MEDICAL OUTREACH: AN INSTRUMENT OF U.S. DIPLOMACY

HEARING

BEFORE THE

SUBCOMMITTEE ON AFRICA, GLOBAL HUMAN RIGHTS AND INTERNATIONAL OPERATIONS

OF THE

COMMITTEE ON INTERNATIONAL RELATIONS HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

MAY 16, 2006

Serial No. 109–180

Printed for the use of the Committee on International Relations

Available via the World Wide Web: http://www.house.gov/international_relations

U.S. GOVERNMENT PRINTING OFFICE

27–644PDF WASHINGTON : 2006

For sale by the Superintendent of Documents, U.S. Government Printing Office
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TUESDAY, MAY 16, 2006

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AFRICA, GLOBAL HUMAN RIGHTS
AND INTERNATIONAL OPERATIONS,
COMMITTEE ON INTERNATIONAL RELATIONS,
Washington, DC.

The Subcommittee met, pursuant to call, at 2:06 p.m. in Room 2172, Rayburn House Office Building, Hon. Jeff Fortenberry (Chairman of the Subcommittee) presiding.

Mr. FORTENBERRY. Good afternoon and welcome. The Subcommittee will come to order.

Today's Subcommittee hearing will explore the issue of medical outreach as an instrument of U.S. diplomacy. As a nation, we have been gifted with extraordinary capabilities to deliver basic health care and related education programs to poor populations in need.

The purpose of this hearing is to explore opportunities to further transform our diplomatic efforts by deploying these capabilities in new and innovative ways to reach overlooked populations with basic health care services that we can all agree no human being should be without.

The United States is already working diligently and effectively in addressing many pressing global health concerns. The U.S. Government has made significant progress in reaching out to distressed populations worldwide. However, I believe that by prioritizing the treatment of easily preventable illnesses within our foreign assistance programs, we can make even greater strides to alleviate unnecessary suffering and to generate international goodwill.

According to the Organization of Economic Cooperation and Development, the United States is the world's leading provider of overseas development assistance. We can be rightfully proud of the efforts of our Federal Government, nongovernmental organizations, and private citizens to relieve suffering throughout the world.

Moreover, with the emergence of the Millennium Challenge Account, we have recognized the need to integrate a new strategic vision and increased accountability in our development programs. By emphasizing policy reform to help partner countries improve their capabilities to meet the needs of their own citizens, we can help to ensure that our investments to improve the lives and livelihoods of people in need have a much greater chance of resulting in enduring benefits.

In March 2002, when President Bush announced that the United States would increase its core development assistance by 50 per-

cent over 3 years—$5 billion per year above prevailing levels—he underscored the U.S's commitment to combating global poverty and made this goal a priority for U.S. foreign policy.

As Ambassador Randall Tobias pointed out in his recent testimony before the House Appropriations Committee, the President also called for reform of our foreign assistance programs, noting that "decades of massive development assistance have failed to spur economic growth in the poorest countries." While this Administration has nearly doubled foreign assistance funding to over $20 billion in 2006, it has also recognized that increased funding alone will not necessarily lead to desired outcomes.

As we seek to prioritize the role of foreign assistance in U.S. policy and look to restructure our assistance framework to address redundancies, ensure transparency and accountability, and effectively target its outreach linked to measurable goals, we have a unique opportunity, I believe, to explore how we might leverage our talent and technology to enhance the delivery of very simple, basic health care services to overlooked and remote populations.

According to the World Health Organization, cardiovascular diseases, malignancies, injuries, respiratory diseases, and perinatal conditions compromise the leading causes of death for men and women. Many of these conditions can readily and cost-effectively be treated in developing countries.

Moreover, conditions such as routine eye infections and ear infections, which might be viewed as mere annoyances in the developed world, all too often go untreated in developing countries, resulting in catastrophic personal, familial, communal, and ultimately, national consequences. These consequences are all the more tragic because they are so easily preventable. I believe that we need to thoroughly assess our health care assistance programs to ensure that we are prioritizing such obvious needs.

We have a wealth of health care technology solutions at our disposal today which we have barely begun to integrate into our domestic health care systems. The routine transmission of diagnostic digital images is one small example of such a solution.

The United States is widely recognized as a world leader in telemedicine and telehealth technologies. These key elements of medical outreach are of particular interest to us. I am pleased to note that we have several of our nation's leading practitioners in this field before us today to provide an overview of how such technologies have helped to build bridges and bring healing to populations in need.

To provide a bit of background, telemedicine is defined as "the use of electronic communication and information technologies to provide or support clinical care at a distance." Telehealth is more broadly defined as "the use of electronic information and telecommunication technologies to support long-distance clinical health care, patient and professional health-related education in public health and administration."

The Department of Health & Human Services has pioneered coordination of information within the Federal Government on leading-edge health care delivery mechanisms. I am grateful that HHS, Department of State, and the United States Agency for International Development are all represented here to provide insight

on how we might further integrate these technologies into our foreign assistance programs and indeed prioritize the delivery of essential health care within Secretary Rice's transformational diplomacy initiatives.

Our witnesses share a great deal of combined expertise in addressing medical outreach challenges. I look forward to hearing their testimonies and in noting lessons learned that will enable us to turn these challenges into opportunity for U.S. foreign assistance.

With that, I welcome Ms. Sheryl Austein-Casnoff. Ms. Casnoff joined the Health Resources and Services Administration as an associate administrator for Health Information Technology in September 2005. In 2004, Ms. Austein-Casnoff was selected for the Senior Executive Service Candidate Development Program and served in the Office of the Inspector General and the Centers for Medicaid Services, where she worked on the implementation of the employer-subsidy portion of the Medicare Modernization Act.

We also have today Mr. Ralph Braibanti. Mr. Braibanti is Director of Department of State's Space and Advanced Technology that houses that. Mr. Braibanti headed the United States team for negotiations with the European Union on an agreement of cooperation between the U.S. Global Positioning System and Europe's planned Galileo satellite navigation system. These negotiations were successfully concluded in 2004. Mr. Braibanti has also served in the Philippines, Paraguay, and Yemen.

Mr. Richard Greene, welcome. Mr. Richard Greene is the Director of the Office of Health, Infectious Diseases and Nutrition for the Bureau of Global Health, U.S. Agency for International Development. Previously, he served as the Deputy Director, Office of Health, Infectious Diseases, and Nutrition, Bureau of Global Health. Mr. Greene has conducted 20 short-term consultancies, including in the Democratic Republic of the Congo, Nepal, Southern Sudan, and Saudi Arabia.

Ladies and gentlemen, thank you again so much for ability to appear before us today, and we look forward to your testimony.

[The prepared statement of Mr. Fortenberry follows:]

PREPARED STATEMENT OF THE HONORABLE JEFF FORTENBERRY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEBRASKA

The Subcommittee will come to order, and good afternoon to everyone.

Today's Subcommittee hearing will explore the issue of Medical Outreach as an instrument of U.S. diplomacy. As a nation, we have been gifted with extraordinary capabilities to deliver basic healthcare and related education programs to poor populations in need. The purpose of this hearing is to explore opportunities to further transform our diplomatic efforts by deploying these capabilities in new and innovative ways to reach overlooked populations with basic healthcare services that we can all agree no human being should do without.

The United States is already working diligently and effectively to address many pressing global health concerns. The U.S. Government has made significant progress in reaching out to distressed populations worldwide. However, I believe that by prioritizing the treatment of easily preventable illnesses within our foreign assistance programs, we can make even greater strides to alleviate unnecessary suffering and to generate international good will.

According to the Organization of Economic Cooperation and Development (OECD), the United States is the world's leading provider of overseas development assist-

ance.[1] We can be rightfully proud of the efforts of our federal government, non-governmental organizations, and private citizens to relieve suffering throughout the world. Moreover, with the emergence of the Millennium Challenge Account, we have recognized the need to integrate a new strategic vision and increased accountability into our development programs. By emphasizing policy reforms to help partner countries improve their capacities to meet the needs of their own citizens, we can help to ensure that our investments to improve the lives and livelihoods of people in need have a much greater chance of resulting in enduring benefits.

In March 2002, when President Bush announced that the United States would increase its core development assistance by 50% over three years—$5 billion per year above prevailing levels—he underscored the United States' commitment to combating global poverty and made this goal a priority for U.S. foreign policy. As Ambassador Randall Tobias pointed out in his recent testimony before the House Appropriations Committee, the President also called for reform of our foreign assistance programs, noting that "decades of massive development assistance have failed to spur economic growth in the poorest countries." While this Administration nearly doubled foreign assistance funding to over $20 billion in 2006, it has recognized that increased funding alone will not necessarily lead to desired outcomes.

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According to the World Health Organization, cardiovascular diseases, malignancies, injuries, respiratory diseases, and perinatal conditions comprise the leading causes of death for men and women.[2] Many of these conditions can be readily and cost-effectively treated in developed countries. Moreover, conditions such as routine eye infections and ear infections, which might be viewed as mere annoyances in the developed world, all too often go untreated in developing countries, resulting in catastrophic personal, familial, communal, and ultimately, national consequences. These consequences are all the more tragic because they are so easily preventable. I believe that we need to thoroughly assess our healthcare assistance programs to ensure that we are prioritizing such obvious needs.

We have a wealth of healthcare technology solutions at our disposal today which we have barely begun to integrate into our domestic healthcare systems. The routine transmission of diagnostic digital images is one small example of such a solution. The United States is widely recognized as a world leader in telemedicine and telehealth technologies. These key elements of medical outreach are of particular interest to us. I am pleased to note that we have several of our nation's leading practitioners in this field before us today to provide an overview of how such technologies have helped to build bridges and bring healing to populations in need.

To provide a bit of background, telemedicine is defined as "the use of electronic communication and information technologies to provide or support clinical care at a distance."[3] Telehealth is more broadly defined as "the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public heath and health administration."[4]

The Department of Health and Human Services (HHS) has pioneered coordination of information within the federal government on leading-edge healthcare delivery mechanisms. I am grateful that HHS, the Department of State, and the United States Agency for International Development are all represented here to provide insights on how we might further integrate these technologies into our foreign assistance programs and indeed, prioritize the delivery of essential healthcare within Secretary Rice's transformational diplomacy initiative.

Our witnesses share a great deal of combined expertise in addressing medical outreach challenges. I look forward to hearing their testimonies and to noting lessons learned that will enable us to turn these challenges into opportunities for U.S. foreign assistance.

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[1] CRS—$19 billion (2004)

[2] WHO, World Health Report, 2005, Annex Table 3.

[3] Department of Commerce' 1997 Report to Congress (from http://telehealth.hrsa.gov/pubs/report2001/exec.htm)

[4] ibid

STATEMENT OF MS. CHERYL AUSTEIN-CASNOFF, ASSOCIATE ADMINISTRATOR, OFFICE OF HEALTH INFORMATION TECHNOLOGY, HEALTH RESOURCES AND SERVICE ADMINISTRATION, DEPARTMENT OF HEALTH AND HUMAN SERVICES

Ms. AUSTEIN-CASNOFF. Mr. Chairman, thank you for the opportunity to meet with you today on behalf of the Health Resources and Services Administration to discuss our health information technology efforts in advancing telehealth.

