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TELEMEDICINE TECHNOLOGIES

HEARING

BEFORE THE

SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

SEPTEMBER 15, 1999

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ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

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CONTENTS

TELEMEDICINE TECHNOLOGIES

WEDNESDAY, SEPTEMBER 15, 1999

U.S. SENATE,
SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:30 p.m. in room SR–253, Russell Senate Office Building, Hon. Bill Frist, Chairman of the Subcommittee, presiding.

Staff members assigned to this hearing: Floyd DesChamps and Elizabeth Prostic, Republican professional staff; and Jean Toal Eisen, Democratic professional staff.

OPENING STATEMENT OF HON. BILL FRIST, U.S. SENATOR FROM TENNESSEE

Senator FRIST. The Subcommittee on Science, Technology, and Space, hearing on telemedicine technologies, will come to order. I want to thank all of our witnesses today, who will be both presenters and discussants of a field that is really fascinating, and one that I think has as much potential as we find here today, some realized applicability in practice today, but also tremendous potential in terms of more efficient use of resources, more effective use of resources, that we have in medicine today. So right at the outset I want to thank all of you for coming and spending time with us.

I mentioned just prior to the hearing, to my colleagues that had just left a lunch who basically said, these are the sorts of questions that I really want to know the answers to, and some of these questions I will be able to ask today, and some we will submit for the record as well, but I wanted to share with you their enthusiasm about a field that you are recognized experts on but which, as I look back to my career before coming to the Senate, being a physician leads me to be very enthusiastic in my support for all that you are doing.

Today's hearing on telemedicine technologies really is at the heart of my own personal interests, both curiosity and profession. It really is the cross-section of medicine, of emerging technology, of the delivery in a very direct way, improved patient care, reaching out to people, many of whom could not be reached otherwise.

Our purpose today is straightforward, and it is to explore the technological barriers to telemedicine, as well as to educate ourselves about the core principles that surround this multidisciplinary field.

The multidisciplinary aspect reflects the great potential, but also introduces, as we will hear today, many of the challenges to techno-

logical development. The technology has grown tremendously, even over the last 6 years, since I actively practiced medicine in the field of thoracic surgery, challenges to not just the evolution of technologies, but then the application of those technologies at the dissemination of that manner, that system of delivery of technologies as well as issues that are becoming increasingly important as we share information over distances, and that brings up the issue of privacy.

Throughout the course of the hearing today, we will hear about a number of the activities that are ongoing. We will hear a little bit about the whole spectrum, from creation to the application itself. We will hear from scientists and administrators who are out there pushing forward this technology in all sorts of areas, from the urban areas, which we will hear about today, and—which an area to me is very exciting, the rural areas, areas of health shortage.

As I traveled around the State during our August recess, I had the opportunity to talk to a number of people in the rural communities around Tennessee and learn a little bit about what they are doing. As the way medicine is practiced changes, the opportunity is very apparent as to the great potential for telemedicine.

I think it really does have the opportunity to lower cost, and numbers that have been presented are an estimated $36 million in savings, by patient monitoring or consultations, but it can also revolutionize our entire health care delivery system in that we find a better way to deliver existing resources that are there by operating more effectively through telemedicine, using them so that we get more value for those existing resources.

Again, we have barriers to address. They are technical, they are administrative, all of which will come out today. There are numerous challenges, and I look at it parallel to when we just started using fiber optics to do laparoscopic type surgery, or thoracoscopic type surgery, that initially there was some resistance to it.

I remember the first presentation at a grand rounds—I happened to be in Tennessee—of the first laparoscopic cholecystectomy, removal of the gall bladder, the huge resistance to a new technology, the fiber optic core, opened up a whole new world that people were resistant to. General surgeons such as myself, and thoracic surgeons, very resistant to that change that new technology opened up, and we have seen a huge revolution in the past 10 years in this thoracoscopic fiber optic minimally invasive surgery.

Government does have a role, a role that again we need your suggestions as we go forward in terms of the privacy issues, in terms of the licensing issues, in terms of the issues of working across the States, which we will hear about today.

Our goal today, and I do not want to keep belaboring it, is to learn more about it and learn more about the challenges we are going to encounter. I will shortly introduce our panel. I want to turn to Senator Wyden, who has worked very closely with me, I met with him on a number of issues in the past, somebody who has been a real advocate in health care issues and in rural health issues, Senator Wyden.

STATEMENT OF HON. RON WYDEN,
U.S. SENATOR FROM OREGON

Senator WYDEN. Thank you, Mr. Chairman. I think you have made an excellent statement, and I will be very brief.

I will tell you that from this vantage point this looks like another opportunity for an EDFLEX style coalition. You know, we teamed up, as you know, on getting the only major education bill through so far this session, and certainly you have given an excellent statement, and I will just highlight a couple of points.

I think one of the additional challenges, Mr. Chairman, is to try to address exactly what the role of the Federal Government ought to be and what the role of the States ought to be, because it is clear that there are so many impressive activities taking place, and as we try to integrate this into a coherent kind of policy it seems to me we have to try to identify some of the elements where the Federal Government takes the lead and areas where the States are in a better position to lead.

For example, I think we have all heard from providers at home that reimbursement is very limited in many areas of telemedicine. It seems to me that is an appropriate area under Medicare and Medicaid where the Federal Government has an appropriate role and clearly could be a leader in.

With respect to States, it seems to me the system of licensure at the State level is an appropriate process. That is the way it has historically been done. I think we ought to leave it that way, but perhaps there is a way to share, for example, information among the States with respect to licensure.

My home State of Oregon is very proud of how they have handled the licensure issue. What we have stipulated at home in Oregon is a physician outside Oregon is seeing patients who are residents of Oregon through telemedicine. The physician need only register with the State Licensure Board.

That way we sort of have a midstream kind of approach where we do have adequate oversight and accountability, but we are not seeing some of the jockeying between the States that has contributed to some tensions, and I just offer that up as the kind of issue that I think we have to deal with as we look to a telemedicine kind of policy, is to try to figure out exactly what the Federal Government has an appropriate role and what the States have an appropriate role in.

The other area, Mr. Chairman, I would mention, and perhaps our witnesses can touch on as well, is what, if any, policy ought to be articulated with respect to Web sites and health Web sites, and it seems to me what we are hearing from providers in this area is essentially two concerns.

One, I think there is a concern among some providers that individuals may be practicing medicine without a license through some of these Web sites, and this is an area that may involve even the Federal Trade Commission. If people are, in effect, misrepresenting their services and their products perhaps the FTC, the FDA, HHS ought to be involved.

But I will tell you, I have a growing concern about that. The other concern I have is whether or not on health Web sites there ought to be some disclosure of commercial interests. It seems that

there is a growing concern that the public is having difficulty sorting out Web sites that are in effect offered and operated by individuals that are essentially of a nonprofit nature, and distinguishing those from Web sites where in effect there is an effort to make profit, and so be it.

The question is, should there be some disclosure, for example, so that people who in effect visit those Web sites know exactly what kind of site they are talking about, but just as you say, there are many challenges, and this is such an exciting field with such promise, and I thought your opening statement was excellent, and I would very much like to work with you on this in the days ahead.

Senator FRIST. Thank you. I am going to introduce our panel of speakers just very briefly, and feel free to enumerate or elaborate upon your credentials or positions, because it is a fascinating group.

I am going to introduce you in alphabetical order, and why don't we proceed in alphabetical order. Try to keep your statements to about 5 minutes, which I know will be very frustrating. It is more frustrating for us, especially when you have such excellent testimony, which I have had the opportunity to review.

The witness' entire written testimony will be made a part of the official record.

Dr. James Brick, who is chairman of West Virginia University's Department of Medicine, a rheumatologist, will open; followed by Dr. Sam Burgiss, Manager of Telemedicine at the University of Tennessee Medical Center; Dr. Richard Ferrans, Chief of Medical Informatics and Telemedicine at the Louisiana State University School of Medicine; Dr. Ron Poropatch, a Board Member of the American Telemedicine Association, and practicing physician, pulmonologist and critical care medical specialist; and Mr. Aaron Waitz, Vice President and Chief Technical Officer of the Health Imaging Division at the Eastman Kodak Company.

Senator Breaux, who had planned to be here but had to return to take care of a very urgent matter, is not going to be with us today and asked me to extend a warm welcome to Dr. Ferrans' mother, who happens to be here as well today, so I wanted to recognize her as well. I will not make you stand up. Put a hand up in the air, Dr. Ferrans' mom. It is good to have you here.

I also want to recognize Dr. Brick, who has testified before this Subcommittee during our last hearing, which I guess was 2 years ago, and we appreciate your being back with us.

With that, let us go ahead in alphabetical order out of convenience, and we will begin with Dr. Brick.

STATEMENT OF DR. JAMES BRICK, CHAIRMAN, DEPARTMENT OF MEDICINE, WEST VIRGINIA UNIVERSITY

Dr. BRICK. Thank you, Senator Frist and members of the Subcommittee. I want to thank you all for inviting me again to come and speak to you about our telemedicine experience in West Virginia with Mountaineer Doctor Television.

As of today, 19 MD telemedicine sites are present in West Virginia, and these include service centers that we call hubs for specialty care in Charleston, West Virginia, at the Charleston Medical Center, and also at WVU, where I come from, at the Robert C.

Byrd Health Sciences Center. Five more sites are planned to be added by the end of this year.

When MDTV first went into operation in 1992, and at the time that I was before the subcommittee the last time, with the help of Federal funding, the cost of both the equipment and telecommunications were very high. We had equipment in each site that was about $100,000, and the cost of our T1 phone lines that we were using at that time were anywhere between $1,200 and $3,000 a month, and these things have improved significantly since then.

Today, the same equipment, depending upon the need and the number of medical peripherals—say, for example, electronic stethoscope, things like that—can cost between $10,000 and $60,000, so that is a lot better than it was before.

Telecommunications costs have also improved significantly for us. We are very fortunate to have enlightened lawmakers in West Virginia who have been able to negotiate very reasonable and fair telecommunications rates for us, and they have come down significantly as well. We would like to see them lower, though, I will say that.

Who benefits from MDTV, and who has really been the benefactor of this program in the last 7 years since we began it? Patients, rural physicians, the rural hospitals, and the University in Morgantown and Charleston Area Medical Center our really important partner, have all benefited from this.

Patients have almost uniformly, and we have surveyed them about this, been pleased with this service and really appreciate the savings to them in time and money. It gives them access to things in their rural communities that they just cannot get at home. Doctors like it for the specialty backup that is so often lacking in small communities.

Medicine now is practiced as a team, and is very different than it was 50 years ago. We train people in areas where they have a lot of specialty expertise, a lot of backup and help, and then we send them to small communities and they do not have that. But by using telemedicine we can avail them of those services, and they have backup, and that really means a lot to people.

The continuing medical education that we give our doctors and nurses and other health care providers over the network is also very important, and in almost every State now this is needed to maintain licensure and it can involve travel over long distances to keep up with that, and our people in West Virginia can get this. Almost every day through the network we have some educational programs.

Rural hospitals also benefit from MDTV, because they can keep the patients in the communities who might otherwise need to be transferred out to larger hospitals.

We really believe that we need to have a strong network of small rural hospitals and clinics in West Virginia and all over the country, but in order for that to happen as much care as possible has to be kept in local communities. We think that for many of these locations the ability to use telemedicine has also become a powerful recruitment tool for gaining medical staff.

One of the hospital administrators in West Virginia, one of the smaller rural hospitals who has been one of our co-partners in this

enterprise for many years told me sometime ago that he had been able to recruit an internist to come to his small hospital because he had this kind of a hookup. He thought that was one of the things that allowed him to get this fellow to come in there.

WVU, the School of Medicine, also uses MDTV to allow us to send our medical students out to rotate in rural clinics and hospitals, hopefully to encourage them to think about considering a rural practice, and it is also important for us to allow them to stay connected with the academic medical center. This is very important, because the accrediting agencies that we have to deal with in medical education require that we have close contact with the students.

As with any new technology there are still issues that need to be resolved, and for us most of the issues are related to reimbursement, and I would like to highlight those just very briefly.

The network sites that are not located in HPSA's, health professional shortage areas, do not qualify for Medicare reimbursement. That is a problem. These networks are set up in complicated ways, and it would be good if we could get better spread of the reimbursement.

The new 75/25 fee-sharing policy between referring and consulting specialists requires that on the consulting end there be a physician, a PA, a nurse practitioner, nurse midwife, clinical nurse specialist, clinical psychologist, or clinical social worker involved. Most of our telemedicine encounters in West Virginia do not involve on the referring end that high a level of sophistication.

We use a lot of registered nurses on the sending end, and we use LPN's, and for me as a rheumatologist that is just fine for me. I can get a lot of information from having a nurse there, and I do not need necessarily a PA or a nurse practitioner, and that would be a big help if we could get that changed.

The CPT codes for telemedicine reimbursement we think are also too limited. For example, telepsychiatry is not covered, and in some areas of the country telepsychiatry has been a very important use of this. I do not know where we are now with this, but I know in the past, for example, in Montana, there was a really big use of this, and my understanding is that telepsychiatry is not covered in the current CPD codes. That would be a real help.

The level of reimbursement we have for these services is very low and we think deters physicians from using the technology, and we really need some reimbursement for the technical aspects of this service. We still do not have that. This is not a cheap thing to do, and people are putting together pieces of "this and that" to pay for the technology. We need some reimbursement for that.

Universal reimbursement for telemedicine is also needed, and I believe it should be mandatory for all third party carriers to reimburse for telemedicine encounters.

West Virginia University's goal continues to be providing increased access and better care to the people of West Virginia. We believe that we have to make every effort that we can to capitalize on telemedicine's potential in this area. Even though we are very encouraged about the future of telemedicine in West Virginia, you must recognize there are still barriers, and most of the barriers we believe are related to reimbursement and paying for this.

I am going to stop now. You have a detailed statement from me, and at the end of the panel, if I can answer any questions I will be glad to. Thank you for letting me come up.

[The prepared statement of Dr. Brick follows:]

PREPARED STATEMENT OF DR. JAMES BRICK, CHAIRMAN, DEPARTMENT OF MEDICINE, WEST VIRGINIA UNIVERSITY

Mr. Chairman, members of the Subcommittee, I thank you for inviting me to talk with you today about telemedicine technologies and our experiences at West Virginia University's Mountaineer Doctor Television program. Chairman McCain and subcommittee chairman Frist, I congratulate you for your interest in bringing the advantages of modem telecommunications to address the special challenges of rural health care.

MDTV, Mountaineer Doctor Television, is a two-way interactive audio and video system that uses ISDN PRI and BRI digital telephone lines for transmission It allows a physician specialist at the West Virginia University Health Science Center in Morgantown to see and talk with a patient at a distant site. The patient and the community physician also see and hear the university physician, just as though they were in an exam room together.

As of today, nineteen MDTV telemedicine sites dot the state of West Virginia, including service centers with specialty care located in Charleston (CAMC) and in Morgantown (RCBHSC). Five more are planned by the end of 1999. When MDTV first went into operation in 1992, the cost of both the equipment and tele-communications were high: $100,000 per location covered the cost of equipment, and anywhere between $1,200 to $3,000 dollars per month was spent for T-1 digital telephone lines. Today, the same equipment, depending on the need and number of medical peripherals (like an electronic stethoscope), can cost between $10,000 to $60,000 dollars. Telecommunications cost have also improved. We are fortunate to have enlightened lawmakers in the state of West Virginia who have negotiated reasonable and fair rates for telecommunications. A digital ISDN, PRI line costs $416 dollars a month with a per minute usage rate. The rate for telemedicine at 512 kbps is $30.00 per hour. The rate at 384 kbps, (a rate used for educational and administrative events), is only $22.50 per hour. Our utilization of the system is a history of steady growth. Medical education has consistently been our networks number one user. In 1998, over 1036 hours of medical education and 209 hours of administrative teleconferencing topped the use of the network over 146 hours of clinical care. However, that 146 hours of clinical care translates into over 680 patients seen. Over all, 1,929 individuals have taken advantage of the specialty doctors via MDTV. This year we anticipate to see 850 patients over MI/TV.

There are many kinds Of health problems for which a visual presentation of the patient is invaluable for a sound diagnosis. In my own field of Rheumatology, MDTV enables me to assess a patient with arthritis in a way that a verbal description over the phone would never do. In many fields, ranging from dermatology to emergency medicine, actually seeing the patient is often indispensable. Who has benefited from MDTV over the past seven years? Patients, rural physicians, rural hospitals, and the University have.

Patients get the advantage of seeing a specialist without having to travel for hours to a major medical center. A patient in pain might find such travel too demanding. Patients may not be able to take a day off work, and some patients don't have transportation and depend on family or community transportation. For patients in need of immediate attention, the delay involved in travel might put their lives in jeopardy.

Rural doctors benefit form MDTV because it gives them the same level of professional support that doctors in urban or academic centers take for granted. These rural doctors see every kind of problem, but they simply can't be an expert in everything. Working with our specialist gives them the security of knowing the they are doing the absolute best for their patients. MI/TV also provides Continuing Medical Education which is needed for physicians to maintain their medical licenses.

