch a news anchor interact in real time with his/her correspondent in a distant part of the globe, or view through the use of a telephoto close-up lens, a distant landscape in intimate detail, so too can we examine a patient at a remote site.

For the rural based physician other operational motivating issues require that: (1) the time involved in a telemedicine consultation must integrate into his/her daily schedule and, if the physician can not participate in the consultation, a nurse at the remote end would suffice to allow for an effective examination by the consulting physician; (2) the consultation be reimbursable; (3) the consultation not be competitive; (4) continuity of care, by avoiding unnecessary referrals to secondary or tertiary care centers, be increased; (5) the physician's revenue stream be enhanced; (6) the consultation functions as an effective educational experience; (7) the system be easy to use; and (8) most importantly, it be perceived by that physician's patient as an effective consultative exchange.

Many of the critical factors outlined for the rural based physician hold true for the consulting physician. Economy of time, ease of use and a method for reimbursement are obvious needs. Perhaps the most difficult hurdle that telemedicine needs to clear is to satisfy the technical requirements of the consulting physician. To achieve this it is important that the system architect understands those needs prior to designing the system. Resolution capabilities

are critical for the radiologist/pathologist; technological simplicity and user friendliness characterize the need of the mental health care professional, and audio quality of the electronic stethoscope and real time transmission of echocardiograms identify the desire of the cardiologist. Experience from previous telemedicine initiatives have taught us to anticipate that each specialist will come with a different expectation of the systems capability. This needs to be addressed and understood by those who endorse the introduction of telemedicine into the healthcare delivery system.

The ultimate test of the value of telemedicine will be dependent on how the patient perceives and adapts to it. If the patient feels the technology makes the consultation too impersonal; if the telemedicine consultation costs more and is not covered by insurance, and if the patient wants to have the physician literally at their side, telemedicine will not be an acceptable delivery system. In the same manner that there is a learning curve for the physician, we can anticipate a similar situation for the patient. A system that is designed to allow direct eye-to-eye contact, that is easy to use, and that gives the patient the ability to control the interview camera has been shown in previous telemedicine systems to be very "patient friendly." In fact, the patient has perceived himself or herself as being treated in a very special way. In the final analysis it will be the human component at each end of the system - not the technology - that will determine whether it is successful or not. Once again the design of the system must be determined by the needs of the people who use it!

Other Uses

It should be recognized that the telecommunication link between sites can be used for multiple purposes, including administrative meetings, nursing and other allied health educational or direct patient care activities. Telemedicine sites could also be integrated into a state's distance learning initiative so that preventative health care programs as well as acute episodic care intervention can be introduced to the classroom.

Continuous Quality Improvement - CQI

As with any component of the health care system, new or old, there must be regular oversight evaluation to ensure that the objectives for which it was introduced are continuing to be met. Economic viability, quality care, accessible service, appropriate utilization and educational strengths will need to be regularly verified in order to justify the continued operational status of the system.

Conclusion

This paper has attempted to sketch a picture of some of the issues related to the implementation of telemedicine. Whatever new directions or programs we eventually initiate to impact the problems in our health care delivery system it must be coupled with a commitment to analyze and critique them. Despite the feeling that changes need to be made rapidly, solutions cannot come overnight. While tradition can not justify maintaining the present inequities, a new idea can not simply be equated with a proven solution. New programs must be developed to provide the flexibility to accommodate to a wide variety of practice situations and a built-in mechanism to respond to changes in program objectives.

The true measure of the performance of any new system will be whether it effects an improvement in the health of the people it serves. Finally to those of us who believe that telemedicine is a solution close at hand and will require only simple changes we had best heed the words of the philosopher John Gardner. "Social change is a learning process for all concerned. It always requires reeducation of large numbers of people to accept new objectives, new values, new procedures. It can not go forward without the breaking down of long established ways of doing and thinking. This is true whether the problem is one of civil rights, the reform of local government, educational improvement, or urban renewal. Most human institutions are designed to resist such learning rather than facilitate it."

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Joining the American Telemedicine Association will enable you or your organization to become an active participant in an exciting and growing part of this nation's health care system.