The mission of the Office for the Advancement of Telehealth is to advance the use of telehealth technologies for improving access and quality of health care services for the underserved. Telehealth can be thought of as a toolbox of diverse technologies applied to diverse health care needs in a wide range of health care settings. Telehealth is a dynamic field both in terms of technologies and how those technologies might be applied. The office serves as the operational focal point for coordinating and advancing the use of telehealth technologies.

OAT is part of HRSA's Office of Health Information Technology efforts. The Health Care Safety Net Amendments of 2002 established and added domestic authorities for a Telehealth Network Grant Program, a Telehealth Resource Center Grant Program, a Mental Health Services Telehealth Program, and a Licensure Portability Grant Program.

Congressional intent in establishing OAT and its programs was to advance telehealth practices by seeding the field with pilot or demonstration projects, establishing a focal point for coordinating telehealth activities, providing technical hands-on assistance, disseminating model practices and lessons learned, and promoting collaborations to foster vital synergy.

In Fiscal Year 2006, Congress, in its Labor, HHS, and Education Appropriations Conference Report language, recognized some of the significant challenges to making the promise of telehealth programs a reality in this nation and expanded HRSA's telehealth programs to include grants for pilot projects examining the cost-impact and value added to telehome and telemonitoring services, telehealth resource centers, and demonstrations to provide incentives for licensure coordination among the states.

The Administration's Fiscal Year 2007 budget request of $6.8 million is equal to the 2006 appropriation. The funds requested will support the continuation of grants that support a consortia of health providers that deploy telehealth technologies to provide access to, coordinate, and improve the quality of health care services, improve the training of health care providers, improve the quality of health information available to health care providers, patients, and their families, evaluate the impact of telehome care and telemonitoring services, and reduce the barriers to physicians and nurses electronically practicing across state lines.

OAT addresses the challenges to advancing telehealth by leading, coordinating, and promoting the use of telehealth technologies. For example, OAT fosters partnerships within HRSA and with other Federal and private organizations to promote telehealth projects and demonstrations to create synergy among those programs. OAT administers grant programs that seed the field and advance the

use of cost-effective telehealth technologies. We also provide technical assistance.

OAT promotes knowledge exchange about successful and not-so-successful telehealth technologies. We identify options for addressing barriers to the effective use of telehealth technologies and work to overcome those barriers. OAT also employs an updated directory, Listserv, technical assistance documents, and Web site to meet these telehealth challenges.

In addition, OAT participates in annual meetings, the American Telemedicine Association mini-meeting, and the Joint Working Group on Telehealth/Telemedicine, as well as serving as an ongoing resource to the public and as a policy support, all to meet the goal of addressing telehealth challenges.

OAT's partners in telehealth include the Office of the National Coordinator, as well as grantees, private sector organizations, and states. We proudly serve as the Chair of the Joint Working Group on Telemedicine/Telehealth, whose members include the Departments of Commerce, Agriculture, Defense, National Institutes of Health, Centers for Disease Control, Agency for Home Care Research and Quality, as well as many others.

OAT manages the Telehealth Network Grant Program, the Telehealth Resource Center Grant Program, and the Licensure Portability Program. The purpose of OAT's Telehealth Network Grant is to demonstrate how telehealth technologies can be used to expand access to and coordinate as well as improve the quality of health services, improve and expand the training of health care providers, and expand and improve the quality of health information available to health care providers as well as patients and their families.

Eligibility for these telehealth network grants is open to urban and rural networks, but we have targeted resources to rural areas. These telehealth network grants allow grantees to purchase or lease equipment, pay for organizational development and operations, conduct internal evaluations on the cost-effectiveness of services, provide clinical services, develop distance education programs, mentor/precept at a distance, and promote collaboration in the region to improve the quality of and access to health services.

Management of the Telehealth Network Grant Program is centered on advancing a cycle of excellence involving grants in program development, evaluation, and policy development. We are proud of our accomplishments in the number of expanded telehealth sites. We have seen dramatic growth nationwide in our Telehealth Network Grant Program, which alone, at 700 sites, provides services in 239 underserved rural communities to a population of 3.8 million people.

Undeniably, the field of telehealth has advanced. We have seen an increase in informed policy, a change in issues, an evolution in technology, and a diversification in applications in telehealth. We have seen a new community come into being, in part with the resources we provided through our Listserv and annual meetings. We are striving to be an ever increasing vehicle of trust for telehealth knowledge exchange and evaluation promotion. Our seed money gives our grantees a source from which to leverage other funds.

We believe that these continuing telehealth efforts represent a substantial achievement in advancing electronic information and telecommunications technologies in support of health-related services when distance separates individuals and communities.

Thank you for the opportunity to discuss the activities of HRSA's Office for the Advancement of Telehealth, and I would be happy to answer any questions.

[The prepared statement of Ms. Austein-Casnoff follows:]

PREPARED STATEMENT OF MS. CHERYL AUSTEIN-CASNOFF, ASSOCIATE ADMINISTRATOR, OFFICE OF HEALTH INFORMATION TECHNOLOGY, HEALTH RESOURCES AND SERVICE ADMINISTRATION, DEPARTMENT OF HEALTH AND HUMAN SERVICES

Mr. Chairman, Members of the Subcommittee, thank you for the opportunity to meet with you today on behalf of the Health Resources and Services Administration (HRSA) to discuss our health information technology efforts in advancing telehealth.

MISSION

The mission of the Office for the Advancement of Telehealth (OAT) is to advance the use of telehealth technologies for improving access and quality of health care services for the underserved. Telehealth can be thought of as a tool box of diverse technologies applied to diverse health care needs in a wide range of health care settings. Telehealth is a dynamic field both in terms of technologies and how those technologies might be applied. The Office serves as the operational focal point for coordinating and advancing the use of telehealth technologies.

BACKGROUND

OAT is part of HRSA's Office of Health Information Technology efforts. OAT was established under the authority of the Health Care Safety Net Amendments of 2002 (Public Law 107–251), which amended the Public Health Service Act to add authorities for (1) a Telehealth Network Grant Program; (2) a Telehealth Resource Center Grant Program; (3) a Mental Health Services Telehealth Program; and (4) a Licensure Portability Grant Program. Congressional intent in establishing OAT and its programs was to advance telehealth practices by seeding the field with pilot or demonstration projects, establishing a focal point for coordinating telehealth activities, providing technical hands-on assistance, disseminating model practices and lessons learned, and promoting collaborations to foster vital synergy.

In Fiscal Year (FY) 2006, Congress, in its Labor, HHS, and Education Appropriations Conference Report language, recognized some of the significant challenges to making the promise of telehealth programs a reality in this Nation and expanded HRSA's telehealth programs to include grants for: (a) pilot projects examining the cost-impact and value added of tele-home and tele-monitoring services; (b) telehealth resource centers; and (c) demonstrations to provide incentives for licensure coordination among the States.

The Administration's FY 2007 Budget request of $6.819 million is equal to the FY 2006 appropriation. The funds requested will support the continuation of grants that support a consortia of health providers that deploy telehealth technologies to: (a) provide access to, coordinate, and improve the quality of health care services; (b) improve the training of health care providers; (c) improve the quality of health information available to health care providers, patients, and their families; (d) evaluate the impact of tele-home care and tele-monitoring services; and (e) reduce the barriers to physicians and nurses electronically practicing across State lines.

ACTIVITIES

OAT addresses the challenges to advancing telehealth by leading, coordinating, and promoting the use of telehealth technologies. For example, OAT fosters partnerships within HRSA and with other Federal and private organizations to promote telehealth projects and demonstrations to create synergy among those programs. OAT administers grant programs that "seed" the field and advance the use of cost-effective telehealth technologies. We provide technical assistance. OAT promotes knowledge exchange about successful and not-so-successful telehealth technologies. We identify options for addressing barriers to the effective use of telehealth technologies and work to overcome those barriers. OAT also employs an updated Directory, Listserv, technical assistance documents, and Web site to meet these telehealth challenges. Also, OAT participates at annual meetings, the American Tele-

medicine Association mini-meeting, and the Joint Working Group on Telehealth/Telemedicine, as well as serves as an ongoing resource to the public and as a policy support—all to meet the goal of addressing telehealth challenges. OAT's partners in telehealth include the Office of the National Coordinator, as well as grantees, private sector organizations, and States. We proudly serve as the Chair of the Joint Working Group on Telemedicine/Telehealth, whose members include the Departments of Commerce, Agriculture, Defense, and NIH/NLM, CDC, and AHRQ, as well as many others.

PROGRAMS

OAT manages the Telehealth Network Grant Program, the Telehealth Resource Center Grant Program (to be awarded at the end of FY 2006) and the Licensure Portability Program (also to be awarded at the end of FY 2006). The purpose of OAT's Telehealth Network Grants is to demonstrate how telehealth technologies can be used to (1) expand access to, coordinate, and improve the quality of health services; (2) improve and expand the training of health care providers; and (3) expand and improve the quality of health information available to health care providers, and to patients and their families. Eligibility for these Telehealth Network Grants is open to urban and rural networks, but we have targeted resources to rural areas. These Telehealth Network grants allow grantees to purchase or lease equipment (up to 40 percent of the grant), pay for organizational development and operations, conduct internal evaluations on a the cost-effectiveness of services, provide clinical services, develop distance education programs, mentor/precept at a distance, and promote collaboration in the region to improve the quality of and access to health services.

The breadth of major service types involved in these awards spanned allergy, asthma control, cardiology, dermatology, diabetes care and management, endocrinology, ENT, infectious diseases, intensive/remote ICU, mental health, neonatology, nutrition, OB–GYN, oncology, orthopedics, pain management, pediatrics, pulmonology, radiology, rehabilitation, remote patient monitoring, rheumatology, surgery, and trauma/emergency. The settings of these awards ranged from assisted living facilities, community health centers, correctional institutions, hospitals, hospices, nursing homes, public health departments, physician offices, schools, and non-health institutions.

ACCOMPLISHMENTS

Management of the Telehealth Network Grant Program is centered on advancing a cycle of excellence involving grants and program development, evaluation (i.e., learning, analyzing, and developing "best practices"), and policy development. We are proud of our accomplishments in the number of expanded telehealth sites. We have seen dramatic growth nationwide in our Telehealth Network Grant Program, which alone, at 700 sites, provides services in 239 underserved rural communities to a population of 3.8 million. Undeniably, the field of telehealth has advanced. We have seen an increase in informed policy, a change in issues, an evolution in technology, and a diversification in applications of telehealth. We have seen a new community come into being—in part with the resources we provide through our Listserv and annual meetings. We are striving to be an ever increasing vehicle of trust for telehealth knowledge exchange and evaluation promotion. Our seed money gives our grantees a source from which to leverage other funds.

We believe that these continuing telehealth efforts represent a substantial achievement in advancing electronic information and telecommunications technologies in support of health-related services when distance separates individuals and communities.