Rural hospitals benefit from MDTV because they can keep patients in the community who might otherwise have to be transferred to larger hospitals, are to have a strong network of rural hospitals and clinics, we must keep as much of the care in the local community. For many of these locations, the ability to use telemedicine becomes a powerful recruitment tool for gaining medical staff. WVU also uses MI/TV to allow medical students to rotate in rural clinics and hospitals, hopefully to encourage them to consider a rural primary care practice as-well-as staying connected with the academic medical center.

As with any new technology, there are issues to be resolved. Equal access to health care may never be realized in West Virginia or the nation as a whole without changes to the currant Medicare roles regarding telemedicine reimbursement. Network sites not located in rural Health Professional Shortage Areas (HPSA) do not qualify for Medicare reimbursement The new 75/25 fee sharing policy between referring and consulting specialist requires the Consulting specialist to bill for the telemedicine encounter, but this is only possible if the Physician, PA, NP, Nurse midwife, Clinical Nurse Specialist, Clinical Psychologist or Clinical Social Worker is involved. Most of our telemedicine encounters involve a health care provider (RN, LPN) and therefore do not qualify for reimbursement.

The CPT codes for telemedicine reimbursement are too limited. For example: Telepsychiarty is not covered.

The level of reimbursement is extremely low and deters physicians from using the technology. Universal reimbursement for telemedicine is needed.

It should be mandatory for all insurance companies to reimburse for telemedicine encounters.

West Virginia's goals continues to be directed toward providing increase access and better care to the people of rural West Virginia. We must make every effort to capitalize on telemedicine's potential. Utilization numbers are growing steadily and telemedicine services are becoming an "expected" part of the health care services in rural communities. Even though we feel much encouraged about the future of telemedicine in West Virginia, we must recognize that barriers still exist. These barriers are for the most part, universal, and address issues like licensure, confidentiality, the need to have on line patient records. These issues continue to be important, but until we address the reimbursement issues and reducing the disparity of line charges in health care, nothing else will matter. We need government and business working together toward this outcome. We strongly suggest the split fee from the Federal Health Care regulations to be removed and that we find ways to reimburse the overhead costs of the telemedicine systems (mainly in the rural area, but also with the consulting doctor or organization as well) just as we do with physicians offices. The process needs to be simple and support the use of telemedicine as any other "tool" used to deliver health care.

Thank you Mr. Chairman and members of the Subcommittee for your time and understanding.

Senator FRIST. Thank you, Dr. Brick. We will be using the lights, and then if there are points we did not have time to get in the question and answer we will have time to make those as well.

We will go in alphabetical order. Dr. Burgiss, again, welcome.

STATEMENT OF DR. SAM BURGISS, MANAGER, DEPARTMENT OF TELEMEDICINE, UNIVERSITY OF TENNESSEE MEDICAL CENTER

Dr. BURGISS. Thank you, Senator Frist. Thank you for the opportunity to be here and testify at this hearing. You and the other members of the Subcommittee have been provided a folder with photographs that relate to this discussion. The University of Tennessee Telemedicine Network at Knoxville provides care to the people of East Tennessee. Patients can receive medical care in their community hospitals and clinics, and in their homes.

The beautiful mountain ridges in East Tennessee and rivers between these ridges create barriers to medical access. Low income and a fear of driving in the city increase the medical access problem.

In 1995, the University of Tennessee Medical Center at Knoxville established the UT Telemedicine Network. Since that time, the network has increased in patient encounters by an average of 178 percent per year. Services offered include clinical consultations, homecare, and family visits. Clinical consultations provide specialty care in communities where it is not otherwise available.

To begin a telemedicine program in a community, we first ask the medical leaders in that community to identify the needs of their patients. Next, we consider the patient's medical needs and how these would be addressed in a telemedicine clinic, and the needs of a care provider during consultations with the patients. Finally, we address the technology.

Medical need of the patients drives the process, not technology. We do not practice telemedicine, we practice medicine. When a telemedicine clinic is scheduled a physician or other care provider is at the UT telemedicine exam room in Knoxville and patients are in the telemedicine exam rooms in their community hospitals and clinics.

The first patient is seen by connecting the UT exam room to his or her community exam room using audio and videoconferencing equipment. The UT Telemedicine Network does everything possible to make the patient and the care provider feel that they are in the same room, and to provide them with the privacy of a traditional exam room.

The Electronic medical instruments are provided to assist the provider in evaluating the patient. A nurse is in the community exam room with the patient to present him or her to the provider. The provider is given the patient's medical records, diagnostic test data, and standard office forms that are used in the provider's practice. The physician's written prescriptions are faxed from the UT exam room to the community exam room, and are handed to the patient as if the patient and provider were in the same room.

After the first patient is examined in the clinic, the provider electronically exits from the patient exam room and prepares notes on the evaluation. These notes are sent to the community physician who referred the patient so that the two providers can coordinate care.

While the provider has been busy completing the notes for the first patient and reading the record of the second patient, a nurse or a medical assistant with the provider has switched the network to the community exam room for the second patient. The provider electronically enters the second room when the patient and the presenting nurse are ready.

As can be seen, telemedicine clinics are operated as a virtual office. The provider at the UT telemedicine exam room is switched from one community exam room to another as if he is going from one exam room to another in a traditional office.

Patients benefit because they do not have to leave their community to obtain the needed medical care when it is suitable to provide this care by telemedicine. Community physicians and health care facilities benefit because the patient is kept in their town where they can participate in this care, including tests and procedures.

The patient's community benefits because the patient is purchasing more medical services in the town and not spending money in the city during trips to get medical care. In addition, the community does not lose the productivity of the patient from his or her employment.

The UT Telemedicine Network has offered clinics in dermatology, anesthesiology, psychiatry, surgery, physiatry, cardiology, neu-

rology, and gastroenterology. In each of these clinics, the providers only offer services that are appropriate by telemedicine.

Evaluation of care by patients showed that 68 percent rate "seeing the doctor" by telemedicine as better than a traditional office visit due to the focused attention of the care provider. In addition to clinical telemedicine, homecare is an important part of the UT Telemedicine Network.

We have provided over 500 homecare visits in our telemedicine Home Touch program since April 1998. These are similar to clinical evaluations, except the patient is in the home and the nurse is the typical care provider. Patients benefit because the care can be obtained quicker and independent of weather. Evaluations of care by home patients have shown that 100 percent are comfortable with talking to the nurse, and are willing to use telemedicine again.

After having telemedicine for 9 months, one patient said, "I'd probably done been in the hospital for 9 or 10 days without telemedicine." His statement was based upon his previous experience prior to telemedicine.

Another patient's family said, "When we need medical help, we need it right now, not an hour later."

The cost savings per visit has averaged $49 by removing the nurse travel time and transportation expense. Typical equipment costs in the home is equivalent to the costs saved in 35 visits. Using homecare telemedicine for only 10 percent of the visits in the United States has the potential to save over $1 billion a year. Telemedicine can decrease the cost and improve the delivery of homecare, with benefits for patients and providers.

When a patient is sent to see a specialist too early in the disease process, the cost of care increases. In research done by our program, the cost of care for skin diseases in a community without a dermatologist was twice that of care with a dermatologist provided by telemedicine. The correct level of medical care at the correct time results in the least cost.

As Dr. Frist mentioned, we need the efficiency improvement in medical care here in the United States. A portion of the medical cost that could be saved by telemedicine providing the correct level of care in clinics and homes should be applied to the facility cost of providing this care.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Burgiss follows:]

PREPARED STATEMENT OF DR. SAM BURGISS, MANAGER, DEPARTMENT OF TELEMEDICINE, UNIVERSITY OF TENNESSEE MEDICAL CENTER

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tients. Finally, we address the technology. Medical need of the patients drives the process, not technology. We do not practice telemedicine. We practice medicine.

When a telemedicine clinic is scheduled, a physician or other care provider is in the UT Telemedicine Exam Room in Knoxville and patients are in Telemedicine Exam Rooms in their community hospitals and clinics. The first patient is seen by connecting the UT Exam Room to his or her Community Exam Room using audio and video conferencing equipment. The UT Telemedicine Network does everything possible to make the patient and the care provider feel like they are in the same room and to provide them with the privacy of a traditional exam room. Electronic medical instruments are provided to assist in evaluating the patient. A nurse is in the Community Exam Room with the patient to present him or her to the provider. The provider is given the patient's medical records, diagnostic test data, and standard office forms used in the provider's practice. The physician's written prescriptions are faxed from the UT Exam Room to the Community Exam Room, and are handed to the patient as if the patient and provider were in the same room.

After the first patient is examined in the clinic, the provider electronically exits from the patient exam room and prepares notes on the evaluation. These notes are sent to the community physician who referred the patient so that the two providers can coordinate care. While the provider has been busy completing notes for the first patient and reading the record of the second patient, a nurse or medical assistant with the provider has switched the network to the Community Exam Room for the second patient. The provider electronically enters the second room when the patient and the presenting nurse are ready.

As can be seen, telemedicine clinics are operated as a "virtual office." The provider in the UT Telemedicine Exam Room and is switched from one Community Exam Room to another like a provider going from exam room to exam room in a traditional medical office. Patients benefit because they do not have to leave their community to obtain the needed medical care when it is suitable to provide this care by telemedicine. Community physicians and health care facilities benefit because the patient is kept in their town where they can participate in the care including tests and procedures. The patient's community benefits because the patient is purchasing more medical services in the town and is not spending money in the city during trips for medical care. In addition, the community does not lose the productivity of the patient from his or her employment.

The UT Telemedicine Network has offered clinics in dermatology, anesthesiology, psychiatry, surgery, physiatry, cardiology, neurology, and gastroenterology. In each of these clinics, the providers only offer services that are appropriate by telemedicine. Evaluations of care by patients show that 68% rate "seeing the doctor" by telemedicine as better than a traditional office visit due to the focused attention of the care provider.

In addition to clinical telemedicine, homecare is an important part of the UT Telemedicine Network. We have provided over 500 homecare visits in our telemedicine Home Touch TM program since April 1998. These are similar to clinical evaluations except that the patient is in the home and a nurse is the typical care provider. Patients benefit because care can be obtained quicker and independent of weather. Evaluations of care by home patients have shown that 100% are comfortable with talking to the nurse and are willing to use telemedicine again. After having telemedicine for nine months, one patient said, "I'd probably done been in the hospital for 9-10 days" without telemedicine. Another patient's family said, "When we need medical help, we need it right now, not an hour later."

The cost saving per visit has averaged $49 by removing the nurse travel time and transportation expense. Typical equipment cost in the home is equivalent to the cost saved in 35 visits. Using homecare telemedicine for only 10% of the visits in the United States has the potential to save over a billion dollars. (National Association of Home Care, www.nahc.org) Telemedicine can decrease the cost and improve the delivery of homecare with benefits to patients and providers.

When a patient is sent to see a specialist too early in the disease process, the cost of care increases. In research done by our program, the cost of care for skin diseases in a community without a dermatologist was twice that of care with a dermatologist provided by telemedicine (Burgiss, et.al. Telemedicine for dermatology care in rural patients. Telemedicine Journal, 1997;3:227-233.) The correct level of medical care at the correct time results in the least cost. A portion of the medical cost that could be saved by telemedicine providing the correct level of care in clinics and homes should be applied to the facility cost of providing this care.

Thank you, Dr. Burgiss.

Dr. Ferrans.

STATEMENT OF RICHARD FERRANS, M.D., CHIEF OF MEDICAL INFORMATICS AND TELEMEDICINE, LOUISIANA STATE UNIVERSITY

Dr. FERRANS. Thank you, Senator Frist. I want to thank you and also Senator Breaux for inviting me to testify. Thank you for recognizing my mom. I also want to thank Senator Breaux and his fine staff for their support of the LSU Health Sciences Center.

Today I want to address the utilization of telemedicine in rural Louisiana to improve health care, some of the barriers to progress that we face, and the specific policy recommendations that will lower barriers. I would also like to note for the record that I am also a member of the Southern Governors Association Task Force for Medical Technology, which is responsible for developing a unified policy for telemedicine for the South. Two days ago, we just met in Memphis and finished this report, which I've submitted into the record.

I am also a member of the Computer-Based Public Health Work Group for the National Committee for Vital and Health Statistics that is charged with implementing HPA. So Senator Wyden's comments, I was very interested in those and hope to be able to address those, although my views do not necessarily reflect those of the NCVHS.

I think we have defined telemedicine as the use of telecommunications technology and information systems to deliver clinical care at a distance. I think most of us know what a typical telemedicine encounter is like, a specialist in an urban medical center seeing a patient in a rural facility in realtime, and all of the things that technology today allows us to do, with really, in large part, off-the-shelf hardware and software. That technology exists today. We do not have to go out and invent it.

So how are we using that to improve care in rural Louisiana? Well, we have really embraced technology as a critical tool to transform our health care system in Louisiana that provides services to all, irrespective of their ability to pay. As a safety net system of care for almost 2 million patients, LSU is committed to network our nine hospitals and clinics with rural facilities using telemedicine. We have recently begun to design a more integrated system, under the auspices of a grant from the Robert Wood Johnson Foundation.

The pilot program is in the rural parishes surrounding Lafayette, Louisiana. All totaled, we will probably see about 2,000 patients via telemedicine next year.

Two years ago, Vice President Gore and I took a medical history online, and reviewed the echo cardiogram of a patient in Church Point, Louisiana, using telemedicine. That patient did not have to travel 3 hours, with congestive heart failure, each way to get medical care.

Today, the LSU Health Sciences Center is committed to bringing emergency services online. Soon, we will be launching the Teletrauma Network of Louisiana, an emergency telemedicine system that will bring the expertise of our world-class trauma team in New Orleans to rural hospitals in Southern Louisiana. So this will enable an accident victim at a rural hospital, like Riverside Medical Center of Saint James Parish Hospital, to be seen via telemedi-

cine by a board-certified trauma surgeon at Charity Hospital in New Orleans—one of only two level 1 trauma centers in our State.

I think, in the future, our surgical experts can use Next Generation Internet technology to instantly evaluate a sugar farmer from Houma, injured in a combine accident during grinding season, or an injured driver, traveling from LaFourche Parish to Baton Rouge. We can aggressively stabilize that patient during the golden hour, which, Senator Frist, of course you know is the first hour after major trauma, when care decisions literally mean the difference between life and death.

In the future, we hope to continue to expand those services to other emergencies that are time dependent, like stroke and myocardial infarction. Again, our mission, as we see it, is to move beyond our walls and take care of our rural citizens. If there is one point that I want to stress, it is, at a fundamental level, we believe that our rural citizens deserve the same quality of care as our urban counterparts. So we are determined to bring the doctor to the patient using telemedicine. In the next year, we will extend our services to more long-term care facilities for the severely disabled. We will increase our correctional telemedicine program. We are even linking up with rural hospitals to provide more psychiatric care, as someone else had mentioned.

With respect to education, we train 90 percent of the primary care physicians in our State. They are the rural doctors of tomorrow. They can spend more time in rural hospitals, our resident physicians, because today they can get their required resident lectures online from LSU Medical Center in Shreveport.

So, why have we been successful? I think there are four reasons. They illustrate the barriers that currently exist for telemedicine. First of all, because of some unique arrangements we have with Bell South, we have unusually low telecommunications rates for rural health care. This makes everything possible. The cost of telecommunications is a major barrier.

Now, the Congress attempted to assist rural hospitals by establishing lower rates through the Telecommunications Act. I will tell you that not a penny of that money has been received by rural hospitals. So my first recommendation to you is to urge the FCC to fulfill the intent of the Telecommunications Act. Our 18 Southern Governors wholeheartedly agree with me on this position.

The second issue deals with reimbursement. It is intuitive that no business can flourish if it cannot charge for its services. We have coverage for Medicaid for telemedicine, and it has not overrun the Medicaid budget. We have coverage for private insurance also. Medicare, after resisting telemedicine coverage for years, HCFA finally relented and began providing coverage, but placed the fee splitting provisions on it.

I will tell you what a rural doctor told me. He said fee splitting is illegal if I send a sick patient 100 miles to see a specialist, but I am required to do it if that patient is seen in my office by the same specialist via telemedicine. So I would recommend that you all direct HCFA to treat a telemedicine encounter like any other clinical encounter.

A third reason deals with infrastructure. The details are in my report. But I think the bottom line is that the Federal Government

shares, with the State governments, the funding for highways. We can share the funding for information superhighways, too, by establishing block grants for States that coordinate their telemedicine and their telecommunications planning. I believe that this can be done through existing programs through the Department of Commerce, specifically TIOP, and also through the National Library of Medicine.

Finally, I think that we are succeeding because of the vision of our leadership. And we are trying to invest in the long term. So I would ask you to please assist us in lowering telecommunication rates, simplifying Medicare rules, and establishing block grants to States for health care superhighways on the Next Generation Internet.