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- Access to a network of peers and experts at the interface of technology and medicine
- Subscription to a quarterly newsletter providing timely news about what is going on in the profession and related industries
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- Access to a clearinghouse of information regarding current projects, resources and special reports
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Individual physicians and allied health professionals who are interested in telemedicine research, education, development and services are encouraged to become members of the American Telemedicine Association. Annual dues for individual members are $125.

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Full membership applications are available from the address listed below.

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AMERICAN TELEMEDICINE ASSOCIATION

Working to promote the development and deployment of telemedicine to help all people gain access to advanced medical care

WHAT IS TELEMEDICINE?

In the strictest sense, telemedicine means live, two-way audio and video communication with patients, physicians, other health care providers, and medical institutions. It includes using telecommunications to link health care specialists with clinics, institutions, peer physicians and patients in distant locations for diagnosis, treatment, consultation, transfer of medical data, and education.

The use of telecommunications technology to assist in delivering medicine is growing rapidly. From initial demonstrations in the 1950s, telemedicine projects are now underway in over 20 states. These projects range from using closed circuit television to bring medical care to patients a few miles away to using satellites to provide medical advice and training to health care professionals in another country.

Telemedicine is widely recognized as a critical part of health care reform. It holds the promise of more equitable access to advanced medical care for rural communities and homebound populations, reducing the cost of health care delivery, providing medical education to health professionals in remote locations, and increasing opportunities for health education to all populations.

MISSION

The American Telemedicine Association (ATA) promotes professional, ethical and equitable improvement in health care delivery through telecommunications technology and enhanced broad-based community telecommunications applications. The association implements these objectives by:

- Promoting telemedical research and education
- Assisting in the development of telemedical policy and standards
- Advocating for the recognition by governments and the health care community of telemedicine as an essential element in delivering modern medical care
- Providing education to public and professional organizations
- Interacting with world-wide communications systems
- Serving as a clearinghouse for telemedical information and services
- Supporting local health care system initiatives in telemedicine, especially in medically underserved areas

ATA BOARD OF DIRECTORS

The American Telemedicine Association

Dear Colleagues:

There is an exciting development in medicine -- cost feasibile, interactive video healthcare delivery via telemedicine. While not new, telemedicine is now cost feasible, even cost beneficial, with proper planning. There is now a new organization founded by healthcare experts in the field -- the American Telemedicine Association. The Association addresses cutting edge approaches to telemedicine through coordinating education, clinical standards, governmental and organizational efforts. The opportunity is offered you to support the work of this organization in advocating for quality standards, expanding new markets for the American health care community and advances in the delivery of quality medical services. If you are interested, **take advantage of this invitation to join the American Telemedicine Association.**

Telemedicine has been called the wave of the future for American health care. The provision of medical consultations, imaging, diagnosis, and related health procedures via long distance telecommunications holds the promise of more equitable access to advanced medical care. Telemedicine can reduce the cost of health care delivery, provide medical education to health professionals in remote locations, and increase opportunities for health education to all populations. For the American health care professionals and institutions, telemedicine provides an enormous opportunity for expanding health care markets throughout the country and throughout the world.

Last year a group of prominent physicians and professionals in allied disciplines established the American Telemedicine Association (ATA). ATA promotes professional, ethical and equitable improvement in health care delivery through telecommunications technology. **A new organization in a new, exciting field, ATA is helping to define the future for telemedicine.** Through education, research, advocacy, and the establishment of standards, ATA is striving to assure telemedicine becomes a recognized and standard part of modern health care in the future.

ATA members support the work of this organization and will receive opportunities to network and learn from experienced professionals in telemedicine through various meetings, newsletters, and other publications planned over the next year. **In less than a year of operation the American Telemedicine Association has been recognized by Congress, federal agencies, and corporate leaders as a respected authority in this "cutting edge" field.** ATA has taken the lead in advocating for such changes as Medicare and Medicaid reimbursement for telemedicine; creation of medical licensing, liability, and tele-clinical standards; and the deployment of American health care expertise internationally through telecommunications transmissions.

By completing the enclosed membership application and paying yearly dues of $125 you can become part of this exciting new chapter in American health care.