CONCLUSION

Thank you for the opportunity to discuss the activities of HRSA's Office for the Advancement of Telehealth. I would be happy to answer any questions at this time.

Mr. FORTENBERRY. Thank you very much. I think we will have questions at the end of the panel.

Mr. Braibanti, would you like to continue?

STATEMENT OF MR. RALPH BRAIBANTI, DIRECTOR, OFFICE OF SPACE AND ADVANCED TECHNOLOGY, BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF STATE

Mr. BRAIBANTI. Thank you. Mr. Chairman and Members of the Committee. First, let me thank you for this opportunity to share with you some examples from our experience that the role that telemedicine can play in promoting U.S. foreign policy objectives in the developing world. I have a longer statement that I am submitting for the record with your permission.

In recent years, my bureau at the State Department, Bureau of Oceans and International Environmental and Science has sponsored two pilot telemedicine projects, one in Pakistan, the other in Afghanistan. The latter is in collaboration with the Indian Space Research Organization.

In the case of Pakistan, with very modest resources, we initiated a program to support a model telemedicine training center in Rawalpindi at the Holy Family Hospital there. We trained a first class of 30 Pakistanis in telemedicine techniques, and in addition, the program involves providing for some professional exchanges and equipment to set up the center in Rawalpindi.

Although that project is less than 3 years old, its positive impact has already been felt in the health care delivery in Pakistan and on United States/Pakistan relations. During last year's devastating earthquake in northeast Pakistan, the country's telemedicine capabilities, although they were in an embryonic stage, were deployed and helped provide treatment for about 6,000 patients who experienced injuries from the earthquake.

These patients sought treatment in tent clinics, of which there were 30 or so in the region, and these were in remote mountainous areas of the country, and through use of the telemedicine capabilities, we were able to provide better care than would have otherwise been the case.

Moreover, from our perspective, a significant benefit of the quick and effective U.S. response in assisting the earthquake victims, which included our new telemedicine component, it is generally credited in that country with helping improve the image of the United States, and there probably were a number of public opinion polls that showed that the image of the United States went up significantly after the earthquake as a result of our perceived effective assistance in responding to the earthquake disaster.

Now, turning to Afghanistan, our telemedicine project there grew out of a broader effort by the State Department to foster space cooperation with India, and looking for ways to cooperate with India in the space arena, we knew that India has a telemedicine program of its own that it uses domestically within India.

So we proposed and eventually developed a collaboration with the Indian Space Research Organization to set up some kind of telemedicine capability in Afghanistan. This was an interesting test case because conditions in Afghanistan are such that the hospital infrastructure is notably weak, particularly in remote rural areas. A number of areas of the country being mountainous are really difficult to get to.

Fifty of Afghanistan's 330 districts, for example, lack basic medical and health facilities, and the transportation networks and weak infrastructure in the education sector make it difficult to upgrade health care there through traditional means of educating more doctors and nurses, building health care clinics, and staffing them with the newly educated doctors and nurses. So telemedicine seemed to be a particularly appropriate approach.

The ultimate aim of our project is to establish a network of stations in remote areas that can be used for telemedicine and telehealth consultations. Each mode station will have an off-the-shelf VSAT, very small aperture terminal, to communicate via satellite networks with larger, more sophisticated network facilities which could be in the capital of Kabul or they could be really anywhere in the world. Once we have a network set up, we can take advantage of medical expertise in a variety of medical centers.

The first phase of the project involved training a team of five Afghan doctors and information communication specialists in the basics of telemedicine and how to operate the equipment that we hoped to install initially in a hospital in Kabul.

The initial training phase was completed in late 2005, and we are now in the second phase, which basically involves having those five trainees work with the Ministry of Public Health to develop and design telemedicine programs, basically to map out how we will proceed, what sites we will use, what kind of medical care we will focus on and so forth.

Our experience from these two very modest initiatives has been very positive. It appears to us that there is enormous untapped potential for using the most modern telecommunications and technology, computer technologies to provide health care in countries like these.

Using modern technology in remote inaccessible villages where existing health care facilities are poor or nonexistent can save lives and, more interestingly for this hearing, I think it can be a relatively efficient way of improving the quality of life of impoverished people.

In addition, from our perspective at the State Department, cooperating with other countries in telemedicine can have mutual benefits. It helps the recipient countries, it can also help our country. For example, a functioning telecommunications system in remote parts of the world can create the capacity to have a better advanced disease surveillance system, which is important to public health in the United States by giving us early warning of overseas outbreaks of infectious diseases.

Cooperation in this area can also serve as a confidence-building measure between antagonistic countries since the cooperation can take place without having to physically cross borders.

You know, we have been working in India with India. We have been working in Pakistan. We have been working in Afghanistan. We hope to one day create a regional telecommunication initiative that brings together those countries with their neighbors, like Nepal, Sri Lanka, Bangladesh, and that is something that we hope to talk with those governments about in the days ahead.

We would also be interested in collaborating with others in government or in the private sector on pilot projects in Africa and

Latin America that would build on the experience that we have had with these two modest projects that we already have under way, and we hope to continue to play a role in exploring new opportunities which promote telemedicine in the developing world. Thank you.

[The prepared statement of Mr. Braibanti follows:]

PREPARED STATEMENT OF MR. RALPH BRAIBANTI, DIRECTOR, OFFICE OF SPACE AND ADVANCED TECHNOLOGY, BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF STATE

Mr. Chairman and Members of the Committee,

I am pleased to have this opportunity to share with you some examples of the role telemedicine can play in promoting U.S. objectives in the developing world.

My Bureau at the Department of State, the Bureau of Oceans and International Environmental and Scientific Affairs (OES), has sponsored two pilot telemedicine projects in recent years, one in Pakistan and the other in Afghanistan in collaboration with India. Both projects have been quite successful so far, and we view them as potential models that could be replicated in other parts of the world.

In 2003 the United States and Pakistan signed a science and technology agreement to serve as an umbrella for a variety of cooperative activities, including activities designed to use the latest technologies to improve the quality of life of Pakistan's citizens. The first activity implemented under this agreement was a project developed by my Bureau's Office of Science and Technology Cooperation to help Pakistan build a telemedicine capacity.

With very modest resources—$75,000 in FY 2004 ESF funds provided under the U.S.-Pakistan S&T Cooperation Program—we were able to initiate a program designed to establish and support a model telemedicine training center at the Holy Family Hospital in Rawalpindi, Pakistan. First we arranged for two Pakistani doctors to discuss the basics of telemedicine at the Army's Medical Research and Material Command at Fort Detrick, Maryland. During their stay in the United States, the doctors also had the opportunity to establish valuable contacts with key members of the U.S. telemedicine community. The next step involved a partnership to provide telemedicine training to Pakistani medical specialists between Fort Detrick's Medical Research and Material Command and Dr. Ronald Merrill's Medical Informatics and Technology Applications Consortium at Virginia Commonwealth University. A first class of thirty Pakistanis has already completed the telemedicine training program. In addition to training, the program involves professional exchanges and equipment and digital video teleconference connectivity for the center in Rawalpindi.

Although this project is less than three years old, it has already had a positive impact on health care delivery in Pakistan and on U.S.-Pakistan relations. In response to last year's devastating earthquake in northeast Pakistan, the country's nascent telemedicine capabilities were deployed to help provide treatment to some 6,000 patients injured in the earthquake who sought medical care at 30 tent clinics set up in remote, mountainous areas of the country. The quick and effective U.S. response in assisting victims of the earthquake, a component of which was the telemedicine initiative, is generally credited with helping improve the standing of the United States in public opinion polls taken in Pakistan afterwards.

Our telemedicine project in Afghanistan grew out of a broader effort by the State Department to foster space cooperation with India. In 2001 President Bush and then-Indian Prime Minister Vajpayee identified civil space cooperation as a key area for improvement in U.S.-India relations. A major conference on U.S.-India space cooperation sponsored by my bureau in 2004 generated interest within both governments, and, consequently, space cooperation became an integral part of the U.S. approach for building a strategic partnership with India. Recognizing that India's national space agency, the Indian Space Research Organization, has a well established telemedicine program of its own, we proposed this as one possible area for collaboration.

Working closely with the staff of the United Nations Office for Outer Space Affairs, and with $50,000 in seed money from the State Department's Oceans, Environment, and Science Initiative (OESI) program, we developed a project in which the United States and India are collaborating to set up a pilot telemedicine program in Afghanistan.

Hospital infrastructure in Afghanistan is notably weak, particularly in remote rural areas of the country. Fifty of Afghanistan's 330 districts are lacking basic medical or health facilities. Afghanistan's mountainous terrain, poor land transportation

networks, and weak education infrastructure make it difficult to upgrade health care through the traditional means of educating more doctors and nurses and building more health clinics. These same conditions make Afghanistan a particularly appropriate candidate for the introduction of telemedicine technologies.

The ultimate aim of the project we are sponsoring in Afghanistan is to establish a network of stations in remote areas that can be used for telemedicine consultations. Each remote station will have an off-the-shelf Very Small Aperture Terminal (VSAT) to communicate by satellite communications networks with larger, more sophisticated medical facilities. This will allow medical services to be provided in remote villages through tele-consultations with specialists at hospitals in Kabul or elsewhere.

The first phase of this project involved training a small team of Afghan doctors and information communications specialists in the basics of telemedicine and how to operate equipment that we hope can be installed at Kabul's Indira Gandhi Hospital in the future. This phase was completed in late 2005. The second phase of the project, which is already underway, involves using the knowledge and skills gained by these five trainees to design a telemedicine program for Afghanistan, an activity that has strong support from the Afghan Ministry of Public Health.

In addition to these two projects, I should also mention that the UN Office of Outer Space Affairs, with strong encouragement from the State Department, has been active in trying to promote broader awareness of telemedicine's potential in the Third World. It has organized several regional meetings or workshops on telemedicine and is planning more such activities; for example, it is sponsoring a training course on tele-health to be held in Mexico in May 2007, which will benefit Latin America and the Caribbean region.

Our experience with each of these initiatives has been very positive. There is enormous untapped potential for using modern telecommunications and computer technologies to provide health care in developing countries, and, in particular, for using these technologies to extend health care to remote, inaccessible villages where existing health care facilities are poor or non-existent. In such environments, building indigenous telemedicine capabilities can be a relatively efficient means of having a positive impact on villagers' quality of life. Moreover, telemedicine cooperation is not a one-way street; there are potential benefits for the United States as well as its partners. For example, functioning telemedicine systems in remote parts of the world can serve as an advance disease surveillance capacity that may be of importance to public health in the United States, giving us early warning of overseas outbreaks of polio, avian flu, or other infectious diseases.

Telemedicine cooperation can also serve as a useful "confidence building" measure between antagonistic countries, since cooperation can take place without physically crossing national borders. We believe we may one day be able to craft a regional telemedicine initiative that includes historical adversaries India and Pakistan, along with their South Asian neighbors. We would also be interesting in collaborating with others on pilot projects in Africa and Latin America, if such opportunities arise. The State Department and the OES Bureau intend to continue to play a role in seeking opportunities to promote telemedicine in the developing world.