As a final recommendation, I would just urge you to visit your telemedicine programs in your home States. The publicity from your participation in these hearings will help us join in this vision. This forum certainly propels us forward to a better future for our rural citizens.

Thank you very much.

Senator FRIST. Thank you.

Dr. Poropatich.

STATEMENT OF RONALD K. POROPATICH, M.D., LTC, USA, MEMBER, BOARD OF DIRECTORS, AMERICAN TELEMEDICINE ASSOCIATION

Dr. POROPATICH. Thank you, Mr. Chairman. Good afternoon, science and distinguished guests. My name is Dr. Ronald K. Poropatich. I am an elected member of the Board of Directors of the American Telemedicine Association, and provide these remarks today on behalf of the Association.

I am a practicing physician in pulmonary and critical care medicine, with over 7 years of direct experience using telemedicine. I am also a Lieutenant Colonel in the United States Army and Director of the Telemedicine Program at Walter Reed Army Medical Center in Washington, as well as on the staff of the Telemedicine and Advanced Research Center up at the U.S. Army Medical Research Command at Fort Detrick, Maryland. However, I am here today strictly on behalf of the American Telemedicine Association, and my remarks do not necessarily reflect the operations of the U.S. Department of Defense.

The American Telemedicine Association represents physicians, other health care professionals, technologists, and companies involved in developing telemedical systems, and providing health care services via telecommunications. We are a nonprofit membership-based organization, established in 1993, which serves to promote telemedicine and resolve barriers to its deployment.

In my remarks today, I would like to briefly point out a few of the critical national issues we believe inhibits the growth of telemedicine. These serve as a barrier to realizing the potential benefits of telemedicine to expand access by all Americans to quality medical services and reduce the cost of providing health care services.

Many of the obstacles facing the use and deployment telemedicine today require changes in existing laws and regulations. I will

highlight several specific areas that should be addressed by the Federal and State governments in the United States.

First is the lack of payment for services. As previously commented on, despite many years of successful telemedicine demonstrations and the rapidly expanding deployment of telemedical services in the private sector and in other countries, the U.S. lags behind in recognizing and paying for medical services provided via telemedicine. Medicare currently reimburses for several different types of remote services, including teleradiology, remote patient monitoring and live video consultations with patients residing in remote health professional shortage areas.

However, broad reimbursement for telemedicine services is still unavailable. This failure to provide coverage of telemedical services has put a brake on the growth of telemedicine, restricted access to health services by many Americans, and hampered the ability of the United States health care industry to use telemedicine in reducing costs and increasing the quality of care.

Knowing the crisis facing the cost of providing health care and the cost associated with increasing access to health services, the ATA has three specific priorities for providing Medicare coverage of telemedicine services. Each of these priorities costs little or nothing in additional Federal outlays, and will help expand access to needed medical services by the American consumer.

First is the Health Care Financing Administration, or HCFA, should clarify that it can fully reimburse for telepathology, since this is a service similar to teleradiology, which can easily be conducted remotely and does not require a direct physician/patient consultation. This can be simply accomplished by HCFA today, and does not require any additional legislation. We are hopeful that HCFA will clarify this issue before the end of the year.

Second, we urge Congress to eliminate existing flaws in the current Medicare program supporting telemedicine services to residents of rural health professional shortage areas. For example, the program does not reimburse for medical consultations provided using store forward technology. This is a very efficient and appropriate way of delivering patient information to a medical specialist, and is being practiced today in the military, in other countries and in demonstrations projects across this country. ATA fully supports legislation introduced by both Senator Kent Conrad and Senator Max Baucus to amend this program.

Finally, when HCFA introduces a prospective payment system for home health care services next year, the provision of telemedical services to the home should be an allowable service that can be used by home health care agencies in providing services to the homebound patient. Studies have shown that the use of telehome care can improve patient care and reduce the utilization of acute care services. The use of telehome care under the prospective payment system will cost no additional Federal dollars. It can help improve services to the patient. And it can help homecare agencies to continue providing services at lower costs. We strongly urge Congress to include language this year, under the Balanced Budget Act Amendments Bill, that directs HCFA to allow these telehome care services.

Second, improved access to telecommunications networks. The deployment of telemedical links to rural and suburban medical centers requires communication networks that are reliable and capable of handling large amounts of data in a short time. Homecare applications that require interactive video, as well as clinical applications involving large patient data files, will greatly benefit from the availability of broadband networks. Congress established a program under the Telecommunications Reform Act of 1996 to provide improved access to high-speed data lines by rural health centers.

Although well-intentioned, the program has fallen far short of its potential. The application process as it exists today is burdensome, complicated, causes substantial hardship on applicants, and creates a barrier on getting the program benefits out to the intended beneficiaries. In addition, eligible services and program beneficiaries are unduly limited.

In a letter to the FCC in March 1999, the American Telemedicine Association called for specific changes in the program by both the Federal Communications Commission and Congress. I have included this letter in my written testimony.

ATA is a member of the Advanced Coalition, a group promoting improved broadband deployment of the Internet. The Internet is becoming the preferred platform for the delivery of telemedical services and can be an important vehicle for providing health services to the individual at home. It is therefore important that Congress help ensure that high-speed access to the Internet is available throughout the country, including to rural communities and individual homes.

State medical licensure is a third issue, sir. Currently, each State requires separate medical licenses for physicians practicing inside State boundaries. Telemedicine challenges this by allowing for the practice of medicine across State lines. Some States have enacted restrictive laws to keep out health professionals licensed in other States. This has been viewed by some as efforts to protect the economic markets of the professionals residing within the State.

Earlier this year, the ATA Board of Directors adopted a position on State licensure that preserves the right of States to continue to license medical professionals, while allowing access by patients and primary care physicians within the States to services of qualified health professionals located in other States. I have included a copy of this statement in my written testimony, as well, sir.

There are other issues and concerns that may require Federal policies. These include protection of health care and telecommunications entities from undue liability arising out of the use of telemedicine and ensuring patient privacy and confidentiality in the transmission of medical information and electronic storage of personal medical information. Within the military, we have addressed the privacy issues by establishing a strict policy of requiring a separate secure server to be used for all medical transaction, with encryption of all medical-related files.

In my responsibilities within the military, I have witnessed a tremendous growth in the use of telemedicine in the delivery of health care. The results of research and services performed at the Telemedicine and Advanced Technology Research Center at the U.S. Army Medical Research and Materiel Command have enabled us to

provide cost-effective and expanded access to medical specialty cases where none was available before.

At Walter Reed Army Medical Center, we are now providing well over 3,000 medical consults per year to armed forces personnel and their families worldwide. In some ways, the efforts achieved by the military have provided a model that might be adopted by civilian medical organizations. However, in the military, we have not been faced with many of the barriers I have discussed here.

It is the hope of the American Telemedicine Association that Congress will help eliminate many of these barriers so that all people throughout the United States can benefit from the potential of telemedicine.

Sir, in closing, in August 1999, the ATA issued a public statement on the role of the Internet in health care. In regards to Senator Wyden's comments, I would be happy to include this ATA position statement on the Internet as part of my testimony.

Thank you.

[The prepared statement and attachments of Dr. Poropatich follow:]

PREPARED STATEMENT OF RONALD K. POROPATICH, M.D., LTC, USA, MEMBER, BOARD OF DIRECTORS, AMERICAN TELEMEDICINE ASSOCIATION

Thank you Mr. Chairman.

My name is Doctor Ronald K. Poropatich. I am an elected member of the Board of Directors of the American Telemedicine Association and provide these remarks today on behalf of the Association. I am a practicing physician in pulmonary and critical care medicine with over 7 years of direct experience using telemedicine. I am also a Lieutenant Colonel in the United States Army and the Director of the Telemedicine Directorate at Walter Reed Army Medical Center in Washington, DC and also serve on the staff of the Telemedicine and Advanced Technology Research Center at the U.S. Army Medical Research and Material Command at Ft. Detrick, Maryland. However, I am here today strictly on behalf of the ATA and my remarks do not necessarily reflect the position of the U.S. Department of Defense.

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In my remarks today I would like to briefly point out a few of the critical national issues we believe inhibits the growth of telemedicine. These serve as a barrier to realizing the potential benefits of telemedicine to expand access by all Americans to quality medical services and reduce the cost of providing healthcare services.

Many of the obstacles facing the use and deployment of telemedicine today require changes in existing laws and regulations. I will highlight several specific areas that should be addressed by the federal and state governments in the United States.

1. *Lack of Payment for Services:* Despite many years of successful telemedicine demonstrations and the rapidly expanding deployment of telemedical services in the private sector and in other countries, the U.S. lags behind in recognizing and paying for medical services provided via telemedicine. Medicare currently reimburses for several different types of remote services including teleradiology, remote patient monitoring and live video consultations with patients residing in remote Health Professional Shortage Areas. However, broad reimbursement for telemedicine services is still unavailable. This failure to provide coverage of telemedical services has put a brake on the growth of telemedicine, restricted access to health services by many Americans and hampered the ability of the U.S. healthcare industry to use telemedicine in reducing costs and increasing the quality of care.

Knowing the crisis facing the cost of providing healthcare and the cost associated with increasing access to health services, ATA has three specific priorities for providing Medicare coverage of telemedicine services. Each of these priorities costs little or nothing in additional federal outlays and will help expand access to needed medical services by the American consumer.

(a) First, the Health Care Financing Administration (HCFA) should clarify that it can fully reimburse for telepathology since this is a service, similar to teleradiology, which can easily be conducted remotely and does not require a direct physician-patient consultation. This can be simply accomplished by HCFA today and does not require any additional legislation. We are hopeful that HCFA will clarify this issue before the end of this year.

(b) Second, we urge Congress to eliminate existing flaws in the current Medicare program supporting telemedicine services to residents of rural Health Professional Shortage Areas. For example, the program does not reimburse for medical consultations provided using store-forward technology. This is a very efficient and appropriate way of delivering patient information to a medical specialist and is being practiced today in the military, in other countries and in demonstration projects across this country. ATA fully supports legislation introduced by both Senator Kent Conrad (D-ND) and Senator Max Baucus (D-MT) to amend this program.

(c) Finally, when HCFA introduces a Prospective Payment System (PPS) for home healthcare services next year the provision of telemedical services to the home should be an allowable service that can be used by home healthcare agencies in providing services to the homebound patient. Studies have shown that the use of telehomecare can improve patient care and reduce the utilization of acute care services. The use of telehomecare under PPS will cost NO additional federal dollars, it can help improve services to the patient and it can help homecare agencies to continue providing services at lower costs. We strongly urge Congress to include language this year under the Balanced Budget Act Amendments Bill that directs HCFA to allow these telehomecare services.

2. *Improved Access to Telecommunications Networks:* The deployment of telemedical links to rural and suburban medical centers require communications networks that are reliable and capable of handling large amounts of data in a short time. Homecare applications that require interactive video as well as clinical applications involving large patient data files will benefit greatly from the availability of broadband networks. Congress established a program under the Telecommunications Reform Act of 1996 to provide improved access to high-speed data lines by rural health centers. Although well intentioned, this program has fallen far short of its potential. The application process as it exists today is burdensome, complicated, causes substantial hardship on applicants, and creates a barrier on getting the program benefits out to the intended beneficiaries. In addition, eligible services and program beneficiaries are unduly limited. In a letter to the FCC in March 1999 ATA called for specific changes in the program by both the Federal Communications Commission and Congress. I have included this letter in my written testimony.

ATA is also a member of the Advance Coalition, a group promoting improved broadband deployment of the Internet. The Internet is becoming the preferred platform for the delivery of telemedical services and can be an important vehicle for providing health services to the individual at home. It is therefore important that Congress help ensure that high-speed access to the Internet is available throughout the country including to rural communities and individual homes.

3. *State Medical Licensure:* Currently each state requires separate medical licenses for physicians practicing inside state boundaries. Telemedicine challenges this by allowing for the practice of medicine across state lines. Some states have enacted restrictive laws to keep out health professionals licensed in other states. This has been viewed by some as efforts to protect the economic markets of the professionals residing within the state. Earlier this year the ATA Board of Directors adopted a position on state licensure that preserves the right of states to continue to license medical professionals while allowing access by patients and primary care physicians within the states to services of qualified health professionals located in other locations. I have included a copy of this statement in my written testimony.

4. *Other key policy issues:* There are several other important issues and concerns that may require federal policies. These include protection of healthcare and telecommunications entities from undue liability arising out of the use of telemedicine and ensuring patient privacy and confidentiality in the transmission of medical information and electronic storage of personal medical information. Within the military we have addressed the privacy issues by establishing a strict policy of requiring a separate secure server to be used for all medical transactions with encryption of all medical related files.

In my responsibilities within the military I have witnessed a tremendous growth in the use of telemedicine in the delivery of healthcare. The results of research and service efforts at the Telemedicine and Advanced Technology Research Center at the U.S. Army Medical Research and Material Command have enabled us to provide cost effective and expanded access to medical specialty care where none was available before. At Walter Reed Army Medical Center we are now providing well over

3,000 medical consults per year to armed forces personnel and their families worldwide. In some ways the efforts achieved by the military has provided a model that might be adopted by civilian medical organizations. However, in the military we have not been faced with many of the barriers I have described here. It is the hope of the American Telemedicine Association that Congress will help eliminate many of these barriers so that all people throughout the United States can benefit from the potential of telemedicine.

Thank you.

AMERICAN TELEMEDICINE ASSOCIATION

ATA POLICY REGARDING STATE MEDICAL LICENSURE[1]

Although telemedicine utilization is increasing, it accounts for only a small fraction of all medical "encounters" in the United States (including teleradiology). Despite that fact, during the last four years at least 14 states have passed legislation severely restricting the practice of telemedicine across state lines.

Most often this restriction takes the form of requiring full and unrestricted state licensure for any external physician providing services via telemedicine to residents of the State. Other states have similar statutes in various stages of the legislative process. Unless meaningful alternatives are developed, it is expected that many more states will follow the trend of restrictive legislation.

BACKGROUND

The powers that are not granted to the federal government under the Constitution are reserved to the states as provided for by the Tenth Amendment of the United States Constitution. These activities are traditionally local in nature and most often pertain to health, safety, and welfare of a state's citizenry. Under this authority physicians and other healthcare practitioners are required to obtain state licenses, comply with various state medical practice acts and are otherwise regulated by state medical boards whose members are usually appointed by state governors.

Although administrative practices might vary from state to state, in the past 30 years there has been a remarkable convergence in licensing requirements stipulated by states to license physicians. *All* states require the United States Medical Licensing Examination (USMLE). *All* recognize appropriate credentials from nationally accredited medical schools and residency programs regardless of location. *All* specialty board certification is conferred by national organizations and are based on national standards.

Today, state licensure requirements have substantially more similarities than differences. In fact, they only vary in terms of procedural and tangential issues, such as the number of times an applicant can take the USMLE (the range is from three to unlimited attempts) and the number of required postgraduate training years (the range is from zero to three years). In fact there is little, if any data to support the claim that physicians of one state are more or less qualified than those of any other state.

The debate surrounding telemedicine and state medical licensure has focused on three approaches: Full and Unrestricted Licensure;[2] Limited Licensure,[3] and National Licensure.[4]

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[1] Adopted by the ATA Board of Directors, May 21, 1999.

[2] Full licensure has unfortunately been the most "successful" approach to telemedicine licensure in recent years. It is rapidly becoming the de facto licensing approach for telemedicine today.

[3] In 1996 the Federation of State Medical Boards (FSMB) produced a "A Model Act to Regulate Practice of Telemedicine or Medicine by Other Means Across State Lines" containing legislative language to create a secondary or limited license for telemedicine purposes. Only three states (Alabama, Tennessee, and Texas) have enacted legislation in any way consistent with FSMB's philosophy. The American Medical Association (AMA) opposed the act and called for a resolution requiring "full and unrestricted license" in each state for those "who....wish to regularly practice telemedicine in that state."

[4] There are least three potential forms of creating a more uniform national licensure system: Federal Certification or Licensure; Federal Preemption of certain restrictive state laws; and Mutual Recognition between states. *Federal Certification* would actually grant licensure at the federal level. An example is aviation. All civilian pilots (including airline transport pilots) are licensed at the federal level. The Federal Aviation Administration (FAA) manages pilot certification in the US. *Preemption* grants functional licensure in certain circumstances by superceding state statutes. The Wyden Amendment (a 1995 attempt to preempt state law in

Continued

FINDINGS

1. The requirement for full and unrestricted licensure in each state can have a chilling effect on telemedicine practice. Moreover, it places excessive economic, administrative, and political burdens on current and future telemedicine providers.

2. Full and unrestricted state-based licensure requirements limit patient rights by denying easy access to remote medical expertise.

3. While reciprocity or other mechanisms of mutual recognition could solve interstate medical licensing issues, recent actions and positions taken at the state level and by a few medical organizations bring into question the political viability of these approaches. Recent attempts to change state laws have resulted in an increase rather than a decrease in licensure barriers.