Sincerely,

Dr. Jane Preston

Jane Preston, M.D., F.A.P.A.
President

1700 One American Center, 600 Congress Avenue, Austin, Texas 78701
(512) 480-2247, Fax (512) 480-2248

INDIVIDUAL MEMBERSHIP APPLICATION

American Telemedicine Association

DEMOGRAPHIC DATA

☐ Female

☐ Male

Name: Last First Middle

Office Address: Street City State Zip Phone

Mailing Address: Street City State Zip Phone

Social Security Number Other names in which you have conducted business

Fax Number Email Address

PROFESSIONAL DATA

License Number State Date of Issue

Other License Numbers States Dates of Issue

Primary Specialty: _____

Board Certifications:
Specialty Board Name Certification Date

Primary objective in joining ATA: _____

Personal goals regarding telemedicine: _____

Has your membership in any professional organization ever been terminated for cause other than non-payment of dues? _____ If yes, please give details on additional sheet.

TELEMEDICAL DATA

Percentage of Time Devoted to These Activities:

_____ Administration _____ Research _____ Clinical Practice

_____ Supervision/Teaching _____ Other

If you are located in, or affiliated with a rural community, please state location, population, and availability of physicians, if known:

_____

_____

Where did you first learn about the American Telemedicine Association?

_____

Were you referred by a colleague? ☐ yes ☐ no

Other Professional Memberships:

_____

_____

AUTHORIZATION

I hereby apply for membership in the American Telemedicine Association and, if accepted, agree to abide by and be subject to terms and conditions of the Constitution and Bylaws of the American Telemedicine Association.

In consideration of the American Telemedicine Association processing my application for membership, I grant permission and consent for you to obtain from any appropriate source, all relevant information concerning my credentials and qualifications.

I hereby release and hold harmless from any liability or loss the American Telemedicine Association, its officers, agents, employees, and members for acts performed in good faith and without malice in connection with evaluating my application and my credentials and qualifications, and hereby release from any liability any and all individuals and organizations, who in good faith and without malice provide information to the above named organization, or to their authorized representatives concerning my professional competence, ethical conduct, character, and other qualifications for membership.

Signed _____ Date _____

Please mail this application with annual dues payment of **$125** to:

The American Telemedicine Association
1700 One American Center
600 Congress Avenue
Austin, Texas 78701
(512) 480-2247
Fax (512) 480-2248

PHOTOCOPY
PRESERVATION

To Melanne

Please follow up — H

file

TO: Hillary
FROM: Melanne

RE: Dr. Koop and Telemedicine

It appears that Dr. Koop has been recruited by the "Baby Bells" to lend his considerable stature to their efforts to get legislation passed which could enable them to engage in all long distance services. They have made representations to him that without these new powers, advances in health related technology will suffer.

What follows is a brief summary of the issue:

- There are growing numbers of transmission companies like AT&T, MCI and Sprint who offer long distance service. These long distance carriers and others are offering breakthough telemedicine and other health services. There is no shortage of health-related players and no legal inhibition of their activities. The Bells are currently forbidden from offering long distance service because they have local monopolies. There is legislation pending that addresses the competitive aspects of communications; the bills would allow the Baby Bells into some long distance services.

- In the House, HR 3626 includes both a Judiciary (Brooks) and a Commerce (Dingell) version. One of the areas covered in the bill would allow the Baby Bells into the area of "incidental inter LATA relief" -- which includes aspects of health information. The Brooks and Dingell versions both have this feature -- although Dingell is stronger. The bill is pending for floor consideration.

- In the Senate, the Hollings bill is S 1822. It too provides for "incidental inter LATA relief" but is more narrow. However, more fundamentally, the Baby Bells don't like the Hollings bill, and are aggressively opposing it, because they view it as too restrictive of their overall access to long distance services (and not for any reason to do with health information services).

- There is a view that if communications reform (which the Administration supports) fails, it will be because the Baby Bells worked to kill the Senate bill. In short, the legislation does allow the Bells to expand into health information; however, the Bells' real interest is their bigger goal of unrestricted entry into long distance service.

- In terms of telemedicine and other health technology, it is a booming field and no one else is arguing about legal constraints.

Suggestions:

- OFL should not get involved in the overall telecommuniations bill; it's a hornet's nest.

- We can tell Koop we've consulted and the best thing for the Bell's technology advances is for the overall legislation to pass.

- We should find some exciting telemedicine projects you could be invited to participate in and invite Koop. We have a former staffer on the health care team who left to work in the House. He has been working with many of the health information technology companies and is anxious for us to do an event.