Thank you for the opportunity to testify. I would be pleased to respond to any questions you may have.

Mr. FORTENBERRY. Thank you very much.

Mr. Greene.

STATEMENT OF MR. RICHARD GREENE, DIRECTOR, OFFICE OF HEALTH, INFECTIOUS DISEASES AND NUTRITION, BUREAU FOR GLOBAL HEALTH, U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

Mr. GREENE. Thank you, Mr. Chairman, for convening this important hearing on medical technology and for inviting me to testify.

Investment in the design and use of appropriate medical technology, high or low tech, is critical to the ability of the U.S. Agency for International Development (USAID) to achieve its health and development objectives. The agency's long-term presence in over 70 countries, combined with in-house technical expertise in areas such as malaria, epidemiology, internal self-help and health systems,

uniquely position USAID to develop health technologies and support their field testing and introductions at scale.

As the government's lead foreign assistance agency, USAID, working in partnership with other U.S. Government agencies, applies a cycle of assessment, development, pilot testing, and introduction of technology and approaches to tackle the main health issues affecting developing countries.

USAID has been supporting the development of new technologies for decades. USAID collaborated with commercial organizations in the development and introduction of health products, leveraging its investments by attracting co-funding from donors and partnering with nongovernmental organizations, local universities, and other local organizations at the field level.

USAID's health technology initiatives span the range of its health programming, including child survival, maternal health, tuberculosis, malaria and HIV/AIDS. Past USAID investments led to products that now reach millions, saving lives throughout the developing world. Current and future benefits are targeted to have similar large-scale public health returns.

One USAID signature product is the safe injection, Soloshot syringe that is automatically disabled after one use, and it cannot be reused. This device prevents transmission of blood-borne diseases that can result in reuse or improper sterilization of a contaminated needle or syringe. In fact, I have brought one of these here that I will be happy to leave as to the issue of an auto-disable syringe.

Since their commercial introduction in 1992, more than one billion Soloshot syringes have been supplied to public health programs in more than 40 countries. UNICEF, which has already distributed hundreds of millions of auto-disable syringes to immunization programs, now provides only auto-disable syringes, many of them Soloshot, to countries. It is anticipated that the transmission of blood-borne diseases due to dirty needles will be reduced by 90 percent in programs using these products.

USAID has also supported the development of injectable devices prefilled with vaccines or other medicines called Uniject, and I have an example of this as well to look at later on.

For example, the World Health Organization estimates that 85 percent of newborn deaths are due to severe infections. It is important that newborns with these infections receive immediate treatment even before the infectious agent is known.

USAID is testing a Uniject prefilled with the antibiotic gentamicin. This device can enable health workers to provide an immediate dose of life-saving medicine that would be inconvenient or impossible with standard needles and syringes. It is already filled with the medicine or vaccine that is used.

Postpartum hemorrhage is the leading cause of maternal mortality in the developing world. Approximately 130,000 women are known to die from postpartum hemorrhage each year during child birth. The use of oxytocin for routine management of the third stage of labor can significantly reduce the incidence of this deadly condition.

Again, a prefilled, nonreusable syringe such as Uniject is found to be the safest mechanism for delivery of life-saving benefits of oxytocin to women giving birth outside a clinic or a hospital setting

where most births take place. Oxytocin-filled Uniject devices also may be ideal for use in emergency situations and in remote locations.

For nearly 20 years, USAID has been involved in developing technologies to improve vaccine quality. Vaccines require careful storage and transport to the point of use to avoid harmful heat exposure. In the past where there was no way to detect whether individual vials had been exposed to heat at some point since distribution, national immunization programs adopted very conservative guidelines for disposal of vaccines when heat exposure was suspected.

USAID facilitated the development of a small label that changes colors to indicate if a vaccine has been damaged by heat exposure, and I have one of these as well, used all around the world in fully eradicating the approach to a number of immunization programs.

The Program for Appropriate Technology in Health, PATH, estimates that over the next 10 years, vaccine vial monitors will allow health workers to recognize and replace more than 230 million doses of inactive vaccine and to deliver 1.4 billion more doses in remote setting, actions that could save more than 140,000 lives and reduce morbidity for countless others.

The ancient scourge of tuberculosis remains a public health threat with almost 9 million new cases every year. The internationally recommended Directly Observed Treatment Strategy, DOTS, for managing TB cases has been accepted nearly worldwide, and its use has increased considerably in the last 5 years. Yet only 53 percent of estimated TB cases are detected and benefit from this therapeutic intervention.

By the end of the decade, USAID will have helped to develop a new, more effective diagnostic for tuberculosis that will, we hope, dramatically improve case detection.

About 4,000 children die every day from diarrhea due to unsafe water or sanitation and inadequate hygiene. Even water from an improved source, such as a household tap, is often unsafe to drink because of contamination during distribution, storage, or handling.

In response, USAID is currently promoting two approaches to employing the use of chlorination, a safe water system developed by the U.S. Centers for Disease Control and Prevention (CDC) and Pure, developed by Proctor & Gamble. Either technology can kill water-borne pathogens that cause cholera, typhoid, dysentery, and other diarrheal diseases.

In the early 1990s, USAID supported CDC research to develop insecticide-treated nets to prevent mortality due to malaria. The use of this technology has been shown to result in a 25 percent reduction in all the causes of mortality among children under five.

USAID has also supported the development of malaria rapid diagnostic tests that could considerably improve the diagnosis of malaria in developing countries, especially where microscopes are not available.

USAID also supports advances in medical technology to improve the level of care to critically ill patients in underserved international communities through long-distance medicine or telemedicine technology.

Through Medical Mission for Children, USAID established a system of internet video conferencing that allows volunteer doctors from 30 mentoring hospitals in the United States to examine, diagnose, and treat sick children abroad. Through use of an extensive video conferencing network, remote, critically ill children can be treated through specialized one-on-one care through live consultation between specialists based at major U.S. medical centers and physicians in local hospitals.

In 2003, USAID's Global Development Alliance invested $1 million in efforts to expand the telemedicine network throughout Latin America and the Caribbean. Satellite ground stations were built in Bolivia, Brazil, Guatemala, Mexico, and Panama to allow remote communities in these countries to receive medical education programming. The ground stations can store and forward up to 120 hours of medical content for on-demand access at each of the five USAID-supported hospital sites.

The global communications technology company Intelsat, Limited, donated satellite bandwidth to help establish the technology infrastructure and add an education component in addition to real-time examination, diagnosis, and treatment. Polycom, a leading video conferencing company, provided video communications equipment to expand the telemedicine and learning network.

Today a network of nearly 600 doctors volunteer a minimum of 12 hours per year to help hospitals in developing countries better diagnose and treat patients. Doctors' pro bono consultations, in-kind contributions of equipment, and other donor support augment USAID's investment by at least four times.

In conclusion, investment in health technology, both low tech and high tech, are an integral part of USAID's programs and a key strategy to achieving its health development objectives. Thank you very much.

[The prepared statement of Mr. Greene follows:]

PREPARED STATEMENT OF MR. RICHARD GREENE, DIRECTOR, OFFICE OF HEALTH, INFECTIOUS DISEASES AND NUTRITION, BUREAU FOR GLOBAL HEALTH, U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

Investment in medical technology, high or low tech, is integral to our ability to achieve health and development objectives worldwide. Over the last 20 or so years, the U.S. Agency for International Development (USAID) has developed, adapted, and introduced many affordable health products, policies, and practices appropriate for addressing health-related concerns in developing countries. USAID's support ranges from proof of principle and field testing to introduction at scale.

USAID's support for new technologies in health, nutrition, and family planning has involved commercial organizations, attracted co-funding from other donors, and partnered with a host of non-governmental organizations (NGOs), universities, research organizations, and local groups.

USAID's investments have led to products that now reach millions, saving lives throughout the developing world. USAID past and future products include safe injection technologies like auto-disable syringes and vaccine vial monitors; diagnostic tests for anemia, vitamin A deficiency, and malaria; long lasting insecticide-treated nets, point-of-use water disinfectants and other products that today are used in countries throughout the developing world. More recently, USAID has supported significant advances in the use of telemedicine to reach health workers and increase the capacity of countries to meet their health needs.

AUTO-DISABLE SYRINGES

Surveys in developing countries have shown that 30 to 50 percent of injections are not sterile. Disposable syringes are reused, and reusable syringes often are improperly sterilized. At the same time, multi-dose vials often lead to 50 percent of

vaccine being wasted and/or children being turned away because health workers are reluctant to open a vial for just one child.

In 1987, a decade before the international public health community mobilized around the problem of frequent reuse of contaminated needles and syringes, USAID identified the need for technologies that could prevent reuse. Working with Program for Appropriate Technology in Health (PATH) through the USAID-supported HealthTech program, USAID launched a program to develop and introduce the devices now known as auto-disable (AD) syringes.

By the early 1990s, two suitable AD technologies had been developed, evaluated in the field, licensed to a major syringe manufacturer, and produced in pilot quantities. One of them—the Soloshot(tm) syringe—was one of the first feasible approaches to nonreusable syringes for immunizations. USAID funded the first validation tests of the device in Pakistan under the direct observation of the World Health Organization (WHO). These successful field trials led to scale-up, production, and introduction of the first commercial AD syringe for immunizing children. In 1996, 56 million AD syringes were distributed by UNICEF, primarily for immunization campaigns; distribution had increased to 150 million by 1999.

Alternative AD syringe designs became available in the latter half of the 1990s, encouraged and facilitated by USAID and its partners. AD syringes now improve the safety of routine immunizations as well as a growing number of curative procedures. Since their commercial introduction in 1992, more than 1 billion SoloShot syringes have been supplied to public health programs in more than 40 countries in Africa, Asia, Eastern Europe, and Latin America. UNICEF now provides only AD syringes (many of them Soloshot) to countries requesting disposable syringes. In 2005, USAID- and CDC-funded projects supplied 12 of the 15 PEPFAR focus countries in Africa and the Caribbean with more than 15 million safety syringes for use in curative care.

USAID also supported another version of the AD syringe, the Uniject(tm)[1] injection device. Uniject is a unique pre-filled, single-use syringe with a needle attached. The device was invented and developed with USAID funding. In collaboration with the licensee, Becton, Dickinson and Company, the world's largest manufacturer of injection equipment, USAID and PATH carried out all the steps of product development and field trials. BD now commercially produces and distributes the device to drug and vaccine manufacturers.

The Uniject device cannot be reused. Traditional birth attendants (TBAs) can use it to immunize hard-to-reach children and women in their communities. Multidose vial waste is eliminated, saving precious dollars. Indonesia now provides the birth dose of hepatitis B (HB) vaccine in the Uniject device to all infants born in the country. UNICEF has identified Uniject as an important tool in its efforts to eliminate maternal and neonatal tetanus in high-risk areas around the world. By allowing TBAs to deliver safe injections, Uniject is especially effective in reaching women who have not been immunized due to ethnic or religious barriers or limited health infrastructure.