4. A more flexible and permissive licensure environment is inexorably tied to reimbursement.

5. A new approach is required that provides a basis for legal challenge of the status quo. For any real movement to occur, state authority in this matter may have to be subordinated a legal instrument of an external authority.

6. The only external authorities are the US Congress or the Judicial system.

Interstate Commerce: Although the states rightfully hold the authority to regulate activities of legitimate local concern, this power is *not* absolute. The Commerce Clause of the US Constitution (Article 1) prohibits states from erecting barriers against activities that are inherently national in scope. In addition, barriers that transcend the traditional scope of state regulatory authority by protecting local economic interests, which restrict interstate commerce, have been treated as violations of the Commerce Clause.

Although the practice of medicine has traditionally been local in nature, telemedicine introduces a distance independent variable that is, by definition, *neither* local *nor* traditional.

In a legal challenge, courts would balance the objective and purpose of state law against the burden on interstate coniirierce. If benefits of state law outweigh the burden of interstate commerce, state regulation will generally be upheld. If regulation imposes a substantial burden on interstate commerce, it will likely be held unconstitutional. Industries with legal and/or legislative precedents for transitioning from local to national regulation includes trucking, food, telecommunication, banking, railroad, and automotive. The hallmark of industries making the transition is financial viability. Sustained economic growth for telemedicine may be essential prior to a successful legal challenge.

If the nature of activity being regulated requires uniform national regulation, then no state regulation is permissible. This is why pilots are certified at the national rather than state level.

Traditionally, the courts have had little tolerance of interference in interstate commerce, especially interference that protect local economic interests, even when state's rights issues are in the forefront. In the majority of cases, state regulations are struck down if it can be shown state laws are designed to protect local interests at the expense of out of state competitors.

ATA POSITION:

The ATA state licensure policy position offers a compromise between full national licensure and state-imposed unreasonable barriers that meets the following guidelines:

- Preserves the right of each state to regulate medicine in traditional face-to-face (FTF) physical setting
- Preserves licensure authority at the state level
- Avoids unnecessary restraints on interstate commerce
- Ensures that all patients have access to health care expertise necessary to protect and promote their health regardless of the location of the provider
- Advances telemedicine as a valuable service delivery strategy that can play a critical role in overcoming time and distance barriers that often limit access to quality health care

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cases in which a physician conducts a consultation using telecommunications) is an example of an attempt to restrain overreaching state laws through limited federal action. *Mutual Recognition* of licensure between states is based on the concept of reciprocity. The drivers license is an example of automatic reciprocity in which the holder of a license in one state can legally drive in any other state. The Nursing Licensure Interstate Compact, currently being finalized by the nursing community, grants nursing licensure privileges in all participating states provided the nurse already has a valid license in at least one state.

1. The medical event should be defined as occurring where the physician is located. No medical event can occur in the absence of a either patient or physician (or other medical provider). Both are essential.

2. A physical face-to-face (FTF) encounter between physician (or other medical provider) and patient within state borders remains the purview of the state.

3. If the encounter is virtual (i.e. non-physical FTF) *and* a physician is located in another state, the encounter is *neither* traditional *nor* local and is *therefore outside the purview or jurisdiction of the state.*

4. States should not restrict physical travel by patients to seek medical advice outside the state and should not be permitted to restrict "virtual" travel as well.

5. States should not restrict a duly licensed physician or other medical provider from seeking consulting medical expertise from a physician or other medical provider licensed in another state.

6. The ATA should support and define the Interstate Telemedicine Encounter (ITE) within the following specific guidelines:

- Telemedicine request originates from a provider who is fully licensed in the patient's state
- The patient and requesting physician must have a real physician-patient relationship
- The patient and requesting physician must have a real (i.e. physical) FTF encounter
- The out-of-state consulting physician using telemedicine must be fully licensed in the state in which the physician is located
- [Optional] The out-of-state physician must register his/her intent to provide telemedicine services to patients residing in that state. This is for information purposes only. No action by the state is required except confirmation of receipt of the letter of intent
- The responsibility of medical care for the patient must remain with the requesting physician. Care *never* transfers to the out-of-state physician in this telemedicine model. The requesting physician is the attending physician.

7. The ATA recognizes that these jurisdictional and licensure issues also effect a wide variety of individuals within, as well as outside, the health care community. The ATA should utilize the state licensure issues to expand the constituency of telemedicine by formal and informal outreach to the "digital community" (hardware, software, and telecom vendors; electronic commerce industry), managed care, and patient advocacy groups.

8. Strategies for creating a more favorable licensure environment and for securing expanded reimbursement should be synergistic. They must be implemented in parallel over time with long term commitment.

Implementation: ATA will assume a proactive position on state licensure and ATA will make every effort to provide input reflecting these policy statements to legislative and/or regulatory organizations.

March 5, 1999

Mr. William Kennard
Chairman
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Ms. Cheryl Parrino, CEO
Universal Services Administrative
583 D'Onofrio Drive
Suite 201
Madison, WI 53719

Dear Chairman Kennard and Ms. Parrino:

The groups indicated below provide these comments regarding the Rural Health Care program that is being administrated by the Universal Services Administrative Corporation (USAC). These groups represent a wide variety of individuals and institutions from across the United States who are involved in the provision of health care, telecommunications services, telehealth and telemedicine. We have a strong interest in the implementation of the Rural Health Care program that maximizes the benefits for patient care in rural America. These comments reflect a level of frustration with the limitations of the program that have become apparent over the first year of implementation.

Our comments are divided into two areas. First, we include proposed actions that can be made by the FCC, which are critical in order to improve the current program operations. These are:

1. The Commission should take steps to notify all approved applications and start the discounts immediately. Current applications now before USAC have been pending for many months. Approvals for these applications have been held up for months for reasons that are not clear. This delay has caused undue hardships on the rural health providers, who are operating on very narrow financial margins already. Continued delay is unconscionable.

2. The application process as it exists today is burdensome, complicated, causes substantial hardship on applicants, and creates a barrier on getting the program benefits out to the intended beneficiaries. The process should be streamlined in two ways.

a. The Commission should reconsider the requirement that all applications are required to enter into a 28-day posting period, at least for areas where there is no existing competition for local service. To date, there have been no competing bids proposed for any application, nor are any competing bids anticipated. The applications are typically for services to very remote locations where no alternative service providers are available. We understand and sympathize with the desire of the Commission to promote competition. However, this has led to additional delays and costs placed on the backs of rural health care providers and delayed the provision of health services for rural Americans.

b. The Commission should streamline the application process. We suggest that the Commission eliminate the complicated process of requiring the local exchange carrier to make calculations of specific charges to be discounted. Instead a simplified process should be put into effect whereby the approved rural health care provider simply submits their paid phone bill for eligible broad band (T1) services with distance line charges spelled out to USAC. USAC would reimburse the carrier for the discounted distance line charges on the bill. The carrier would pass on the money in the form of a discount on the next bill. The discounts should be based on an average cost for communications services to rural areas versus urban areas in existence for each state.

3. The Commission should consider reimbursement for other costs associated with providing telecommunications services for rural health care that have higher costs for rural areas. Such costs include connection fees for ISDN and switched services, and toll charges for connections to urban areas.

4. The rural health program is supposed to serve public health agencies, which provide essential services to rural communities. However, very few of these agencies currently have applications pending. The Commission should assess the reasons for this non-participation, identify specific program elements needed to increase participation and set targets for improving participation.

Second, we include a set of recommendations that may require statutory amendments to the governing legislation. These are based on the experience gained in the program over the past year where obvious deficiencies have become apparent. Given the current under utilization of estimated funding of the rural health program, the approval of these changes would have minimal impact on the size of the rural health program as originally envisioned. These are:

1. The program should include discounts for all forms of communications services when used in the delivery of health care to rural health care providers. As currently designed, services eligible for the rural health care program are effectively limited to a T1 line, largely because of the use of distance costs associated with this service. However, advancements over the past few years in technology and communications have enabled health care providers to transmit and receive information at speeds lower than that required of T1 lines. Although lower in cost, this still remains an impediment to many health providers due to the few resources available in support of rural health care.

2. The existing regulatory framework requiring additional agreements between multiple local and long distance carriers should be resolved. Establishing links between many applicants and urban centers require crossing LATA boundaries, due to the large distances. The ETC requirement has either precluded support for rural health care providers or led to unnecessary complications between local and long distance carriers in the development of applications by eligible health providers. Coordination between multiple telecommunication companies requires the rural provider to rely on employees of the companies to help complete forms and develop adjusted rate schedules. This adds time and complexity to the application process.

3. The rural health care program, unlike the school and library program, does not cover associated costs with the establishment of high-speed communications connections. The health care program should be changed to mirror those services that are currently eligible in the school and library program.

4. The rural health care program should be changed to foster collaboration among all eligible institutions where appropriate and allow the rural health provider to col-

laborate with public health agencies in the implementation of the program. In many rural communities the health care institution and the local school and library are located in very close proximity. However, the programs operated by USAC do not allow a combined effort by health, school, and library facilities. In many areas this leads to unnecessary duplication of communication services. In addition, local public health agencies can be an important partner with the rural health care providers.

5. The program should consider all rural health institutions under the program without regard to tax status as eligible for receiving discounted services. In many areas, particularly the many different Health Professional Shortage Areas, the only health provider serving rural residents does not happen to be a non-profit institution.

6. The legislation ignores three other important health care institutions serving rural America: long-term care facilities, home health agencies and skilled nursing facilities. These facilities should be made eligible for support under the program.

Jonathan D. Linkous
Executive Director
American Telemedicine Association

Organizations endorsing this letter:

American Academy of Physician Assistants
American College of Nurse Practitioners
American Hospital Association
American Telemedicine Association
Association of Telemedicine Service Providers
National Association of Community Health Centers
National Organization for State Offices of Rural Health
National Rural Health Association

Senator FRIST. Thank you very much.

I am going to turn to Senator Burns for a statement.

STATEMENT OF HON. CONRAD BURNS, U.S. SENATOR FROM MONTANA

Senator BURNS. I thank the chairman. I just want to submit my written statement.

I want to thank Dr. Brick for recognizing the advances that we have made in Montana. We started doing this a long time ago. This is nothing new for the State of Montana, as you well know. And so we are pretty familiar with this.

I am going to read your statements, and I have listened to your statements with a great deal of interest. I thank you for coming today and offering these statements. Because especially in the mental health area, we are starting mental evaluations by telemedicine. That has been very successful in Montana. And we are even doing it in youth justice, a lot of those things.

Because we are a big State. You guys think you come from big States. Tennessee is awful long, but you ain't very deep. [Laughter.]

Senator BURNS. We are long and deep.

Senator FRIST. Now, this deepness. We will debate about how deep we are.

Senator BURNS. You ain't very deep. I have been there.

Dr. Burgiss, I have got a spy down there spying on you anyway.

Thank you very much. I appreciate that.

[The prepared statement of Senator Burns follows:]

PREPARED STATEMENT OF CONRAD BURNS, U.S. SENATOR FROM MONTANA

I'd like to start by thanking Senator Frist for holding this hearing today. I'm especially proud knowing that Montana is home to the 11th largest telemedicine network, the Eastern Montana Telemedicine Network. This is especially amazing con-

sidering that the EMTN was only created in 1993. It's grown from the small network of 5 hospitals to an extensive association of 11 sites. These sites have connected to other networks throughout the country and even internationally.

So, what impact does telemedicine have on rural health care? In Montana, it has made a huge difference. A rancher injured up in Glasgow, Montana now has the same access to specialists that a resident of Billings would have. Glendive Medical Center Personnel can now attend classes and learn about the latest medical techniques through their videoconference connection. Colstrip Medical Center administrators can coordinate their operating plans with the other 10 administrators on the network, allowing greater efficiency in health care. All of these opportunities are critical to providing the best possible health care to all of Montana's rural communities.

The volume of traffic over the network is a good indicator of how doctors view the effectiveness of this capability. In the last three years alone, traffic has increased 65% on the EMTN. Again, in 1996, it was rated as the 11th most active telemedicine network nationwide. The number of participants has increased from 525 people in 1995 to almost 17,000 participants annually by 1997. People believe in the benefit from this system, and I expect that usage will continue to grow in the coming years.

But before I go too far in boasting about how wonderful this system is for Montana, I want to quickly touch base on what I believe is holding it back from its maximum benefit. The single greatest cost of running this system is in the data network cost. We were lucky in getting a Rural Electrification Administration grant in 1993 to get this thing started, and the Office of Rural Health Policy helped expand the network in the last few years, but the monthly telephone bill with US West runs into the thousands each month. That's even after taking a network discount into effect. To really keep this thing going, we need to make sure that the high data rate connections are cost effective. That's what holds telemedicine back nationwide; easy, cheap, local access to a broadband backbone. We were lucky to get some assistance in developing ours. Other regions haven't been as fortunate. I think this committee owes it to our rural citizens to find ways to bring enabling technologies like broadband access to local communities. This, in turn, will help stimulate development of capabilities like the telemedicine networks. It's a great example of leveraging technology to directly improve the health care of people who would otherwise be overlooked by the big heath care affiliates.

So again, has telemedicine made a difference in rural life? I'm sure you can tell by now that I believe it has. I'm personally committed to try to keep expanding telemedicine networks nationwide by whatever means possible. I've included broadband access in my digital agenda to try to expand inexpensive access to everybody who wants it. Eastern Montana has certainly benefitted by having the EMTN through their local hospitals. Others deserve the same chance.

Thank you, Mr. Chairman. I look forward to hearing from the panelists.

Senator FRIST. Thank you very much, Conrad.

The spy is his daughter, who is a physician in the great State of Tennessee.

Mr. Waitz, thank you.

STATEMENT OF AARON S. WAITZ, CHIEF TECHNICAL OFFICER AND VICE PRESIDENT, HEALTH IMAGING DIVISION, EASTMAN KODAK COMPANY

Mr. WAITZ. Good afternoon, Chairman Frist and Subcommittee members. I am Aaron Waitz, Chief Technical Officer and Vice President of the Eastman Kodak Company's Health Imaging Division. I am pleased to be here today to share our views on telemedicine and telehealth, a phenomenon that will transform the way health care is delivered.

Mr. Chairman, telemedicine and telehealth have the potential to transform the world of health care, just as the Internet transformed the world of commerce. Today, individuals are comfortable going on the Internet to seek out all sorts of information, including medical information. Tomorrow, individuals will turn on the telehealth product in their home to link with a health care provider,

obtain medical images and information, and manage their wellness program.

As background, the Eastman Kodak Company, headquartered in Rochester, New York, employs approximately 84,000 people worldwide, with over 44,000 in the United States. The business of the Health Imaging Division is medical pictures. Integrated solutions to capture, process, present, distribute, and print health-related images, using a broad range of sophisticated technology. For over 100 years, Kodak's health imaging business has served the needs of providers and recipients of health care. Kodak is the leading manufacturer of x-ray film, and we are leading the development of electronic medical imaging products.

Today's telemedicine products can bridge the distances separating practitioners in rural, underserved communities with health care providers in more concentrated medical service areas. The ability to provide patient monitoring results in decisions at earlier disease states, and earlier interventions results in fewer hospitalizations. The results are lower costs throughout the entire health care system.

Kodak Health Imaging has been active in the field of telemedicine for several years, through our partnership with public and private sector health care organizations. In Tennessee, our partnership with Midsouth Imaging covers radiology services for six Baptist Hospital facilities in Memphis, enabling the sharing of subspecialty expertise and data.

In Louisiana, Kodak and Schumpert Medical Center in Shreveport have in place an on-call teleradiology system to facilitate remote diagnosis by on-call radiologists in their homes.

In Texas, the Baylor Grapevine, in San Antonio, uses Kodak's PACS systems to connect 30 mobile vans, offering remote radiology services to a central reading site.

In the future, telehealth technologies will link health care providers directly with their patients, improving opportunities for contact between the two, and making telehealth care a means through which patients are more directly involved with maintaining their state of well-being. Kodak is looking ahead to these types of products that will enhance and expand the scope of that patient/provider contact and that patient-directed care.

Telehealth applications in home health care could involve the measurement of a patient's vital sign data via a device directly linked to a remote health care provider, which provides the quality images and data that providers demand to achieve better outcomes.

The future of telehealth in physical therapy could involve remote rehabilitation of extremities. Rather than a patient traveling to a central facility, potentially requiring time off from work, the patient could take a telehealth product and receive remote therapy in the convenience of their home. The incentives for this device would be timely access, higher quality care and reduced costs.

Technology exists today to allow continuous monitoring of patients via wearable and ingestible biosensors. In the future, test orders will no longer require the patient to travel to a diagnostic laboratory as is the case today. Instead, data could be continuously recorded and uploaded via the Internet to a health care provider for analysis.

Just as telemedicine products move the delivery point of care from the hospital to freestanding community facilities, to the home, future telehealth products will move the field away from monitoring a patient after an episode of illness to self-monitoring that ensures maintenance of health.