The Uniject also has a role to play in the health of mothers. Hemorrhage is the leading cause of maternal mortality, and is a particular problem in home deliveries because the short response time makes referral impractical in most cases. Annually, approximately 130,000 women are known to die due to hemorrhage during childbirth. The use of oxytocin for routine management of the third stage of labor can significantly reduce the incidence of postpartum hemorrhage. Active management of the third stage of labor includes routine use of a 10 IU dose of oxytocin given intramuscularly and is recommended by the World Health Organization for all institutional deliveries and home deliveries attended by a person with midwifery skills.

A prefilled, nonreusable syringe is thought to be the safest mechanism for delivering the life-saving benefits of oxytocin to women in peripheral health care settings and homes. This prefilled, easy-to-use, injection-ready format assures that an accurate pre-measured dose is given in a nonreusable, sterile device with minimal preparation and minimum waste. These benefits may greatly improve the ability of midwives and village health workers to administer oxytocin as part of the Active Management of Third Stage of Labor to the large numbers of women giving birth outside clinic or hospital settings. Oxytocin filled Uniject devices may also be ideal for use in emergency situations and remote locations. USAID is working to make this technological promise a reality.

The World Health Organization (WHO) estimates that 85% of newborn deaths are due to infections—sepsis and tetanus make up a significant portion of these infections. Of the 12 countries in which most of the world's neonatal tetanus occurs, six are African. In 2000, a WHO advisory committee developed a document for the

[1] Uniject is a trade mark of BD.

"management of the child with a serious infection or severe malnutrition." In this document, WHO recommended intramuscular injections of ampicillin and gentamicin as the standard therapy for these bacterial infections and the treatment of neonatal septicemia, meningitis, and pneumonia.

In order to achieve maximum impact on neonatal sepsis rates, it is important that newborns with these infections receive immediate treatment, even before the infectious agent is known. USAID is supporting the Uniject(tm) devices pre-filled with a single injectable gentamicin dose. These devices could be easily transported and used in a home setting with an oral antibiotic. Community health workers and traditional birth attendants could be trained to use gentamicin-Uniject and a complementary oral antibiotic to extend the accessibility and facilitate the administration of antibiotics for early treatment of neonatal infections before referral. Gentamicin-Uniject can provide a platform to enable health workers to provide an immediate dose that would be inconvenient or impossible with standard needle and syringe.

The use of AD syringes increases the volume of medical waste in the form of used syringes and needles. Infectious sharps waste is dangerous to health care workers, waste handlers, and the community. Safe disposal methods for sharps are needed to protect anyone who may come in contact with contaminated needles.

USAID supports the development and advancement of technologies that health workers can use to safely dispose of used needles and syringes. These include safety boxes and needle removers to safely separate the used and possibly contaminated needles from the syringe for easier disposal. USAID-supported waste technologies currently are being used in the PEPFAR focus countries in conjunction with AD syringes. Needle removers already are in wide use in immunization programs, and WHO has included needle removal as a safe disposal option in health care waste management plans for sub-Saharan Africa.

VACCINE VIAL MONITORS

USAID has been involved in developing technologies to improve vaccine quality by limiting the adverse effects of excessive heat and freezing. Vaccines require careful storage and transport to the point of use to avoid harmful heat exposure or freezing temperatures. When there was no way to detect whether individual vials had been exposed to heat during storage or transport, national immunization programs had very conservative guidelines for vaccine handling and disposal of vaccines.

In 1987, USAID launched a search for suitable technologies that could identify exposure to heat. The result the "vaccine vial monitor" (VVM), a small circular indicator printed directly on vial labels or fastened to the tops that changes color irreversibly from light to dark with exposure to heat over time.

Since their introduction in 1996, VVMs have helped ensure that only potent vaccine is used to immunize children. The presence of VVMs made it possible for the polio eradication campaign to carry oral polio vaccine safely into remote areas without refrigeration. It enabled WHO to implement a multidose vial policy that allows health workers to use opened vials of vaccine for more than one day. Since January 2001, UNICEF has required that all its vaccines have VVMs. To date, more than 1 billion vaccine vials with VVMs have been delivered to developing countries. Over the next ten years vaccine vial monitors will allow health workers to recognize and replace more than 230 million doses of inactive vaccine and to deliver 1.4 billion more doses in remote settings—actions that could save more than 140,000 lives and reduce morbidity for countless others.

Other technological solutions to constraints on immunization programs that USAID has under development include needle-free jet-injector devices that can be used for giving injections without needles and thermostable vaccines that will not require refrigeration.

MALARIA

USAID supported CDC to conduct a series of scientific trials that proved that insecticide treated nets were an effective tool to prevent infant and child deaths from malaria. The Agency, in partnership with CDC, is now working to get the nets distributed to the most vulnerable populations throughout Africa.

TUBERCULOSIS

The ancient scourge of tuberculosis (TB) remains a public health threat with almost 9 million new cases each year. The internationally recommended "DOTS" strategy for managing TB cases has been accepted nearly worldwide, and its use has increased considerably in the last five years. Yet, only 53% of estimated TB cases are detected and benefit from this therapeutic intervention.

The DOTS strategy is the best proven line of defense against tuberculosis. However, it relies on a 100-year old diagnostic technology, a drug regimen whose newest addition came 40 years ago, and labor-intensive case management of the 6–8 month treatment. The only vaccine available for TB, BCG, was introduced in 1921 and offers protection against severe forms of disease in children under 5 but offers minimal protection to adults.

Almost half of TB cases remain undetected, largely due to barriers to access to appropriate diagnosis and care. The "Global Plan to Stop TB 2006–2015" and the new Stop TB Strategy proposed by WHO mainstream innovations in service delivery such as DOTS-plus for drug-resistant disease, algorithmic approaches to screening for TB, public-private partnerships for implementing TB control, coordinated management of TB/HIV and revised treatment regimens that only five years ago were topics of research. USAID was a key donor for the research behind many of these advances.

USAID's current plan for TB calls for supporting research to optimize the effectiveness of existing technologies while continuing its support for late-stage clinical trials of new drugs and diagnostics. USAID also is ramping up efforts to prepare the field for the introduction of new technologies and to address barriers to access to services. By 2009, USAID will be responding to a robust pipeline of potential new diagnostics by supporting field trials and testing novel approaches to deliver these new tools at country-level.

RAPID DIAGNOSTICS FOR VITAMIN A DEFICIENCY, ANEMIA, AND MALARIA

USAID has field tested a relatively simple, rapid, and inexpensive enzyme immunoassay for use in assessing the prevalence of vitamin A deficiency in populations and the effects of program interventions. This test uses technology that is already established in many district- and provincial-level hospitals and laboratories, thus making it much more practical than the current method of measuring vitamin A deficiency. (Test's name is Retinol-binding Protein Assayt)

For anemia, the Hemocue test consists of drawing a tiny amount of blood from a simple finger prick into a disposable cuvette and inserting it into a small, battery-operated device. Seconds later, an accurate reading of an individual's hemoglobin level is available. The results of Hemocue tests, which cost less than $1 per test, are guiding interventions and monitoring progress in addressing anemia, which affects more than one-third of the world's population, especially young children and women.

Malaria rapid diagnostic tests (MRDTs) are new products that could significantly improve the diagnosis of malaria in developing countries, especially where microscopic diagnosis is not available. Some experts estimate that 35–60 percent of malaria in Africa is wrongly diagnosed. The benefits of a sensitive, specific, quick, simple, and inexpensive diagnostic test for malaria are considerable and could be used in settings where resources are limited and more sophisticated testing equipment may not be available.

TELEMEDICINE

USAID supports advances in medical technology to improve the level of care to critically ill patients in underserved international communities through long-distance medicine, or "telemedicine" technology. Through Medical Missions for Children (MMC), USAID established a system of internet video conferencing that allows volunteer doctors from 30 mentoring hospitals in the United States to examine, diagnose, and treat sick children abroad. Through use of an extensive videoconferencing network, remote, critically ill children can be treated through specialized one-on-one care through live, two-way diagnostic and treatment consultations between specialists based at major U.S. medical centers and physicians in local hospitals.

In 2003, USAID's Global Development Alliance invested $1 million in efforts to expand the telemedicine network throughout Latin America and the Caribbean. Satellite ground stations were built in Bolivia, Brazil, Guatemala, Mexico, and Panama to allow remote communities in these countries to receive medical education programming. The ground stations can store and forward up to 120 hours of medical content for on-demand access at each of the five USAID hospital sites.

Global communications technology company Intelsat Ltd. donated satellite bandwidth to help establish the technology infrastructure and add an education component in addition to real-time examination, diagnosis, and treatment. Polycom, a leading video conferencing company, provided video communications equipment to expand the MMC Global Telemedicine & Learning Network.

Today a network of nearly 600 doctors volunteer a minimum of 12 hours per year to help hospitals in developing countries better diagnose and treat patients. Doctors' pro-bono consultancies, in-kind contributions of equipment, and other donor support augment USAID's investment by at least four times.

In South Africa USAID is funding $3 million as part of the federal government's Emergency Plan for AIDS Relief and will use the funding to expand South Africa's public health education channel. The Health Channel will be a satellite broadcast channel to deliver free education to patients and healthcare workers in clinics and hospitals in South Africa. The channel was created through a public private partnership between the Department of Health, Sentech, and Mindset Network. The Mindset Health Channel aims to be in all 4,000 public healthcare sites in South Africa within 5 years, serving 97,000 nurses and 36 million South Africans.

Eventually, the channel has the potential to be extended across all of Africa and will create a sustainable, mass-scale public health intervention tackling all major health issues. The network, also available through digital video online to qualified medical professionals, functions like an on-air educational symposium.

Mr. FORTENBERRY. Thank you all for your insights. I would like to discuss with you, Mr. Braibanti, first if I could and then entertain some suggestions from other panelists in regards to several questions that I have, but if you could begin by—we will look at specific examples that you talked about and generalize back from there to some broader principles as to how we can improve the system.

Would you discuss again particularly the program in Pakistan that you mentioned that helped on the ground in the aftermath of the earthquake, what kind of technology was employed, and give an overview of exactly I guess the medical infrastructure that was in place that was able to deploy and help you help save lives?

Mr. BRAIBANTI. Well, I am no expert on the intricate details of what took place, but it is my understanding that, first of all, we deployed our own military personnel to the region to help out, and the fact that some of our personnel who are familiar with the technologies and techniques of providing diagnosis via satellite hookups to doctors in other locations away from the earthquake and the fact that we had some people in Pakistan with the training in how to do the same things was of tremendous help in setting up these kinds of communications networks and making them work, because we couldn't have done it by ourselves, in this case, I do not think the Pakistanis could have done it by themselves, but with their newly trained personnel, together with our people with some experience, we made a tremendous difference.

Mr. FORTENBERRY. And this was the international military that was the catalyst that because of the confluence of these other factors that you had been working around the people and around their efficient medical personnel as well as your understanding of the technology, that allowed this to occur, is that correct? Am I understanding you correctly?

Mr. BRAIBANTI. In the case of the earthquake——

Mr. FORTENBERRY. Yes.

Mr. BRAIBANTI [continuing]. Disaster response, yes.

Mr. FORTENBERRY. That probably speaks to the broader issue in terms of the barriers in implementing successful role models that will outreach, that would deploy advanced telecommunications and telehealth opportunities. Can you speak to some of those barriers, and perhaps, Mr. Greene, you might like to jump in with your thoughts?

Mr. BRAIBANTI. Well, I think from my own experience, there are some barriers in terms of of course availability of resources, number one.

Secondly, I think we can do more networking looking internationally than we do today. I think we have a great capability within the United States. We have people who are doing things overseas, but a lot of people are doing things through their own networks. There are centers of excellence in the United States who work with, who collaborate with, people overseas on their own. The people that we have dealt with all were already doing international activities, and we of course have annual conferences of people who are interested in telemedicine where they share information.

But it seems to me so far that what is being done is kind of an opportunistic basis and without too much of a broader overview of what we could be doing on a global basis or on a national basis to promote the use of telemedicine internationally.

Mr. FORTENBERRY. Which of course brings us to the point of today's hearing, why this is so important to bring together a lot of disparate groups to discuss the broader potential here. As you suggested earlier, there is tremendous untapped potential.

But the government is near enough to superseding private effort to promote for a potential partnership and offering a more reactive or proactive strategy to bring services particularly to the poor. Again, that would help our diplomatic efforts as well. But, Mr. Greene, do you care to comment on the same question?

Mr. GREENE. Yes. The experience that we have had with telemedicine, which I think has been very successful, has been in Latin America, where the infant mortality rates are not approaching what the United States infant mortality rates are, but certainly a lot closer than in Africa.

I just got back from a week in Senegal looking at a lot of appropriate technologies. I was very interested in the learning program indicating the cyclic response of treatment meds and the rapid diagnostic test. We have the low-cost technology to make that program work. I am not sure that in Senegal in the remote households where most of the people are served we are ready for the telemedicine at this time. This is why our program began in Latin America.

However, I think there is potential. We have a study probing particular prevention and repair of dostetriz fistula, and this is a program that involves a high level of surgical skill. Most of the programs that we deal with deal with doing simple interventions available in the developed world that can prevent under 5 mortality, but this is a very complicated surgical procedure and this is where I think that we can benefit, I believe, with the expansion of telemedicine.

Now, having said that, take a look at two or three places that we have space for the program. We have Uganda. We have the Republic of Congo. I am not sure that you would have the technology in the middle of the Congo at this point to set up. But in Bangladesh, the reason I am more familiar with that is that is where I served 5 years in the Foreign Service. I can see there is potential there. And again, it will depend on the targets of opportunity. I can see that in particular areas.

In other parts of Africa where we are dealing with varied conditions which, frankly, we have simple technologies to deal with, I am not sure that that would be the first choice, but I certainly think there is tremendous potential there. Here you carefully choose where you invest.

Mr. FORTENBERRY. And thank you, by the way, for bringing the materials to show us the demonstration. Congress Members generally do like thoughts, but probably not needles, so if you have a friendlier type of display next time, it might be helpful.

Mr. GREENE. I am surprised I got it through security. [Laughter.]

Mr. FORTENBERRY. Well, good. Maybe we will have some time tomorrow. We can move on to some of the tests in general. If we could explore the satellite ground station that you had referenced briefly in Latin America, because the second panel is going to talk about some of the potential technologies there that might serve the world's most remote forest regions more than our capabilities do today, but obviously this is one that would be able to be implemented. Have you had any success? What would you say about that?

Mr. GREENE. I did not personally visit this program. I heard it was a rigorous program. I think the key thing is being able to serve the remote communities, and the satellite ground station has allowed this to happen. And I think indeed the cost of installation, I don't have the exact cost, but I think it is reasonable.

But this allows this technology to get out to the remote areas, and again, when it comes to the time for investment that USAID and the U.S. Government would be making in countries of Latin America, would be more in the less developed sectors and more on the non-communicable type of diseases where this type of telemedicine would be absolutely critical. The important thing here is that these ground stations, it is my understanding they can be installed at a very reasonable price and have multiple uses.

Mr. FORTENBERRY. Thank you. And again, I think we are going to reserve questioning until our second panel to get the most of execute you as well.

Ms. Austein-Casnoff, if I could turn to you for a moment, you gave a very compelling comment in your testimony that OAT promotes knowledge and exchange in successful and not so successful telehealth technologies.

I think it is useful to explore the second part of your statement where you are not so successful. The reason that I say that is—I also work in the Small Business Committee—we heard from the Small Business Administration one time about a very, very high level of loan-turn downs that they have. Now that might be regarded as a lack of success, but actually it can be a measure of success by intervening into what would impoverished allocation of resources prior to it happening and leveraging those resources to better use.

So if you could explore what appears to be something perjorative by not really, I think that would be helpful.

Ms. AUSTEIN-CASNOFF. If I might provide specific examples for the record, but in theory, it is exactly as you explained. One of the key issues in our seed money is sustainability, and if our grantees are not able to find ways to sustain themselves to bring in appro-

priate partners to spread the kind of information technologies that they have through other partners across the region or across other states, then they are not going to be successful.

So I think it very much is in line with acceptability, adaptability as well as financial sustainability, and I will be happy to provide some specific examples of that.

Mr. FORTENBERRY. Thank you. And based upon your experience, are there opportunities to better leverage the knowledge base within your agency to deliver enhanced outreach to the poor of U.S. foreign assistance?

Ms. AUSTEIN-CASNOFF. Well, of course, our legislative mandate is limited to the United States, but we do take great lengths to share the information we learn. You are going to hear on the second panel actually from one of our grantees.

So in terms of spreading the kind of knowledge and taking advantage of the experiences that we have outside of the U.S., I think many of our grantees are probably involved in that as well.

Mr. FORTENBERRY. Health care in general is becoming rapidly globalized. That would be the for-profit private sector deliveries, primarily of elective types of procedure, you have people leaving the United States going elsewhere to secure them and obviously we have had for many many years a very active trade, if you will, in terms of our country delivering health care services to people who are coming here for assistance.

I think we are on the very edge of something that is going to begin to become much more pervasive in the United States, so we may be calling upon your office to rapidly share all of the information that you have.

Well, thank you all so much for your insights. Again, we are in the seminal phase of all of these discussions because we are very interested in trying to discern how governmental policy can leverage the best of our technologies here in the United States with our foreign assistance in order to serve the most underserved population and also to potentially enhance our good relations with other peoples.

One of you made a comment, as well, that when you are delivering, I think it was you, Mr. Braibanti, that when you are delivering services in remote areas that might be under particularly intense conditions, rather than having personnel move about that might exacerbate that tension remote delivery of services as another whole chapter that can be written in terms of our diplomatic as well as outreach to the poor. So thank you all very much for your insight. We appreciate your time.

The Subcommittee will recess for 5 minutes, and then we will continue with our second panel.

[Recess.]

Mr. FORTENBERRY. The Subcommittee will come to order.

Good afternoon. Thank you all so much for joining us today. I would like to introduce our panelists.

Dr. Karen Rheuban serves as Professor and Director of the University of Virginia Office of Telemedicine. Dr. Rheuban is also a fellow of the American College of Cardiology and the American Academy of Pediatrics. She has been honored with a multiple year listing in the "Best Doctors in America" database.

Our second witness today is Dr. Keith Vrbicky. Dr. Vrbicky is chairman and CEO of the American Educational Telecommunications Company. He also has a private OB–GYN practice in Norfolk, Nebraska, and serves as an Assistant Clinical Professor at Creighton University and the University of Nebraska Medical Center. Dr. Vrbicky is the recipient of the Golden Apple Teaching Award for Excellence in Teaching at Creighton University, his alma mater. Welcome.

Mr. Jeb Carney, good afternoon. Mr. Carney serves as a board member and vice chairman of the Defense Forum Foundation, which conducts monthly briefings to Members of Congress and their staff on defense, national security and issues of human freedom. He is also the president and director of the National Council on Readiness and Preparedness. Mr. Carney is the founder of the Sahara Marathon International, a multinational effort that recently completed the sixth annual humanitarian fundraising marathon for the refugees of Western Sahara.

Dr. Bing Chen is Chair and Professor of the Department of Computer and Electronics Engineering at the University of Nebraska's College of Engineering in Omaha. His most current activities include supporting the efforts by the Henry Doorly Zoo, which is located in Omaha, to acquire two pandas from the People's Republic of China and the promulgation of the Silicon Prairie vision for future economic development within the State of Nebraska.

Doctor, I assume that dimension of your work in bringing the pandas to Nebraska, probably you didn't visit the National Zoo.

Mr. CHEN. No, I didn't. [Laughter.]

Mr. FORTENBERRY. Yes. But thank you all again for your willingness to join us today. We will begin with you, Dr. Rheuban. Thank you.

STATEMENT OF KAREN S. RHEUBAN, M.D., MEDICAL DIRECTOR, OFFICE OF TELEMEDICINE, UNIVERSITY OF VIRGINIA

Dr. RHEUBAN. Chairman Fortenberry. Chairman Fortenberry, on behalf of the University of Virginia, thank you for the invitation to testify today.

As you are well aware, articulated in your opening statement, health is a core tenet of human happiness. Outreach efforts to prevent and mitigate disease and alleviate suffering serve as a foundation for collaboration amongst people of all cultures and nations.

Advanced technologies provide tools to enhance and sustain those collaborations and strengthen our ability to respond to global threats from pandemics and to provide disaster relief. However, without further coordination amongst key Federal agencies, nongovernment and international organizations, foreign governments, and additional Federal support, we will only scratch the surface of what can be accomplished through telemedicine in the international setting.

Telecommunications have long played a role in humanitarian relief and medical outreach, be it via telephone, ham radio, fax, the internet, or video teleconferencing technologies delivered over terrestrial, satellite or wireless connectivity. The ever increasing global deployment of broadband communications services can facilitate

the delivery of instantaneous and carefully coordinated culturally sensitive health care.

The telemedicine program at UVA began in 1992 with a pilot initiative that linked us to the King Faisal Hospital in Riyadh, Saudi Arabia.

In 1995, funded by Federal grants, including from the Office for the Advancement of Telehealth, the Department of Commerce and the U.S. Department of Agriculture, we established the Southwest Virginia Alliance for Telemedicine to enhance access to local and available specialty care in rural Virginia. We now serve as the hub of a 60-site network that includes community hospitals, a Veterans Administration hospital, federally qualified health centers, schools, health department clinics, and a number of prison facilities in Virginia.

To date, we have facilitated more than 8,400 live interactive clinical consultations in 31 different medical and surgical subspecialties. In addition, we have provided interpretation of thousands of radiographic images. We have saved lives, supported timely interventions, and spared patients the burden of unnecessary travel.

As examples, our dermatologists have diagnosed skin lesions ranging from drug allergies to flesh-eating streptococcal infection. Our emergency physicians have evaluated and treated snake bites, and we in pediatric cardiology regularly diagnose and manage infants with life-threatening congenital heart defects.