This Subcommittee, and the entire Congress, play an important role in ensuring that the current and future generation of telehealth products reach patients in health care provider shortage areas and throughout the country. We are seeing in practice throughout the country that telemedicine and telehealth broadens access to care, reduces health care costs and provides a better quality of care for patients. The challenge is to strike the appropriate balance so that government policies do not restrict the integration and growth of telehealth technology in health care.

There are several areas that Kodak believes are important. First, the regulatory and statutory barriers that impede the acceptance of remote consultation across geographic boundaries. Examining a patient in another State or recommending treatment may be tantamount to practicing without a license.

Second, appropriate reimbursement for providers using telehealth. Current law does not reflect the technological advances and the resulting dramatic cost reductions that allow new paradigms of interaction.

Third, a national high-speed Internet. The increase in bandwidth throughout the national infrastructure enables cost-effective transmission of high-quality diagnostic images.

Fourth, achieving the correct balance between the desire to secure a patient's medical information and the inability of remote providers and patients to interact. The use of telemedicine health care networks to facilitate disease management and health promotion will depend upon the ability to gather and exchange medical information freely.

And, fifth, standardization of electronic medical records and the communication protocols. The development of uniform Federal standards will accelerate interoperability among the vast numbers of medical image and information systems.

Mr. Chairman and subcommittee members, we want to partner with you to address potential issue areas in a way that ultimately benefits users and practitioners of health care. If the system that delivers health care lags behind technical capability of the next generation of telemedicine and telehealth products, then patients and the entire health care system will be the losers.

In conclusion, Eastman Kodak believes the future of telemedicine and telehealth is brimming with possibilities. We believe the next generation of products will have broad applications that will profoundly change the current health care paradigm. Kodak is excited at the prospect of taking medical imaging to a place where barriers of distance and time are removed.

We have a long history of breaking new ground in health care, from our 1896 development of the first product designed to capture x-ray images. Telehealth products represent the next phase in the process of designing products that help providers detect, diagnose and treat their patients more efficiently. We applaud the leader-

ship of this committee in discussing the challenges and the potential of this technology, and we stand ready to work with you.

Thank you.

[The prepared statement of Mr. Waitz follows:]

PREPARED STATEMENT OF AARON S. WAITZ, CHIEF TECHNICAL OFFICER AND VICE PRESIDENT, HEALTH IMAGING DIVISION, EASTMAN KODAK COMPANY

Good Afternoon Chairman Frist and Subcommittee members. I am Aaron Waitz, Chief Technical Officer and Vice President of the Eastman Kodak Company Health Imaging Division. I am pleased to be here today to share our views on telemedicine and telehealth, a phenomenon that will transform the way healthcare is delivered.

Mr. Chairman, telemedicine and telehealth have the potential to transform the world of healthcare just as the Internet transformed the world of commerce. Within this decade, all of us witnessed the expansion of the Internet, from narrow applications to broad consumer acceptance and use. Once the capacity of the telecommunication system was matched with the convenience of access, the Internet exploded. The result is that, today, individuals are comfortable going on the Internet to seek out all sorts of information, including medical information. Tomorrow, individuals will turn on the telehealth product in their home to link with a healthcare provider, obtain medical images and information and manage their wellness program.

As background, Eastman Kodak Company is headquartered in Rochester, New York. We employ approximately 84,000 employees worldwide with over 44,000 of them in the United States. Moreover, as a purchaser of health care in the United States, we provide coverage for nearly 200,000 lives, of which approximately 70,000 are retirees and their families. The business of the Health Imaging Division of Kodak is medical pictures-integrated solutions that capture, process, present and print health-related images using a broad range of sophisticated technology.

For over 100 years, Kodak's Health Imaging business, as served the needs of providers and recipients of healthcare. Kodak is a leading manufacturer of x-ray film and we are leading the development of electronic medical imaging products, including PACS (picture archiving and communication system), teleradiology and computed radiography. As a purchaser of health insurance and provider of health care products, Eastman Kodak understands the imperative of broad access to affordable quality health care that is not inhibited by distance or time.

Today's telemedicine products can bridge the distance separating practitioners in rural, underserved communities with health care providers in more concentrated medical service areas. Now it is possible to link health care professionals, regardless of location, and the result is improved access to high quality health care for some people. Closer patient monitoring results in decisions at earlier disease-states and earlier interventions result in fewer hospitalizations. Effective use of telemedicine and telehealth care results in lower costs throughout the entire health care system.

Kodak Health Imaging has been active in the field of telemedicine for several years, through our partnerships with public and private sector healthcare organizations. In Tennessee, our partnership with Mid-South Imaging covers radiology services for six Baptist Hospital facilities in Memphis, enabling the sharing of sub-specialty expertise and data. In Louisiana, Kodak and Schumpe Medical Center in Shreveport have in place an in-hospital primary reading system and an on-call teleradiology system, to facilitate remote diagnosis by on-call radiologists in their homes. In Texas, the Baylor Grapevine in San Antonio uses Kodak PACS to connect 30 mobile vans offering remote radiology services to a central reading site.

In Colorado, Active Medical Inc. is using Kodak's computed radiography (CR) units to offer x-rays in nursing facilities, instead of moving nursing home patients to hospitals. The images are captured on a storage phosphor screen and converted to viewable images. The image can be transmitted to remote "soft-copy" viewing locations or to laser printers for hard-copies. Not only does the x-ray technologist come to the patient for this procedure, but the image is transmitted to a nearby hospital where the radiologist reads the image and verbally reports back to the nursing home within 35 minutes. The nursing home patient does not have to worry about making a trip to the hospital, the productivity of the radiologists is increased, all while providing quality care.

In the future, telehealth technologies will link healthcare providers directly with their patients, improving opportunities for contact between the two and making telehealthcare a means through which patients are more directly involved in the maintaining their state of well-being. Kodak is looking ahead to the types of products that will enhance and expand the scope of that provider-patient contact and that patient-directed care. Telehealth applications in home health care could involve

measurement of a patient's vital sign data and ethoscopic sounds by a device linked with a remote healthcare provider. Unlike the blood pressure device that we currently see in grocery or drug stores, this application of telemedicine would permit interaction between patient and provider. Our scientists and engineers are examining methods of linking the two, just as we now have the capacity to link two providers remotely, with devices that are user friendly for patients, provide the quality images and data that providers demand and offer valuable information that can achieve better outcomes.

The future of telehealth in physical therapy could involve remote rehabilitation of extremities, such as the hand or ankle. Rather than a patient traveling to a central facility, potentially requiring time off from work, the patient could take a telehealth product and receive remote therapy in the convenience of their home. Rehabilitation exercise could be performed on the home device and monitored remotely by a physical therapist. During the manipulation of the extremity, the telehealth product could measure strength or range of motion while proceeding through a series of rehabilitation exercises. In this example, a therapist linked remotely to the patient would monitor the movements made and the progress between sessions. The incentives for applications of this rehabilitation device would be present in remote areas or more urban, larger facilities with many patients, through timely access, higher quality care and reduced costs.

Technology exists today to allow continuous monitoring of patients via wearable or injestible biosensors. In the future, tests ordered will no longer require the patient to travel to a diagnostic laboratory, as is the case today. Instead, data could be continuously recorded and uploaded via the Internet to the healthcare provider for analysis.

Just as telemedicine products move the delivery point of care from the hospital to a freestanding community facility, to the home, future telehealth products will move the field away from monitoring a patient after an episode of illness to self-monitoring that ensures maintenance of health, while continuing to offer care in locations of the patient's and provider's choosing. If these advances are combined with others in medical imaging, such as miniaturization or improvements in computer aided diagnosis, the result is a dramatic improvement in the quality of care available in telemedicine and telehealth. Add expansions in web-based technology and the result is an explosion of possible applications for telemedicine and telehealth products.

This Subcommittee and the entire Congress play an important role in ensuring that the current and future generation of telehealth products reach patients in healthcare provider shortage areas and throughout the country. We are seeing in practice throughout the country that telemedicine and telehealth broadens access to care, reduces health care costs and provides a better quality of care for patients. The challenge is to strike the appropriate balance so that government policies do not restrict the integration and growth of telehealth technology in healthcare. There are several areas that Kodak believes are important:

- The regulatory and statutory barriers that impede acceptance of remote consultation across geographic boundaries. Examining a patient in another state or recommending treatment may be tantamount to practicing without a license.
- Appropriate reimbursement for providers using telehealth. Existing legislation was developed at a time when telemedicine was synonymous with teleconferencing, restricting reimbursment to provider-to-provider transactions. It does not reflect the technological advances and resulting dramatic cost reductions that allow new paradigms of interaction. For example, direct patient-provider interaction.
- A national high-speed Internet. The increase in bandwidth throughout our national infrastructure, coupled with advances in image compression technology, enables cost-effective transmission of large high quality diagnostic images. Telehealth consultations then become the beneficiaries of this increased bandwidth.
- Achieving the correct balance between the desire to secure a patient's medical information and the inability of remote providers or patients and providers to interact. A balance must be reached between protecting sensitive information and facilitating the coordination of information in high quality healthcare networks. The use of telemedicine in these networks to facilitate disease management and health promotion will depend upon the ability of the healthcare networks to gather and exchange medical information.
- Standardization of electronic medical records and communication protocols. The development of uniform Federal standards will accelerate interoperability among the vast number of medical image and information systems.

Current healthcare systems with experience with telemedicine and telehealth, whether private insurers or national healthcare systems like the Veterans Administration or Medicare, can offer data that address concerns about efficacy and cost and remove the potential barriers to product integration. As a partner with providers of health care, Kodak has information on the success story of telehealth. We want to partner with you to address potential issue areas in a way that ultimately benefits users and practitioners of healthcare. If the system that delivers healthcare lags behind the technical capability of the next generation of telemedicine and telehealth products, then patients and the entire healthcare system will be the losers.

In conclusion Mr. Chairman and Subcommittee members, Eastman Kodak believes the future of telemedicine and telehealth is brimming with possibilities. We believe the next generation of products will have broad applications that will profoundly change the current healthcare paradigm. The new millennium will be one in which quality healthcare will be accessible to millions of people in settings more numerous than those available today. Kodak is excited at the prospect of taking medical imaging to a place where the barriers of distance and time are removed. We have a long history of breaking new ground in healthcare, from our 1896 development of the first product designed to capture x-ray images. Telehealth products represent the next phase in the process of designing products that help providers detect, diagnose and treat their patients. We applaud the leadership of this Committee in discussing the challenges and potentiaI of this technology and we stand ready to work with you. Thank you.

Senator FRIST. Thank you, Mr. Waitz.

Several of you commented in the oral testimony, then also in your written testimony, on the privacy issues and security issue, from fingerprinting to setting up separate servers. I would like to give each of you an opportunity to expand or, if you did not mention it in your oral testimony, to mention, in terms of privacy and security, current state-of-the-art technologies, pitfalls today, and then as we look out over the next 5 years, what should be done, or what do you recommend should be done to in some way—and maybe a policy that we put forward—to assure both security and privacy, which are the issues that come forward any time you communicate via the Internet and Next Generation Internet or through the air.

Let me just open it up, and then any of you can comment. And keep your comments fairly brief, because I would like to hear from all of you.

Dr. Brick.

Dr. BRICK. I will speak from our experience in West Virginia. We were very concerned about this at the beginning because of an unfamiliarity with the technology. We were just sort of afraid we were spreading these electrons all over the world with pictures of patients and things like that. But as we have become more familiar with it, our concerns about privacy have become less.

The network that we have used has always been secure. We do not use the Internet. At the beginning we had a network that was completely dedicated T1 lines. Now we have switched to ISDN. But for us, that is not something that has concerned us really.

I come from the days with paper charts. And everything was written down on little pieces of paper. And you know that those things fall into people's hands, too. And I think, realistically speaking from our standpoint, this is more secure than paper charts.

Now, we do not have a computerized medical record that goes along with this. But from the standpoint of seeing patients and patient confidentiality issues with that, I am more secure with this than I am with the charts. And I do this every week. I see lots and lots of patients on TV. And the patients are happy with it, too.

Senator FRIST. So with the dedicated line, the T1 or ISDN?

Dr. BRICK. Yes, the dedicated network, that is right.

Senator FRIST. Other comments? Dr. Ferrans?

Dr. FERRANS. Thank you. We also use a dedicated network. So we can certainly put robust security around it. I think as far as having a non-secure health care transaction over the Internet, I would be very concerned about that.

With regard to information security and privacy and confidentiality, it is very, very important that we protect that information. That goes for everything from electronic security to not talking in the elevators about patients.

I think one of the things that is of concern is that if HHS does issue the regulations on privacy and confidentiality, that will only cover electronic medical record information and not all medical record information. This may have the effect of serving as a financial deterrent for people to develop more sophisticated information systems that really deliver benefits to the patient.

I did want to mention one thing about our security. We are determined to make sure that we know exactly who is accessing the record. So we are going to be using desktop fingerprint security. Now, we have gotten a grant from our State government to do that. I can just show you—this is a biometric reader. It just plugs into a computer. I put my fingerprint on it and it instantly logs me in. It costs about $100.

So, again, the technology is there. We can safeguard information.

Senator FRIST. But you would argue for comprehensive medical record privacy rather than just a focusing, which probably would not happen unless the U.S. Congress acts, in terms of regulation of just the electronic side?

Dr. FERRANS. I think we need comprehensive legislation, covering patient confidentiality. It touches every area, from informed consent—I am actually less worried about this than I am worried about what happens to the information that goes through third parties. And I have heard testimony about drug companies buying transcription houses and all sorts of other things that cause me great concern. There is no electronic privacy out there today in general. And health care information is not a secure——

Senator FRIST. We have a patchwork that is really inadequate today.

Dr. Poropatich.

Dr. POROPATICH. Senator Frist, the current state of patient security, as you know, is highly variable. First, I can walk into most hospitals in this country and take a patient's record if it is not paperless, and disclose important information about patient confidentiality. It is a big issue. Clearly we have not tackled it in the last 50 to 100 years that we have been keeping written records.

However, we have an experience in both Internet and video teleconferencing. Video teleconferencing is a very clean way to provide consultations. It is more expensive, but it is fairly secure. However, we are migrating very aggressively to the Internet. Because we within the DOD, for example, because of the limitations of bandwidth, for example, ships at sea, if you turn the ship, you lose your connection with the signal that you are trying to transmit, et cetera.

There is clearly electronic commerce security issues that have already been reached. Electronic commerce, as you know, is a growing business in this country. A lot of the security features that we need for medicine have already been achieved in electronic commerce. However, within the DOD, for example, we have established a standard for using the Internet for patient consulting. Those standards include the information must reside on a dedicated server, used for nothing other than clinical consultation. That the individuals that use it have to have password protection into the system. That the information that is sent across the Internet is encrypted.

It begs the question: How much encryption do you need, 40-bit, 56-bit? We are establishing a threshold at 56-bit des. However, that level of encryption was recently violated at the Pentagon just within the last year. So 56-bit des does not buy you full security if some hacker out there truly wants to get into your medical record.

However, I think you need to also address the issues of when you send information over the Internet, how do you know that it is not being parted en route and changed, and when it eventually reaches your site, things were changed? Or, if it is residing in an archive in your hospital, that it is not being changed while it is being archived?

Those are other issues that we need to address in addition to the ones I have already alluded to. So it is a very thorny issue. I think electronic commerce is going to help a great deal. Many Americans are willing to give up their credit card numbers over the Internet, even their social security numbers. This week's issue of Newsweek is dedicated to the Internet. It tackles a lot of these issues from a sociological as well as practical electronic commerce frame.

So I think medicine is going to be able to solve this problem due to the fact that we are going to be using the Internet more and more. I think it is a very important way to do telemedicine, because you can distribute it, you are not tied up with expensive bandwidth, you can do the consults from your home, on the road, with wireless. We think that in the military, for example, within the next 5 years, every soldier will have their own personal communication device, a wristwatch, that will allow them to move information. I think the security issue is important to start planning now for legislation to ensure a minimum standard.

I will leave my comments at that.

Senator FRIST. Thank you.

Dr. Burgiss.

Dr. BURGISS. Thank you, Dr. Frist.

What we have done in Tennessee is primarily interactive consulting, as you could tell. We have tried to apply some Tennessee ingenuity using what we have. We do not have the infrastructure that the military might have concerning encryption, et cetera. But some of the things that we have done, such as point to point, as was mentioned in West Virginia, provides for security. Other things we are doing for security in clinics include using three ISDN lines instead of one. This makes it more difficult to put this data back together, by spreading it among lines.

Also, security is in our home telemedicine. You may have a question in mind of how secure is the home situation? When we are

doing a home consultation, both the audio and the video are digitally encoded. It is even more secure than the patient talking by phone to the nurse without the telemedicine.

If you have been in a home where you have a computer using a modem, which is like what we are doing, and if somebody picks up another phone on the line, they certainly do not hear anything, they do not see anything, and it all crashes. We are using technologies and some inherent considerations.

Another example is to transmit the patient's name and the data by separate paths. That has been a creative way for improved security that we have used.

These things have worked for us. But they will not work on the Internet. That is a different situation. I do believe and endorse that the Internet will need a different level of security, innovative security. Creation and work within the military and other branches will be very supportive of this technology that will be required.

Senator FRIST. Thank you.

Mr. Waitz.

Mr. WAITZ. I think the current state-of-the-art in terms of access to medical information really falls in two areas right now—devices that health care providers actually carry with them, things like smart cards, radio tagging devices—versus things that actually positively identify you based on biophysical parameters, biometric devices like fingerprinting, face recognition or retinal scanning. I think all of these devices, that are devices that you do not have to carry something with you, avoid the pitfall of when you want to access medical information for example not having that particular device there.

I think the biggest issue, at least in clinical environments that I have been in, is quick access to information and not providing the barrier in order to get access within the institution. As my colleagues on this panel have said, walk into any hospital in America today and that information is freely available inside the hospital.

I think the recommendation going forward is really secure transmission capability. I know there are technologies that the NSA is using that does not use encryption, it uses an optical technology to provide secure data transmission. I think, in essence, the work that is being done in electronic commerce will be leveraged for telemedicine applications. It is the same kind of problems, really, regardless of the application that is going across the Internet. All these applications have the same security and privacy issues.

Senator FRIST. Good. Thank you. Thank you all. The privacy issue and the security issue is obviously one that is very frightening to individuals, to patients, in that very, very privileged engagement of provider and patient. It is something that I think we must address, must stay ahead of the curve, without throwing new barriers up.

Senator Wyden.

Senator WYDEN. Thank you, Mr. Chairman. It has been an excellent program. I just have a couple of questions at this point.

First, maybe for the folks at the Telemedicine Association. I know you all indicated, and I had to be out of the room for just a couple of minutes, that you are going to send us a policy paper on Web sites. Could you, though, just for purposes of this after-

noon, take a few minutes and highlight what the Association's position would be in the two areas that I am getting the most questions about.

First, the question of practicing medicine without a license. Second, the question of commercial disclosure, when a Web site is involved in an area of health care where they are making money, what is the appropriate role?

As you know, there have been several celebrated cases—one of which was discussed in the New York Times just last weekend—that have raised this issue. If you could just highlight your position in those two areas, and then we will dig into the policy paper when it arrives.

Dr. POROPATICH. Yes, sir. I think the key uses right now for the Internet, as we are aware, includes general health information. Then the second issue would be clinical consultation; a patient wishes to get an opinion from a physician or a provider. Then the issue is raised, well, how do I know that the individual who is giving the information is qualified?

There needs to be, I think, within the medical community—within the associations perhaps is where I would target it—that they need to validate that the people on the other end answering these questions have the approval of their certifying medical agency, whether that is the Medical College of Chest Physicians, the AMA, whatever, a professional organization could endorse them in a way that does not necessarily imply further financial remuneration.

As you know, the most celebrated case recently, the gentleman who has developed a very high-profile Web site, a very prominent physician in this country, had to essentially eliminate his financial gain from this particular Web site. That kind of disclosure of financial interest I think needs to be addressed head-on. It is unclear to me at this point whether we took a specific stand at the ATA in our policy paper on that, sir. I would ask that I could come back and address that issue with you in my additional testimony.

Senator WYDEN. Can I just interrupt you at that point. I appreciate your candor. I hope that you all at the Telemedicine Association will come out very strongly for disclosure of commercial interest in this area. Because I think it could do great damage to this extraordinarily exciting field. It is a field that Dr. Frist and I are so excited about.

I think it could do great damage if what happens now is a lot of people are misled through health Web site, go to these Web sites believing that they are being run by nonprofit organizations, organizations without a pecuniary interest, and then all of a sudden, 6 months later, they find that they have in effect been steered to yet another deep pocket.

I do not happen to think we need legislation on this. I do not think we need to rush and write a whole crate full of laws at this point. But what will happen if we cannot get thoughtful, concerned folks like you all at your Association, with aggressive disclosure policies, we will see abuses. Then it does come to the doors of Dr. Frist and myself.

I want to hear you on the other point, but I am encouraged that you all are concerned about it. I hope that you will tackle this

head-on. Because if there are a couple of cases where people are flagrantly misled, this will do a lot of damage.

Dr. POROPATICH. Yes, sir. I think the medical societies need to take action on that. It could involve perhaps some validation of that individual giving the advice, an endorsement from that medical society.

The other issue that has been getting a lot of negative press with the Internet is in regards to prescription drugs being prescribed without a health care provider even seeing the patient. Viagra, antidepressants, a whole list of drugs are being made available to consumers illegally and unethically. That is another issue that is being raised I know within the pharmaceutical industry as well.

So we raise these issues in that ATA statement, sir, and caution consumers primarily to be very wary of who is the one providing the information and what kinds of professional endorsements that individual has from such medical societies or from other nonprofit agencies that can validate the statements that are being made.

Senator WYDEN. Are you saying that fairly soon, say within a matter of months, we will start seeing medical societies requiring disclosure policies in these areas? Is that essentially what you are hoping for?

Dr. POROPATICH. I think it is a hope more than a reality. I think the medical societies—you know, telemedicine has been in effect for almost 30–40 years now; 1959 was the first time in this country. We are in our third wave now. I think the medical societies are just now starting to embrace the notion of telemedicine. It is not a four-letter word as some people may perceive it. I think it is gaining a great deal of credibility within the medical community.

The medical societies, especially the American College of Chest Physicians, the Society of Critical Care Medicine, have now developed subcommittees, the American Dermatology Association, the American Dental Association. There are a lot of societies out there, sir, that have already started to have subcommittees to look at medical informatics in general, of which telehealth, telemedicine is one piece.

I think that is where we make the push to police these kinds of illegal actions.

Senator WYDEN. Well, that is certainly sensible. To some extent, the two areas can often intersect. Because practicing medicine without a license very often involves someone trying to engage in a practice for purposes of profit. At the same time when someone visits a Web site, they ought to be able to know about commercial interests. Hopefully you all can lay out a very clear policy of what you hope will happen around this country, and then publicize it aggressively. Because I can tell you, I would like to pick up on that.

I think that the role of the Congress in this area is not to rush and legislate and to write some new laws, but to give you all a decent berth to sort of prosecute this position. I would like to see it.

The only other area I wanted to ask about is each of you in your statements raised the question of adequacy of reimbursement. Again, I had to be out of the room for a few minutes. But except for one of you who mentioned I think fee-splitting, I do not think I got the sense of what your priority would be if you could wave

your wand and the U.S. Congress would make one change in Federal reimbursement policy that would be helpful to telemedicine.

So, if we could, for my remaining time, why do not we just start with Mr. Waitz and just go right down and let us just say you are in our shoes and you can make one change in terms of Federal reimbursement policy that would be helpful to telemedicine. Starting with you, Mr. Waitz, what would that be?

Mr. WAITZ. I think current laws today regarding reimbursement were built in a time when telemedicine was equated with video conferencing. As a result, a physician was available on both ends. Because of the high cost of the equipment, it was not foreseen that you potentially could have these kinds of interactions with low-cost technology between provider and patient directly without a physician at both ends. Currently that kind of situation is not reimbursed. That would be an area, we think, where there is tremendous growth and tremendous good for both the patient and the whole health care system.

Senator WYDEN. Dr. Burgiss.

Dr. BURGISS. Yes, I agree in concept that the problem that needs to be fixed is the way the Medicare reimbursement is being done by the law and rulings that went into effect January 1st. That law should be revised to treat telemedicine as any other care of medicine, as near as possible like an office visit, for reimbursement.

We certainly provide telemedicine care like an office visit. We know that the model of having a physician come with the patient for a consultation is not the model that is used in conventional care. Rural physicians certainly do not have that kind of time and they do not have high-level nurses either. They would do well to have a licensed practical nurse.

I would think that No. 1 is Medicare reimbursement and I think with a Medicare revision, it will help Medicaid and other reimbursements to follow suit. Thank you.

Dr. POROPATICH. Sir, if I had just one wish, it would be to eliminate the Medicare limits placed on reimbursement for store and forward teleconsultation. This would open up telepathology, for example, where we are still waiting, which is very analogous to teleradiology which is being reimbursed. We fax EKG's back and forth across States. Store and forward, in my mind, is a very viable means of doing telemedicine and providing quality patient care.

We do provide, as you know, for video teleconference, when you have talking heads and providers on both ends. However, the store forward is, in my mind, the way we are going to be practicing medicine in the future. That would be my wish. Which would then incorporate other forms of other applications, such as home health care, which could also then be reimbursed.

So I think one wish would be to open up the Medicare laws and reimburse for store forward.

Dr. FERRANS. The Task Force for Medical Technology for the Southern Governors Association issued nine specific recommendations regarding Medicare. They have been submitted into the record. I would just highlight, in addition to the fee-splitting, this idea about the health professional shortage areas should be changed to what we call MSA's, or non-metropolitan statistical areas.

I agree with the other comments about store and forward. This idea about having to have a physician present to present the patient—I mean, as an internist, if Dr. Frist was seeing one of my patients, I do not understand why, for him to be reimbursed, I have to be in the room with the patient to present him to him. It does not make clinical sense from that standpoint.

So I think the regulations just need to be simplified to provide coverage like any other encounter.

Senator WYDEN. Thank you.

Dr. BRICK. I would confirm what the other fellows said. They have already asked for most of my wishes. But I would add then, if I got another wish, that we get some reimbursement for the technical costs of this. Most of the programs that I know of in this country are being run out of State university medical schools and other large not-for-profits like that. We are now paying the technical costs, buying the equipment, paying the phone lines. These things are a lot cheaper than they used to be, but they still cost.

For this to become real medicine, and it really is real medicine—it is not telemedicine, it is real medicine—we have got to get a way to pay for the technology. So I would add that to the wish list.

Senator WYDEN. Thank you, Mr. Chairman.

Mr. WAITZ. Can I add something? I think it is really important in talking about telemedicine to say that it is really enabling technology. Telemedicine is not an end onto itself. I think the reimbursement really needs to be thought of in those terms. So the reimbursement should be technology neutral.

Senator FRIST. Thank you.

Several of you mentioned in your written testimony the Universal Service Fund, the provision in the Telecommunications Act of 1996, the provision dealing with establishing telecommunications discounts to rural hospitals through the Universal Service Fund, with recommendations of urging the FCC to fulfill the intent of the Telecommunications Act. Anything to add to that?

Dr. Ferrans, you very specifically went into it. Has it been a total sort of nonstarter to date? Is there any history, any positive direction? Your letter, will hopefully have an impact. I will take a careful look at that, to see how we can facilitate the process.

Any other comments that I should know about in terms of the lack of action on that, Dr. Ferrans?

Dr. FERRANS. I think it is a nonstarter. Like someone else said, the single greatest barrier is the forms that people have to fill out.

Senator FRIST. It is the complexity of the forms at a rural hospital if they are sitting there?

Dr. FERRANS. Impenetrable barriers, No. 1. The other thing is that they have limited eligibility of services to T1 lines. I think all of us have been talking about trying to get broadband services. So larger bandwidth should also be discounted. We believe that long distance carriers should also be able to participate. They are laying fiber everywhere. Whoever can come in cheapest for the rural hospitals, I think the competition should be there. I think that that is obviously in a broader perspective that the committee has jurisdiction over. But certainly the FCC has limited it to only local phone companies who can provide that. That situation is not open today, as we all know.

Senator FRIST. Other comments? Yes, sir, Dr. Poropatich?

Dr. POROPATICH. Yes, sir, Senator Frist. There are several problems that I would just like to reiterate. It is in the letter that we sent out in March. There is a 28-day posting period, which seems unduly necessary. Eliminate the calculated charges for discounted services. It does not seem that that is a worthy thing.

Getting to Dr. Brick's comment, reimburse for other costs such as ISDN connection fees, toll charges for connections to urban areas from the health professional shortage area, calling into the city. That seems unnecessary. Solicit more public health agencies to participate. There are a few public health agencies in these areas that have actually submitted proposals because of the burden of going through this process.

Discount all forms of communications, not just T1 lines. This specifically addresses T1, and that has been mentioned already. Avoid local and long distance phone company charges which are built in there. The Rural Health Program should include schools and libraries regarding this high-speed communications. The Rural Health Program should be coordinated with the schools and libraries, which it currently is not. Then consider all rural health programs, not just the nonprofits in this particular application. Also include in this program, sir, long-term facilities, home health and skilled nursing.

I will leave my comments at that.

Senator FRIST. Thank you.

Other thoughts or comments?

Dr. BRICK. I was on a public committee. I was asked to be on it by Senator Rockefeller to develop the rules for this, after it was written. I was the chairman of the rural subcommittee. All the things that these fellows have talked about here are all things that we brought up in that committee. We thought that we were done with it, that we had it fixed.

I went back to West Virginia and I thought, boy, we are going to get our phone lines cheap and we can pay for this, and this thing is just going to explode. It did not happen. We did not get what we expected—little twists here, little twists there. They made it more and more difficult. Pretty soon we were not able to get the breaks on the phone lines that we needed. I would agree that it has not come across the way we thought it was going to.

Senator FRIST. We will keep the record open for 7 days for other questions from my colleagues as we go forward. There is a bill, S. 980, that has been referred to that I am a cosponsor on, that Senator Baucus and others have participated in it as well. I would be very interested in each of you looking at that—it is a rural health bill—that apply to telemedicine and make specific recommendations on how that might be improved. It is a very important bill that covers a lot of areas.

But as we look at telemedicine and we look at the Next Generation Internet, which is mentioned in much of your testimony, which is a bill that I was the author of that came out of this particular committee, you look at broadband, the potential of lowering costs once we take advantage of the tremendous technology that is, over the next 12 months, going to be coming online, I would be very interested in focusing on telemedicine, based on your comments

today, looking at S. 980, pulling out where we might improve that particular bill.

Again, there are a number of issues. I think that we will bring the hearing to a close. Let me just give any of you an opportunity to touch upon something that we may not have touched upon yet. Again, your written statements are superb and bring to my attention a number of issues that I have not thought about, that are very important, that we are all thinking about. Any other points that you would like to make before we close?

[No response.]

Senator FRIST. Let me then just basically close by saying that your participation really does help in painting this picture, to give us meaningful insight as we go ahead. The technological advances are rapid. We have this long history with telemedicine. The credentialing issues, the across State line issues, the technology barriers are all issues that we will continue to explore.

The privacy issue is one that has to be addressed, and I think addressed pretty soon. Because although you give me some reassurance that today we are using the existing technology in lots of different ways and there have not been big problems, there is a huge difference between me going across town, going in a hospital, and because I am a doctor, having access and taking a record out and misusing it versus hitting the key on a computer and pulling it out and sending it to 50 million people around the country. It does introduce new concepts that we as policymakers will continue to need your help to address.

This, again, is a dialog that is ongoing. I want to express my appreciation for all of your supporting this, and for taking time to help educate us.

Thank you very much. With that, we stand adjourned.

[Whereupon, at 3:55 p.m., the hearing was adjourned.]

APPENDIX

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. BILL FRIST TO DR. JAMES BRICK

Question 1. What will telemedicine look like in 5 years? In 20 years?

Answer. We believe that in West Virginia, telemedicine will still be a viable option for our citizens to obtain their specialty health care. *Will it change five years from now?* Yes. Chances are that both the low-end picture phones will be of better quality and will be used more frequently as well as the high-end video over the Internet. The World Wide Web will be more reliable and the problems of streaming of video and lack of bandwidth will be answered. In twenty years, we believe that telemedicine will be an invisible part of all health care in our country, just as telephones are today. Telemedicine will save many rural practices, clinics and hospitals by keeping the patients in the community for their care. There will be universal licensure for all practices of medicine that will allow physicians in one area of the US to treat patients in other parts of the country via telemedicine.

Question 2. Can private industry accelerate the growth of telemedicine? Or is this a question of policy?

Answer. Private industry can aid in the growth of telemedicine via technology advances and by the private insurance carriers reimbursing for clinical telemedicine encounters. The private insurance industry needs to consider reimbursement to providers for operations of their equipment. Policy certainly has influence over the private sector. Policy makers need to support efforts for open architecture of telemedicine systems and standards for all telemedicine equipment and procedures. A combination of both policy and private sector initiatives is what is needed for continued growth.

Question 3. How can universities accelerate the growth of telemedicine in rural communities? Are there targeted training programs for medical students and residents? If so, are there special incentive programs for those who participate?

Answer. Yes, universities can accelerate the growth of telemedicine in the rural community. Often, it has been the university academic medical centers that have made the in-roads into the rural communities. These rural communities have needs that work well with the missions of these centers of learning and often present opportunities for the medical students to further their experiences in medicine. At the Robert C. Byrd Health Science Center in Morgantown, our students rotate into the communities during their training. Telemedicine allows for them to stay "connected" to Morgantown, so that they may receive the same academic opportunities while they are on rotation.

No, there are no incentives other then experiencing medicine in a new environment and learning how to use the medical tools of the future via telemedicine.

Question 4. You mentioned in your testimony that medical education has consistently been the number one user of your network. Can you describe some of these applications?