We provide technology facilitated screening services, such as digital retinal imaging to diagnose patients at risk of blindness. We have recently procured a mobile digital mammography van configured to broadcast screening mammograms back to our radiologists for immediate interpretation.

We have incorporated telehealth facilitated specialty services in support of an annual massive health outreach efforts held at the Virginia-Kentucky Fairgrounds during which more than 3,000 uninsured patients are served in 1 weekend. These same technologies allow us to broadcast thousands of hours of health professional and patient education.

Any of these initiatives can be replicated in international outreach. A child in a rural country such as Haiti suspected to have heart disease need not have to wait months to gain entry into the United States solely for purposes of diagnosis when an ultrasound image can be transmitted in a heartbeat.

UVA has supported the delivery of clinical consultations and educational services in Europe, Africa, Central America, the Middle East, Asia, Australia and Canada. Our Center for Global Health has provided mentored research opportunities through the NIH Fogarty Center for more than 80 international fellows, and those programs continue enhanced by advanced communications technology and fostered by internal relationships.

Since the inception of our program, our infectious disease specialists have provided telehealth-facilitated HIV/AIDS care to patients in Virginia with well documented positive clinical outcomes. These same faculty, in partnership with the medical school at Makerere University in Uganda and colleagues from other universities have helped to create an infectious disease institute and HIV/AIDS training and clinical center in Kampala.

Training has been provided onsite to more than 500 physicians from 21 different African countries, and thousands of patients have been treated with anti-retroviral therapies and receive careful monitoring for complications of both disease and/or treatment.

Data from that project is regularly transmitted back to the U.S. via satellite facilitated broadband. In this initiative, 10 rural clinics have been established in Uganda with funding from The AIDS Support Organization. They now seek funding to develop a telehealth and clinical and educational network much like our own.

Our HIV/AIDS telehealth exploration and partnerships have resulted in relationships that have launched the offering of interactive for-credit courses and exchange programs linking UVA with three sub-Saharan African universities in Botswana, South Africa, and Mozambique.

In conjunction with the U.S. Telecommunications Training Institute, international visitors seeking to develop telehealth programs in their home countries have trained at our university. Just yesterday we participated in the launch of the new telemedicine center at Kuwait University, via videoconferencing technologies.

We are working to integrate telehealth into other international humanitarian outreach projects such as Helping Children Worldwide, a medical research program in Liberia and Sierra Leone, or the Remote Area Medical Cervical Cancer and Women's Health Outreach Project in Guyana, where clinicians parachute into the rain forest to provide gynecological care to hundreds of patients each year.

Colleagues from other academic medical centers have also used technology to enhance international outreach. Examples include the remote support of operative procedures in the Andes, the provision and care to indigenous people in the Amazon River Basin by a riverboat equipped with satellite telehealth technology, or the evaluation of patients from such locations as a field station atop the Himalayas.

Creating an infrastructure through which such projects may be developed and sustained still remains a challenge, in part because of difficulties in securing funding and/or affordable bandwidth, and, in some locations, even electricity.

Rich repositories of innovative telehealth applications have evolved from the Department of Defense and NASA-supported research, innovations that can and have been replicated for nonmilitary uses. The Department of Commerce has identified the export of U.S. health care as a viable product to promote clinical services abroad; telehealth is a tool to enhance that strategy.

We respectfully propose the establishment of a federally funded international telehealth resource center that links HRSA's Office for the Advancement of Telehealth with USAID and other key State Department programs, the CDC, the Department of Commerce and the Department of Defense telehealth research enterprise.

Such an initiative, linked both to the United Nations and the World Health Organization to facilitate the delivery of prioritized international health care outreach in a culturally sensitive collaborative process, has immense potential to help provide care to the forgotten and disenfranchised, to track and respond to epidemics,

and to positively export contemporary health care and educational services to the world's citizens in need. We have only begun to explore the rule of telehealth in this process.

Thank you.

[The prepared statement of Dr. Rheuban follows:]

PREPARED STATEMENT OF KAREN S. RHEUBAN, M.D., MEDICAL DIRECTOR, OFFICE OF TELEMEDICINE, UNIVERSITY OF VIRGINIA

Chairman Smith, distinguished members of the Subcommittee on Africa, Global Human Rights and International Operations, my name is Dr. Karen Rheuban. I serve as Professor of Pediatrics, Senior Associate Dean for External Affairs and Medical Director of the Office of Telemedicine at the University of Virginia Health System in Charlottesville.

"Without health, there is no happiness. An attention to health, then, should take the place of every other object." Eloquently articulated in 1787 by our founder, Thomas Jefferson, those words remain equally relevant in our contemporary world. Health—both physical and emotional—is a core tenet of human happiness. Outreach efforts to prevent and mitigate disease and alleviate suffering can serve as a foundation for collaboration amongst people of all cultures and nations. Advanced technologies offer a tool to enhance and sustain those collaborations and strengthen our ability to respond to global threats from pandemics and to provide disaster relief. However, without significant additional federal funding and coordination amongst key federal agencies, academic health centers, non government and international organizations, we have only scratched the surface of what can be accomplished.

On behalf of the University of Virginia, it is an honor and a privilege to provide testimony that speaks to the role of telemedicine in the delivery of healthcare and health related educational services to further collaboration transcending geographic boundaries.

Telecommunications have long played a role in humanitarian relief and medical outreach, be it via the telephone, ham radio, fax, the internet or video-teleconferencing technologies delivered over terrestrial, satellite or wireless connectivity. The ever increasing global deployment of broadband communications services now can facilitate the delivery of instantaneous and carefully coordinated culturally sensitive health care .

The telemedicine program at the University of Virginia began in 1992 with a pilot initiative that linked the King Faisal Hospital in Riyadh, Saudi Arabia with our health professionals in Charlottesville, both with physician exchange and the incorporation of interactive satellite communications services. Based on that initial experience, we strove to integrate technology to provide care in rural Virginia, where patients face the immense burdens of travel for access to locally unavailable specialty healthcare services.

In 1995, the University of Virginia Telemedicine program and the Southwest Virginia Alliance for Telemedicine were established to enhance access to specialty healthcare services and health related education for distantly located patients and health professionals. We initially selected sites in Appalachian communities in which we had established relationships and where we had hosted outreach clinics for many years. The program expanded quickly, supported by federal grants from the US Department of Commerce, the US Department of Agriculture, the Office for the Advancement of Telehealth, state funds and corporate and foundation grants and gifts.

We currently serve as the hub of a network of 60 sites which include community hospitals, a Veterans Administration hospital, federally qualified health centers, rural clinics, schools, health department clinics and a number of prisons in the Commonwealth of Virginia. To date, through this network, we have facilitated more than 8400 live interactive clinical consultations and follow-up visits linking distantly located patients with our University of Virginia health professionals representing 31 different medical and surgical subspecialties. These services are provided on a scheduled basis or emergently, as needed, at any time, day or night. In addition, we have provided many more thousands of radiographic interpretive services through our teleradiology program. We have saved lives, supported timely interventions, and spared patients unnecessary travel and expensive transfer where feasible.

As examples, through these linkages, our dermatologists have diagnosed skin lesions ranging from drug allergies to flesh-eating streptococcal infection. Our emergency physicians have evaluated and treated snake bites and drug overdoses, and we in pediatric cardiology regularly diagnose and when necessary, remotely manage infants with life-threatening congenital heart defects.

Our gynecologic oncologists supervise a nurse practitioner located six hours from Charlottesville as she performs cervical biopsies on patients at high risk for cervical cancer. We follow and treat chronically ill patients such as those with Hepatitis C, and HIV/AIDS and, as we are able, spare post operative patients or patients with devastating neurological impairments such as Huntington's disease or spinal cord injuries the unnecessary burden of travel for care. We provide mental health services to patients in communities where previously no such services existed. We have procured robotic surgical tools that will allow our urologic surgeons to collaboratively perform procedures both in our own operating suites and at other locations.

In conjunction with our community based partners, we offer services that include the long distance screening of patients for retinopathy, the major cause of blindness in patients with diabetes mellitus. Retinal images captured by a nurse trained to operate a specialized camera are electronically transferred to the interpreting ophthalmologist. We have recently procured a mobile digital mammography van configured to broadcast screening mammograms back to our radiologists for immediate interpretation and feedback to women in rural communities. We have tied this outreach program to a collaboration that will bring state-of-the-art screening for human papilloma virus, the cause of cervical cancer, and shared tumor boards and remote access to clinical trials for women in Appalachia. We have brought telehealth services to the Virginia-Kentucky fairgrounds in support of a massive outreach effort serving more than 3000 patients in one weekend. Technology allows us to provide quality care where such care is not otherwise available.

These same technologies allow us to broadcast thousands of hours of health professional and patient education, such as our grand rounds lectures, the CDC bioterrorism lecture series, conferences and lectures specifically requested by health professionals in rural communities. We have broadcast patient education programs and offer courses for rural high school students that incorporate the rich resources of our University community.

Any of these initiatives can be replicated in international outreach. Lessons learned from the development of our domestic telemedicine program coupled with greater global deployment of broadband communications services have allowed us to step beyond Virginia to provide services in other countries. The mission of our University's Center for Global Health is closely interwoven with that of our Telehealth program, and we have supported the delivery of clinical consultations and educational services in Europe, Africa, Central America, the Middle East, Asia, Australia and Canada. The Center for Global Health, through the NIH Fogarty Center programs, has provided mentored research opportunities for more than 80 international fellows. Those programs have continued as research collaborations enhanced by advanced communications technologies.

Since the inception of our program, UVA infectious disease specialists have provided telehealth facilitated HIV/AIDS care to patients in Virginia with well documented positive clinical outcomes. These same faculty, in partnership with the medical school at Makerere University in Uganda, the Infectious Disease Society of North America and colleagues from several other US universities have created an Infectious Disease Institute and HIV/AIDS training and clinical center in Kampala with funding from Pfizer and the Gates Foundation. Since 2002, training has been provided to more than 500 physicians from 21 different African countries. Through this initiative, thousands of patients have been treated with anti-retroviral therapies and receive careful monitoring for complications of both disease and drug treatment. Data from that project is transmitted via satellite facilitated broadband to Bethesda daily. Outside Kampala, ten rural clinics have been established with funding from The AIDS Support Organization (TASO). These clinicians have received training at Makerere, however, at those sites, the only source of connectivity is via telephone, dialup email or fax communications. This group now seeks to develop a telehealth clinical and educational network to further that effort.

The opening of one door has led to another. As a result of the exploration of HIV/AIDS telehealth enabled outreach projects in Africa, we have broadcast live-interactive courses in environmental sciences that have linked UVA students and professors with their counterparts in South Africa, Mozambique and Botswana. Students at all universities connect with one another simultaneously and receive credit for their participation. UVA environmental scientists connect with research colleagues located in remote field stations in Botswana and Namibia. Just yesterday we participated in the launch of the new telemedicine center at Kuwait University.