Answer. We have nursing and pharmacy courses, for credit, taught over the network statewide. We have continuing medical education (CME) credit given for various lectures for multiple medical disciplines. Additionally, we give access to our residents on rotation to lectures and grand rounds. We also provide communities throughout our state network, health information that is useful and timely.

Question 5. What do you believe is the major contributor to the increase in the use of telemedicine: equipment cost reduction or improved care to the patients?

Answer. We believe that both have merit. With the lowering cost of the tools of telemedicine, more locations can entertain the idea and make it a reality. Needless to say, it is the improved access to specialty care and the convenience to the patient that makes the decision of using telemedicine so appealing. Additionally, it cannot be overlooked that here in West Virginia, the state via contracts with telecommunications carriers, have made the access and cost of digital communication affordable. If on the national level, telecommunication costs could truly be reduced for small

rural health care centers, this would indeed make for an increase in the use of telemedicine.

Question 6. Does MDTV collaborate with other states?

Answer. As of today, no collaborative arrangements have been made. We do however, communicate with the telemedicine community concerning issues of importance. We additionally host future telemedicine groups if they require demonstrations of the technology and need assistance with start-up questions.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON BILL FRIST TO DR. SAM BURGISS

Question 1. What will telemedicine look like in 5 years? In 20 years?

Answer. During the next five years, we expect to see telemedicine to homes grow significantly. The traditional homecare patient will receive care using telemedicine when suitable to his or her medical condition. This care will include videoconferences with a provider or vital signs monitoring, or both based on the need of the patient. In five years, homecare should utilize advanced non-invasive monitoring sensors worn by the patient, including blood glucose and cardiac function sensors as well as others available today. The patient monitor will have a wireless connection to a receiving unit in the home, allowing the patient mobility. This receiving unit will evaluate the data to determine if alarm values have been exceeded and will notify a central monitoring station attended by a nurse or other provider who can help the patient with his or her condition.

Urban homes will have access to standard telephone lines, high-speed telephone lines, cable television lines, and wireless communication for telemedicine. In the rural environment, standard telephone lines will be used until a cost-effective wireless technology exists for each home, since it is not likely that additional wired infrastructure would be established in rural areas due to cost. Patients will either use dedicated electronics or their computers for telemedicine. The Internet will provide the major backbone for communication, which will require enhanced privacy and security for the patient. In five years, it is not likely that all patients will become literate in computer use and thus, will need units designed for telemedicine to provide simple operation and reliability.

Telemedicine will spread in homes beyond the traditional homecare patient to any patient with a chronic illness or who needs medical care often. The use of present telemedicine clinics held in community medical facilities will shift into home telemedicine for many patients. The goal of this care will be to improve quality of life and to reduce the cost of care by preventing the need for care at a more acute level. In 20 years, telemedicine will provide care where the patient is located, which could be at home, at work, or while traveling. The patient will use a digital video wireless personal telephone (like cellular) to connect with his or her physician or other care provider. The patient and provider will have a videoconference about the patient's condition. A camera on the unit will show skin and wound conditions. If the patient needs to provide vital sign data, he or she will have a small sensor that plugs into the data port of the telephone to make the measurement and send the information to the provider. If testing or treatment at a hospital is required, the patient will be referred to a hospital near their location. Medical records will be forwarded to the appropriate location, or patients will carry smart cards containing their records. This concept raises the question, "Will it be better in the future to have medical records distributed to all locations where a patient might travel, or would it be better to distribute care to all locations where a patient might travel?"

Question 2. Can private industry accelerate the growth of telemedicine? Or is this a question of public policy?

Answer. Private industry and public policy makers should work together to accelerate the growth of telemedicine. Public policy is needed for telemedicine examinations to be treated without discrimination as face-to-face consultations between patients and providers. Policies must allow reimbursement for professional and technical fees, promotion of telemedicine as accepted practice, removal of licensure boundaries, and the opportunity to use telemedicine when needed to provide the correct level of care. Our telemedicine program has shown that providing the correct care at the correct time can decrease medical cost (Burgiss, et.al. Telemedicine for dermatology care in rural patients. Telemedicine Journal, 3,3,1997.). Funds saved by providing the correct level of access should be used, in part, to pay the technical expense of delivering care by telemedicine. This includes the cost of equipment, communication lines, and personnel to provide this service. The goal will be a net reduction in the cost of care with improved health.

Private hospitals and other private healthcare businesses ideally will provide the telemedicine service infrastructure. These private industry groups would establish interconnected health care networks using telemedicine to support a patient in their region just as if that patient had access to a tertiary care medical center. One goal of interconnected networks is to allow a patient to be seen by any needed provider.

Question 3. How can universities accelerate the growth of telemedicine in rural communities? Are there targeted training programs for medical students and residents? If so, are there special incentive programs for those who participate?

Universities have the capability to provide medical education programs using telemedicine networks. These programs are needed by care providers in rural communities and are required for credentialing. Health care professionals in rural communities typically do not have access to educational opportunities without traveling to a metropolitan region, which requires a large amount of time away from caring for patients in their community.

Several telemedicine programs are beginning training for medical students and residents. Medical faculty members of the University of Tennessee Graduate School of Medicine who provide consultations using the UT Telemedicine Network have introduced medical students and residents to telemedicine. Nursing students have also been to the telemedicine department for orientation training. More formal training in telemedicine is being discussed for these students.

Question 4. You mentioned in your testimony that the University of Tennessee Telemedicine Network has increased by an average of 178 percent per year since its opening in 1995. Can you describe some of the challenges and opportunities in accommodating this level of growth? Do you expect this rate to continue?

The challenge has been to operate the telemedicine department as a dedicated team willing to do what is needed to make telemedicine successful for the medical facility. Team members must be flexible and sufficiently dedicated to change from one task to another when priorities change. Every opportunity to provide a patient service, demonstrate telemedicine for providers, and expand the program must be addressed as a new challenge in providing the best possible service to our customers. The energy, enthusiasm, and willingness to address any appropriate "instant opportunity" is similar to that of an emergency department and different from some other areas of medical care.

Opportunities are exhibited by the service provided to the patient, the growth of the program, and the program is increased in national visibility. The primary opportunity is to be involved with the bridge between technology and health care that can revolutionize the delivery of that care.

The rate of growth in the first four years of the program was affected by a slow beginning with a single clinical site and expanding into homecare and patient services in the fourth year. Between January 1, 1998, and June 30, 1999, the patient encounters during each six month period averaged a 50 percent increase above the previous period. The program is presently in a rapid expansion at the present with homecare sites increasing from eight to 69 in the next few months. In future years the growth may decrease to a steadier rate of 10 to 20 percent per year. The actual increase will depend on the development of new opportunities for the application of telemedicine.

Question 5. You stated in your testimony that 68 percent of the patients rate "seeing the doctor" by telemedicine better than a traditional office visit due to the focused attention of the care provider. Can you explain why the care provider is more focused in a telemedicine session than a traditional office visit?

Answer. During our telemedicine clinics, the provider sits at a desk with the patient record, a camera, and a video monitors. Without moving from the desk in our telemedicine exam room, the provider visits the patient at the first site, completes notes for the first patient, prepares for the second patient, visits with the second patient at another site, and completes that patient's notes. The provider would normally be walking between exam rooms in a typical office. In the telemedicine exam room, there is no chance for the thoughts of the provider to be interrupted by staff and patients, as there would be in the hall of the typical office. In a recent telemedicine clinic, our dermatologist examined 14 patients in two hours and every patient response was very positive about the quality of the interaction. A nurse or medical assistant supports the provider with patient records, sending prescriptions and documents by telefax, obtaining medical references, and operating the telemedicine system. Thus, the provider is sitting at a desk concentrating on providing care without interruptions and distractions. Recent data from the UT Telemedicine Network further verifies the preference of the patient for "seeing the doctor" by telemedicine as compared with a traditional office visit. Our latest report (including 60 patient surveys from 112 visits from January through August 1999) shows that 95 percent rated telemedicine "more convenient" than an office visit in Knoxville. This is an

expected response since many patients would have to drive for an hour to see the physicians in Knoxville. The following question asks "Compared to an office visit, how would you rate seeing the doctor by telemedicine?" the patient is asked to indicate "better," "same," or "worse." On this report, 75 percent rated the telemedicine visit "better" and 25 percent rated it the "same" as an office visit. None rated the telemedicine visit "worse." Comparison with the "convenience" question shows that the patients are actually rating "seeing the doctor" rather than the convenience.

To the question, "Based on your experience today, would you be willing to be seen again by a doctor using telemedicine?" 97 percent responded "yes." When asked "Would you recommend seeing a doctor by using telemedicine to your family and friends?" 97 percent responded "yes."

Some of the comments provided by patients are shown below:

This is the most fascinating experience I have ever seen in the field of medicine. The nurse and doctor were very helpful and explained procedure to my understanding; very cordial and made me comfortable during the exam.
It was quite an experience. I found that it was easier to talk to the doctor on TV than it would have been if he were there in the room.
I was not asking my last question to someone walking out of the room.
The doctor impressed me very much. Thank God for new technology.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. BILL FRIST TO DR. RONALD K. POROPATICH

Question 1. What will telemedicine look like in 5 years? In 20 years?

Answer. Five years—with FCC Telecommunications Act of 1996 and development of new shared bandwidths across all communications businesses I think home health care telemedicine will become a major force in meeting the health care needs of Americans. Low cost and readily available bandwidth will be available, to include rural America. Legal issues with reimbursement, will be resolved as HCFA completes its multiple pilot projects on Store-Forward TMED, showing its utility in delivering quality low cost health care. I would expect that the medical community will gradually increase its acceptance and use of the use of telemedicine in health care as more computer savvy physicians emerge from medical school into key medical leadership roles.

Tele-pharmacy will evolve to a level whereby patients can walk up to vending machines in most public places and acquire medications similar to Banking ATM machines.

Patients will begin to carry their personal health care records on them in an electronic format—similar to the credit card (Smart card) or medical dog tag (Personal Information Carrier—PIC), currently being evaluated by the Department of Defense.

Public health kiosks will begin to emerge whereby patients can consult directly with medical experts on health questions or medical diagnosis and treatment recommendations. All transactions will be logged on the patients PIC or Smart card for documentation.

Health care centers will be three types—hospital based, out-patient based, and virtual (i.e. WebMD). As more physicians choose lifestyle issues over long hours away from home for various reasons (woman on convalescence leave after having a baby), medical payors will have a cadre of medical expertise that fall directly in these three categories.

Twenty years—biosensor technology will have evolved along with wireless services, such that all Americans will be able to wear health care monitoring devices (perhaps on a wristwatch-type device) that feed into a central medical database, rich in Knowledge Management. This Artificial Intelligence monitoring station will directly notify patients of times to take medications, track trends in patient vital functions, and alert to possible medical problems developing. A patient's health care provider will be included in reviewing this data and making recommendations directly with patients. The Electronic Patient Record will have already been developed, and a large archive of medical data will be stored and reviewed (data-mining) enabling the best treatment courses for all diseases. Bandwidth and memory storage issues will not be problematic for health care workers engaged in telemedicine (all health care providers!). As such, remote tele-surgery will be widely utilized with surgical expertise located in Centers of Excellence, and general surgeons or physician extenders (PA's / Nurse Practitioners) actually located with the patient and performing the surgery.

Home health care will have evolved to such an extent that most testing—sleep studies, ultrasound of body parts, x-rays, etc will be consolidated either in the home or in most public places close to home. Holographic images of health care providers

will be electronically transmitted into the patients home such that physical exams could be performed, appearing as if the provider is actually present.

Question 2. Can private industry accelerate the growth of telemedicine? Or is this a question of public policy?

Answer. Accelerating the growth of telemedicine is both a public policy issue and an important role for private industry. Private industry, from developers and vendors of equipment and services to health care facilities, will continue to be pivotal in the deployment of telemedicine. However, issues such as licensure of health professionals, reimbursement by government-run programs and establishing liability boundaries remain barriers that require government action. It is critical that governmental institutions from Congress to state and local governments take positive actions to support telemedicine.

Question 3. How can universities accelerate the growth of telemedicine in rural communities? Are there targeted training programs for medical students and residents? If so, are there special incentive programs for those who participate?

Answer. There are several targeted training programs for telemedicine that exist today. East Carolina University, The University of Vermont, Oklahoma State University and the University of Texas Medical Branch at Galveston all have telemedicine training programs. The military is currently developing a five block, two hours per block curriculum on telemedicine.

Universities need to develop curriculums and teach at early years of training. Key will be the need to broadly expose all health care fields to the concepts needed for utilizing telemedicine in their respective fields.

Question 4. You mentioned in your prepared statement that the military has addresed the privacy issue by requiring a separate secure serve to be used for all medical transactions with encryption of all medical related files.

(A) Are you aware of any similar type of transactions being taken by the private industry to protect patient privacy and confidentiality?

(B) What would you estimate the additional cost would be for an independently operated secure server?

Answer A. There are many activities underway in the private sector to maintain patient privacy. The move toward computer-based patient records raises a number of substantive and process issues. We do not keep records of individual policies and practices followed by individual private institutions. However, there are privacy and security efforts underway in practically every major hospital systems regarding protecting patient privacy when dealing with either computerized patient records or transmission of medical data and images over networks. The National Library of Medicine is funding several demonstrations on various uses of privacy and confidentiality in the use of telemedicine. One of the concerns that ATA has made public is the privacy of patient information when provided over the Internet to a commercial health or medical Web site. The level of use of encryption for such transactions is unknown.

B. The cost of an independent server can vary. However, the cost of the equipment and appropriate software can be obtained for as little as $2,000. Additional expenses would include the cost of connecting to the communications network.

Question 5. How significant a problem is reliability of communications network for telemedicine?

Answer. This is a difficult question to answer. There are broadband issues with VTC, both in rural and metropolitan areas—both differ. Rural communities are limited to availability of high speed communications networks as well as reliability and cost, whereas metropolitan areas are less effected. I think this a moving target as more areas come on line with alternate bandwidth choices—wireless (cellular, satellite) as well as terrestrial (cable, ADSL). I have had problems in the past with various ISDN providers having different "clock speeds" for their proprietary ISDN systems, such that connecting between facilities was impossible or fraught with reliability concerns. This is less of a problem now as ISDN development matures in this country. Reliability with the Internet has been less of an issue with the DOD and is more dependent on whether a user has to compete with a small finite "pipe" coming into their work area, vs. slow computers that make downloading information tedious. Again, I think it less of an issue as technology improves for both hardware as well as bandwidth availability.

A related issue is providing reliable and affordable communications network to the home. As I mentioned above telehomecare is one of the most promising new applications of telemedicine. While much can be accomplished over voice grade telephone lines some applications require more than just plain old telephone service. Deployment of high speed networks to the home via wireline, wireless or cable should be a priority in the development of telecommunications related public policy.

Question 6. Can you elaborate on any licensing reciprocity efforts that the ATA has been involved with?

Question 7. Can you update the Committee on any activities ATA may be involved with on flexible and permissive licensure initiatives?

Answer. As I mentioned in my earlier testimony, the ATA Board of Directors recently adopted a statement regarding state medical licensure. Although we have not been directly involved in any reciprocity or related initiatives related to licensure, several of our members have been involved in developing the recent statement issues by the Southern Governors Association on this issue and we endorse efforts by both the Southern Governors Association and the Western Governors Association to address health and medical licensure issues as they relate to telemedicine.

Question 8. You mentioned that homecare applications will benefit greatly from the availability of broadband networks. In these applications, what is the range of the estimated cost for the equipment at home? Do the patients incur the cost of the equipment and associated cost such as access cost?

I have met with various vendors setting up homecare with telemedicine follows. In my opinion over the past few years the equipment has been better designed for a less computer savvy patient. Those applications that have been the most developed for remote patient monitoring homecare include: Congestive Heart Failure (CHF), Diabetes, and Chronic Obstructive Pulmonary Disease (COPD)—which includes asthma, bronchitis, and emphysema. Most vendors will install the equipment to operate over POTS. In many cases fees are assumed by the patient's insurer and the medical clinic providing the consultative service. The provider is charged an amount for having so many patients on the system—i.e. $100/patient start up fee, and $10/month maintenance fee (These numbers were from a vendor from February 1999). The patient assumes the cost of the phone charge and a monthly fee for equipment use (perhaps around $15 per month). VTC based telehomecare consultations are not fully reimbursed at the moment but ATA has been advocating for the Health Care Financing Administration to allow homecare agencies to use telehomecare devices in the delivery of homecare services under Medicare.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. BILL FRIST TO MR. AARON WAITZ

Question 1. What will telemedicine look like:

In 5 years?

Answer. In the next five years we see a growing trend towards patient centric devices used in telemedicine. This will allow physicians and other health care providers to directly interact utilizing the hi-speed digital communications infrastructure that will be operational within this country. These provider/patient real-time video interactions will also allow physiological monitoring to provide a virtual presence for routine procedures. These kinds of interactions will provide better access to health care providers, especially in rural areas, and improve efficiency and productivity, thus reducing the overall costs of patient management. Telemedicine consults will provide better screening of patients, eliminating unnecessary visits to the emergency room or clinic. Physiologic sensing devices will be in the home or worn by the patient and provide continuous monitoring of physiological functions. Some of this technology is now appearing on the market, but five years from now the equipment will be more sophisticated and even easier to use. It will not only provide the monitoring function, but will provide real time computer aided analysis of the data collected. This capability will be used to monitor specific disease states as well as maintain the patient's state of well being. We expect to see these devices operate in wireless environments. However widespread perfusion of nomadic devices will probably be in the five- to ten-year range driven mostly by consumer/commercial deployment.

With the improved ability to transmit image data over the next generation Internet we will see growing utilization of telehealthcare. No longer will studies have to be repeated by the referring doctor due to lack of timely access to diagnostic images and reports. These will be available through a secure Internet connection. This should reduce costs from the healthcare system by removing the necessity for redundant diagnostic imaging procedures. Physicians will be able to collaborate more easily to seek out opinions from their peers. No longer will the bounds of their consults be limited to physical geography.

In 20 years?

In 20 years, "Mores Law" predicts there will be a 10,000-fold increase in computing power available. It is expected that similar increases in communications bandwidth capacity will occur. This development, coupled with ubiquitous wireless

network access will drive fundamental changes in the way healthcare is delivered. Remote interactive sessions between providers and patients will be commonplace. Access to this capability will be ubiquitous, convenient and affordable. Access to an integrated patient's record will be widely available regardless of number of physicians treating that patient and regardless of their physical location. This patient record will be a multimedia report rich with all the imaging content and diagnostic interactive reports. The physician will be able to access vast secure databases to correlate a patient's indication with other patients suggesting the best course of action. This integrated record will also contain information linking family history, lifestyle and dietary information to allow diagnosis by looking at the patient's total condition rather than today's limited access to the complete picture. This kind of integrated record will allow focus on management of a disease in a holistic approach rather than today's treatment of independent events.

We expect to see common usage of implantable, self-monitoring and self-regulating devices (smart devices) programmed by your doctor. These devices will continuously monitor your health, provide information into your medical record and alert the patient of pending problems.

Even 20 years from now, we still see that some conditions will require face-to-face interactions for diagnosis or therapy. However, virtual sessions will replace the more common visits done today. These sessions will allow the healthcare provider to be able to simulate the four senses (hearing, sight, touch, and smell) currently used in a diagnostic consultation providing true virtual presence. The physician will have access to ″super human″ capabilities due to powerful computer aided processing. We expect that tele-surgery will be done on a limited basis for routine procedures. This will allow rural community hospitals to provide the quality of care equivalent to the leading institutions. Complex data analysis will be done by interactive computer systems and provide expert consultation for the prescribed diagnosis or treatment. This coupled with dramatic advancements in genetic science will dramatically raise the level of quality of care while improving productivity and cost. The costs associated with managing a patient will take a broad long-term view rather than the short-term episodic state we practice today. Data mining of these vast secure libraries of patient history will allow use to more effectively determine the best course of treatment that will improve patient outcomes in a significant way while improving the patient's quality of life in a meaningful way,.

Question 2. Can private industry accelerate the growth of telemedicine? Or is this a question of public policy?

Answer. Private industry will continue to innovate in the area of telemedicine as long as the market materializes. However, private industry alone cannot accelerate the growth of telemedicine. Public policy can facilitate the process by addressing barriers to grow, specifically provider licensure requirements and the reimbursement policies of health systems, like Medicare and Medicaid.

For true acceleration, public policy should remove barriers or, ideally, provide incentives for adoption of technologies that have the potential to save money and improve care and outcomes. Reimbursement should be formulated based on treatment of a patient's condition regardless of how the treatment is physically delivered. We must insure that legislation is technology neutral. We are living in a time where the pace of technological change is constantly increasing. We cannot afford to have barriers that hinder the acceptance of new medical procedures or products that will fundamentally improve the entire healthcare delivery system. If a technological neutral policy is adopted, then market economics and improved patient outcomes will drive the growth.

An important area where national funding is extremely important is in facilitating the research and development of standards. Standardization of communication protocols, communication infrastructure and the integrated patient medical record are fundamental requirements for full realization of all the benefits touted for telemedicine. Government can play a role in accelerating these activities by funding the R&D associated with the development of these standards and providing test beds. One important area, which is a major impediment to integration of today's medical information systems, is the lack of a standard patient identifier. Without this, heterogeneous information systems can not reconcile a patient's records across multiple institutions. Of course with this patient identifier, we need to insure that safeguards are in place to insure the security and confidentiality of those records.

Question 3. How can universities accelerate the growth of telemedicine in rural communities? Are there targeted training programs for medical students and residents? If so, are there special incentive programs for those who participate?

No comment

Question 4. Can you elaborate on the potential that telemedical technologies have on increasing the productivity of workers in the health care professions?

By removing distance as a factor in the delivery of medical treatment, productivity can be improved. For example, the workload of a single home health care nurse can be improved from five visits per day to 15-25 visits per day by using a telemedicine technology.

By improving access via telemedicine, more effective triage can be accomplished. Patients can be cared for by generalists able to handle the case and higher skilled health professionals concentrate their specialized attention on patients requiring that level of skill.

Also, are these savings from increased productivity on the same level of savings due to improved patient monitoring?

More clinical research needs to be done in this area. Nevertheless, we believe that savings from improved patient monitoring ultimately will be significant, per patient and throughout the healthcare system. Long term clinical outcome studies are necessary to provide the conclusive data needed to support this claim.

Savings from increased productivity are easier to quantify and the volume of encounters is large. For example, in home health care, large savings can be demonstrated by increasing nurse productivity by two or three times, assuming an equal outcome. For example, in telehomecare, closer monitoring can result in fewer emergency room visits or hospital readmissions, or can keep a patient's health status from deteriorating as rapidly.

Question 5. Can you distinguish between the quality of care that will be offered by direct linkages between health care providers and their patients and those offered by current linkages?

- Closer familiarity with the patient's condition, response and support mechanisms increases the chances of the ″right″ treatment.
- Faster response and treatment by the provider improves outcome. (Provide the "right" treatment faster).
- Closer and more frequent monitoring increases patient compliance with treatment plan and medications, which can impact recovery times.
- Increased patient satisfaction.
    - Direct access reduces anxiety, increases feeling "safe"—results in a more positive emotional state.
    - Patients spend more time at home, with family and not in institutions.
- Behavior modification to wellness mode & self-monitoring.
- Provide access that cannot be easily obtained in rural areas.

PREPARED STATEMENT OF DR. ARNAULD E. NICOGOSSIAN, ASSOSIATE ADMINISTRATOR, OFFICE OF LIFE AND MICROGRAVITY SCIENCES AND APPLICATIONS, AND CHIEF MEDICAL OFFICER, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Mr. Chairman and Members of the Committee:

Mr. Chairman and distinguished members of the Committee, I am delighted to have this opportunity to provide information on NASA's telemedicine activities, specifically innovative technologies and how these can be applied to rural health care.

NASA has fostered the development and application of telemedicine as an inherent tool in our practice of medicine for human space flight, which is conducted in a remote and hostile environment. NASA physicians have faced a challenging dilemma in that our astronauts have not always been within reach. During the early days of mission planning, we had to develop the means to monitor the physiological status of our astronauts, and provide medical care from a great distance. NASA experience during the Apollo flights, the Apollo-Soyuz Test Project, Skylab, and onboard Mir provides ample evidence of the utility of telemedicine—bone and muscle loss, immune changes, and radiation effects. We successfully diagnosed and treated. . . . The early telemetry systems developed for telemedicine have become more sophisticated through the years, going beyond monitoring to teleconsultation and distance learning, aiming toward the development of advanced sensors and the use of virtual environments for training, and possibly treatment. As with much of NASA's technological developments, the technology that enables our use of telemedicine, telepresence, and virtual reality is now being used for the benefit of non-astronauts as well; for all of us here on Earth.

Although NASA's main purpose for developing telemedicine is to support space travelers, we utilize ground-based activities to investigate and promulgate new technologies, protocols and procedures.

In 1997, NASA established an integrated strategic plan for telemedicine, which formulates approaches that provide opportunities for evaluation and adoption of technologies for space flight and potentially for applications to terrestrial settings.

This plan involves activities in biomedical, medical, environmental monitoring, clinical care, enhanced diagnosis and treatment, and medical education. NASA defines telemedicine as the integration of telecommunications information, human-machine interface, and medical care technologies for the purpose of enhancing health care and maintenance in space flight.

Telemedicine in space flight and on the ground has been practiced through the exchange of information, data, images, and video across distances using telecommunications networks such as telephone lines, satellites, microwave, and computer networks like the Internet. Today's telecommunications technology, which is characterized by high-speed links that connect the world, provides accessibility in real-time and this can greatly enhance the delivery of medical care. The available technologies can link remote locations to larger medical centers to provide an opportunity for specialty consultations that might not otherwise be possible. The application of telemedicine offers advantages in terms of both cost-effectiveness and improved care to remote areas, disaster sites, and under-served populations.

NASA has a rich history in telemedicine development. Much of the recent work in telemedicine has been focused on applications on the Internet. NASA was one of the very first to implement telemedicine on the Internet, and recognize the important value of store-and-forward telemedicine. NASA, under Administrator Daniel Goldin, has been pushing the technology envelope in the area of information and intelligent synthetic environments for the purpose of enhancing safety and further reducing the cost of systems design. Under the NASA Administrator's leadership, we are also developing biologically inspired technology, biometrics, and nanotechnology which will further improve health and safety during human and robotic missions in space. These technologies will provide autonomy and reliability of operations. Technologies developed for space applications will have direct benefit to terrestrial applications as well. Combining the multimedia computer, computer networks like the Internet, and the ability to digitize, transmit and manipulate images, allows for high quality medical care, at reduced cost, and with far more convenience for patients and health care providers alike.

NASA Ames Research Center (ARC) has partnered with several other agencies and departments of the Federal government to develop the Next Generation Internet (NGI). One promising application is the use of the NGI for telemedicine. In addition, the NASA ARC and several other NASA Centers are connected to the NASA Research and Education Network (NREN) for exchange of data and collaborative activities at very high speeds. The Cleveland Clinic is working with NASA ARC, NASA Glenn Research Center, and the NASA Johnson Space Center to explore the transmission of 2-dimensional color Doppler echocardiographic images and how this technology might be useful in biomedical research and for crew health on the International Space Station (ISS). A new center for biocomputation, linking ARC and Stanford, has been established to improve not only training but also to benefit patients who require complex reconstructive surgery.

Finally, we are developing new, portable, and compact technologies that will allow *in situ* diagnosis of illness or injury during space flight. These technologies will integrate information systems and microsensors that will provide the capability for rapid, non-invasive diagnoses of infectious disease and the use of virtual reality as a treatment interface. Such capabilities are afforded by systems such as the Telemedicine Instrumentation Pack (TIP), a compact and portable doctor's office for medical evaluation and diagnosis, which will be a useful tool in areas where medical capabilities are severely limited, such as areas struck by natural disaster or isolated villages in underserved parts of the world. The TIP was successfully evaluated on the STS-89 Shuttle mission in January 1998. In addition, the TIP has been demonstrated effectively in several areas, including rural Texas and between the Crow Indian Reservation, Montana and Billings, Montana.

NASA's international test beds in telemedicine demonstrate the usability and versatility of innovative technology for clinical consultation and continuing medical education. NASA's telemedicine technology allows for both video and audio communications between multiple participants in live or "store-and-forward" sessions, and an ever-enlarging database of medical imaging and diagnostic systems which can transmit information across a network.

COMMERCIAL ENDEAVORS

To meet the challenges of our telemedicine strategic plan, NASA sponsors a commercial space center (CSC) at the Medical College of Virginia—Virginia Commonwealth University in medical informatics and technology applications (MITA). This center has established a consortium of industrial and academic partners. This consortium, known as MITAC is focused on implementing the strategic plan through

partnerships to revolutionize the delivery of health care not only in space but on the ground as well.

The MITAC at the MVC-VCU is focused on developing sensors, transmitters, effectors, and process simulators for this purpose. MITAC is a key partner in NASA's telemedicine activities. NASA and the MITAC are working closely together with academia and industry to not only meet the needs of the human space flight program but to enhance the availability and quality of health care for all people regardless of their location.

Recently, Yale University—a MITAC member—participated in the Everest Extreme Expedition E^3-99. Working with other academic and industrial partners, a communication link was established at the Mount Everest base camp to support telemedicine interactions. The effort used videoconferencing between Mt. Everest and Yale University to offer medical support to climbers and to collect physiological data on the climbers for purposes of scientific research.

Among the advanced technologies used at the Mt. Everest Telemedicine Clinic at Base Camp was the portable 3-D tele-ultrasound system initially developed by Defense Advanced Research Project Agency and now used by NASA for telemedicine in remote and extreme environments. Numerous ultrasound images of internal organs and tissues of the body were obtained during the expedition. Thus, in addition to pushing the limits of advanced medical technologies, the new ultrasound capability provided a valuable clinical tool that not only helped the climbers, but also paves the way to advanced medical care for astronauts, as well as people in rural areas.

During the past several years, NASA and MITAC have collaborated on a unique experiment in telemedicine. Operation Rainforest is focused on low bandwidth Internet solutions integrated with a remote and mobile surgical van. Patients at an isolated hospital in Sucua (in the jungle of Ecuador) require expert evaluation and guidance in the area of laparoscopic surgery. Communication using a cellular phone and an Internet Service Provider permit three teams of medical personnel—at a hospital in Sucua, in Cuenca, Ecuador, and at Yale University—to interact in real-time to effect decision-making and enhance the clinical outcome.

These kinds of international test beds provide tremendous lessons-learned and encourage the adaptation of the innovative technologies for space missions, while enhancing life on earth.

FUTURE APPLICATIONS FOR SPACE FLIGHT

NASA is exploring ways to monitor critical health parameters that are easy to use, lightweight, non-invasive, wireless, voice-activated, and unobtrusive. Development of a telemedicine-based monitoring system which will be used on the International Space Station (ISS) continues. Integrating unobtrusive technology, such as the WARP (the Wireless Augmented Reality Prototype), portends the future. It will allow an untethered astronaut, wearing a lightweight pair of display glasses and outfitted with a suite of miniature biosensors to communicate through a sophisticated two-way wireless communications link to the ISS communications infrastructure. On the heads-up display, the astronaut responsible for crew health will be able to view biosensor data, such as heart rate, and other information, such as how to conduct Cardiopulmonary Resuscitation. This unique, wireless system involves voice activation and control of the miniature camera and display. The sensors on the body are also wireless, and the communications system itself is worn on a belt.

Also in development are "smart clothes" with non-invasive sensors woven into the fabric, which can monitor multiple internal parameters, and be programmed to only alert the practitioner when unhealthy parameters develop. This device tracks the position of various joints and the pressure or load placed on the feet. The future of such technology is limitless, and it is already delivering important near-term benefits, such as aiding the retraining of patients whose injuries have caused them to need to relearn how to walk.

POTENTIAL APPLICATIONS

NASA's efforts to monitor the health of its astronauts have helped promote significant changes in the way medical care in terrestrial medical transport (by ambulance) is conducted in the United States, improving National efforts in telemedicine and creating potential opportunities for ease of access to health care. Like those developing countries previously mentioned, there are severely under-served areas, with respect to medical attention, right here in the United States. Access through telemedicine will greatly reduce this isolation. Although many of our citizens in rural America live tens of miles away from the nearest medical center, they have Internet access through terrestrial systems or via satellite. This has tremendous im-

plications for poor and aging populations, homebound people, and even for infants. This is also applicable to certain work sites, particularly in hazardous fields, in remote areas such as on oil-drilling rigs or aboard ocean-going vessels. There is also application for medical care in secure areas such as prisons, where patient transport to a state-of-the-art medical facility is inadvisable and expensive.

Further development of this technology can help us right here and now, and maybe in the future will reduce the cost of health care. Effective and secure use of electronic management and transmission of patient information and teleeducation could save billions of dollars. Integration of telecommunications, rapidly evolving computer technologies and specialized sensors into health care delivery will provide opportunities for increasing accessibility on a worldwide scale, and improve health care for all. Experience gained from NASA's efforts will help optimize the development of these applications of telecommunications technology for health care.

SUMMARY

New challenges in space mean new solutions on Earth. As we continue to develop new systems for the hostile environment of space, we will find application to problems that we live with every day. While most of the general population will never be aboard the ISS, in orbit more than 200 miles above the Earth, we can all benefit from the Earth-bound applications of this tremendous, cutting-edge technology called telemedicine.

Today we are researching technologies which can provide autonomy in operation, decision making processes, and health maintenance for future space explorers who might one day venture beyond low Earth orbit into interplanetary space.

We thank you again for the opportunity to convey to you some of the exciting progress in NASA's telemedicine program.

For additional information please visit the following Web site:

http://www.hq.nasa.gov/office/olmsa/aeromed/telemed/