We are one of four US telehealth programs along with HRSA's Office for the Advancement of Telehealth to annually host international visitors through a program sponsored by the US Telecommunications Training Institute (USTTI), a non-profit partnership between leaders of the U.S. information technology (IT), telecommunications, and broadcast industries and senior federal officials from the State Depart-

ment and the Federal Communications Commission. Through this program, dozens of international healthcare and IT professionals seeking to explore the feasibility of establishing telehealth programs in their home countries have been trained in telehealth technologies.

We are actively working with our faculty to integrate telehealth into existing and expanding international humanitarian outreach projects such as "Helping Children Worldwide", a medical relief program serving children in Liberia and Sierra Leone, or the "Remote Area Medical Cervical Cancer and Women's Health project" in Guyana, where clinicians parachute into the rain forest to provide gynecologic care for hundreds of patients each year. Participating clinicians are regularly asked to treat patients with other ailments, and all these initiatives would be vastly enhanced by telehealth capabilities.

Colleagues from other academic medical centers have also used technology to enhance international outreach to include the remote support of operative procedures, the provision of second opinion services that incorporate teleradiology and telepathology tools, the provision of care to indigenous peoples in the Amazon River basin operating from a riverboat equipped with satellite telemedicine technologies, or from such locations as a field station atop the Himalayas to name just a few.

Creating an infrastructure through which such projects may be developed and sustained remains a challenge, in part because of difficulties in securing funding and/or affordable bandwidth, and, in some locations, even electricity. Many of these projects have been established with satellite telephones and are powered by solar panels or car batteries in regions without connectivity or power. Today, wireless broadband technologies offer the additional the potential to leapfrog beyond terrestrial communications where such connectivity does not exist.

Rich repositories of innovative telehealth applications have evolved from Department of Defense and NASA supported research—innovations that can and have been replicated for non-military uses. Continued funding of these programs is imperative. The Department of Commerce has identified the export of US healthcare as a viable product to promote clinical services abroad; telehealth has been identified as a tool to enhance that strategy.

We respectfully propose the establishment of a federally funded international telehealth partnership and resource center that links HRSA's Office for the Advancement of Telehealth (OAT) with USAID and other key State Department programs, the CDC, the Department of Commerce and the Department of Defense telehealth research enterprise. Such a partnership, if linked to the United Nations and the World Health Organization to facilitate and support prioritized international healthcare outreach in a culturally sensitive collaborative process, has immense potential to help provide care to the forgotten and disenfranchised, to track and respond to epidemics, and to positively export contemporary healthcare and educational services to the world's citizens in need. We have only begun to explore the role of telehealth in this process.

Thank you.

Mr. FORTENBERRY. Thank you very much.

Dr. Vrbicky.

STATEMENT OF KEITH VRBICKY, M.D., CHAIRMAN AND CHIEF EXECUTIVE OFFICER, AMERICAN EDUCATIONAL TELECOMMUNICATIONS, LLC

Dr. VRBICKY. Thank you, Congressman Fortenberry. Mr. Chairman and Members of the Committee.

Thank you for allowing me to briefly share with you the experiences of our Nebraska-based telemedicine and distance education company, AET, American Educational Telecommunication. Our company was founded in 1989. AET's mission is to utilize information technology tools that enhance the delivery of health care and education to people and professionals lacking access to these services due to their geographic location.

As an OB–GYN physician, moving from a metropolitan area in Omaha with two distinguished medical centers to practice in a rural setting, I quickly realized the challenge to access specialty consultations for my patients, which potentially affected their out-

come and well-being. Additionally, not having access to the educational opportunities of continuing education and doctor-to-doctor interactions can quickly place rural health care professionals at a disadvantage in their ability to know the latest and best treatments for our patients.

Unfortunately, at that time, the cost of communication lines was very expensive and reimbursement by insurance carriers for second opinion consultations was not yet covered. Subsequently, an Egyptian-born colleague with AET was contacted by authorities in the Egyptian Ministry of Health, expressing their interest in accessing United States-based medical services utilizing the then developing communications technology.

This eventually led to an international multi-point live interactive demonstration, which took place on August 7, 1999, between two facilities at the University of Nebraska Medical Center, one facility in Maryland, and Cairo University in Cairo, Egypt. Demonstrations of today's telemedicine diagnostic equipment along with the live video conferencing between professionals led to the realization by the Minister of Health and others that this was a valid service to improve access to quality care and education to the people and health care professionals in Egypt.

From February 4 to 8, 2000, live daily interactive broadcasts, sponsored by the Egyptian Society of Cardiology, took place at the 50th annual cardiology congress in Cairo originating from Creighton University in Omaha and Washington Hospital here in DC.

The following are testimonials following these events:

> "AET's telemedicine and teleeducational services will have a major impact on medicine in Egypt over the next few years. We spend millions of dollars each year to send patients abroad for treatment. By having doctors use AET's network, I expect these costs will decrease dramatically."
>
> "Medical students will benefit too because they can view lectures on a real-time basis from other universities worldwide, obtain certificates from a distance and get accreditation."
>
> "At the cardiology conference," Dr. Sherif comments, "I carefully watched the reactions of my colleagues as they watched live transmission from Creighton University. The transmission quality was so good that a few of my associates initially didn't believe it was being broadcast to us in real-time. The bottom line is that this technology will not only be good for Alexandria University, but for our entire nation."

Another testimony from Dr. Magd:

> "The image quality was superb and the technology is a major breakthrough for our country. I envision AET's telemedicine network services being utilized by virtually any medical specialty. All throughout Egypt, all their hospitals, all their medical clinics and medical centers will be able to connect to this network which will be an invaluable asset in helping our physicians to better diagnose and manage their patients' medical conditions."

Additional live international interactive demonstrations that AET has performed have included dedication of the Suzanne Mubarak Telemedicine Center at Cairo University, demonstration to Japan's royal family during their visit to Cairo University, which assisted in obtaining Japan's funding of a new pediatric hospital in Cairo, and the grand opening ceremonies of Egypt's new broadband services.

We have experienced dramatic life-changing results throughout the time we have provided these services. In particular, let me give you an example. A 10-year-old Egyptian boy has a rare neuroopthalmologic condition and has rapidly been deteriorating over a period of 6 months.

His mother, his physician in Cairo attended a video conference at the Cairo University Telemedicine Center. Consultation was done via live videoconference with a rare pediatric neurophthalmologist at Washington University. Currently there is only about 20 of these physicians in the United States. The boy's physician reviewed his history, performed the requested exam, and the tests were live and broadcast. A new diagnosis in 15 minutes was able to made by the pediatric neuroophthalmologist, and substantive changes in the boy's medications were ordered.

Two weeks later the boy was completely back to normal as a result of this consultation, a dramatic event that changed this boy's life.

As this patient's physician stated:

> "You don't know all the answers all the time, and it is really useful to be able to consult with someone else who gives you insights into the same problem. This technology has tremendous applications because of the huge geographical expanse."

With today's teleconferencing systems, doctors are now able to have face-to-face discussions and share critical X-rays, electrocardiograms, echocardiograms, angiograms over the high-speed two-way information network. They can exchange opinions on diagnosis, treatment, surgical techniques, post-surgery treatment and even view diagnostic and therapeutic procedures.

A.E.T.'s international telemedicine and distance education services have also expanded into Mexico and Latin America. AET's partner, the Universidad de Autonoma in Guadalajara, serves as the Latin American hub for in-country and international access to second opinion consultations. Unlike the high utilization of services from centers in the Middle East where the government provides payment for the services, our experience in Mexico shows a tremendous interest and desire for the services but a reluctance on patients' part due to the cost. We are currently working on the insurance reimbursement issue and feel that once this is resolved, utilization will increase.

It has become very apparent to us that whenever we travel and present AET's productions and services, the American health care system is highly revered for its quality and its compassion. AET, for example, has just entered into a multi-year contract with the Ministry of Health in Dubai. Their interest lies not only in second opinion consultations but accessing continuing medical education for their health care professionals.

We are confident that as a result of this contract, we will be able to expand the services to the surrounding Gulf countries as well. Recent trips to Thailand and other Southeast Asian countries have also demonstrated a similar interest in accessing the American health care system and education.

I believe that AET's experience is an example of how a small U.S.-based company can and have built relationships overseas, which can enhance U.S. diplomacy. It must be stressed that considerable attention and respect for the social systems and culture of the various regions is of paramount importance to any successful implementation of these services. Building these trusting relationships requires considerable time and patience.

A.E.T. will also be launching a round-the-clock health channel, television channel, initially in the Middle East, that will deliver content via satellite and the internet. Programs will educate people on the important health care issues, such as diabetes, women's health care, pediatrics, cancer, fertility, cardiology and more.

We are taking initiative to attend these private broadcasts on women's health, which has received a tremendous response throughout the 2 billion listeners in that area of the world. Because of our numerous business, academic and institutional health care industry alliances, we will be able to deliver timely and cost-effective programming throughout the region, and eventually we would like to do so worldwide.

It is our goal that with the continued use of digital teleconferencing technology, we can help remove the boundaries to high quality medical care and help to provide access to specialized expertise and information to all.

Again, I would like to express my sincere appreciation to you, Mr. Chairman, for inviting me to testify today and I am open to any questions.

[The prepared statement of Mr. Vrbicky follows:]

PREPARED STATEMENT OF KEITH VRBICKY, M.D., CHAIRMAN AND CHIEF EXECUTIVE OFFICER, AMERICAN EDUCATIONAL TELECOMMUNICATIONS, LLC

MEDICAL CARE AND EDUCATION WITHOUT BOUNDARIES:

Mr. Chairman and members of the committee:

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As an Ob/Gyn physician, moving from a metropolitan area with two medical centers, to practice in a rural setting, I quickly realized the challenge to access specialty consultations for my patients, which potentially affected their outcome and well-being. Additionally, not having access to educational opportunities of continuing education and doctor-to-doctor interactions, can quickly place rural healthcare professionals at a disadvantage in their ability to know the latest and best treatments for our patients.

Unfortunately, at that time, the cost of communication lines was very expensive and reimbursement by insurance carriers for second opinion consultations was not yet covered. Subsequently, an Egyptian born colleague with AET, was contacted by authorities in the Egyptian Ministry of Health, expressing their interest in accessing U.S. based medical services utilizing the then developing communications technology.

This eventually lead to an international multi-point live interactive demonstration, which took place on August 7, 1999, between two facilities in Nebraska, one

in Maryland, and Cairo University in Egypt. Demonstrations of today's telemedicine diagnostic equipment along with the live video conferencing between professionals led to the realization by the Minister of Health and others that this was a valid service to improve access to quality care and education to the people and healthcare professionals in Egypt.

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> Medical students will benefit too because they can view lectures on a real-time basis from other universities worldwide, obtain certificates from a distance and get accreditation.
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> At the cardiology conference, I carefully watched the reactions of my colleagues as they watched live transmissions from Creighton University. The transmission quality was so good that a few of my associates initially didn't believe it was being broadcast to us in real-time! The bottom line is that this technology will not only be good for Alexandria University, but for our entire nation.
>
> *— Dr. Sherif El Biltagui, Lecturer of Cardiology, Alexandria University, Alexandria, Egypt*

> "The image quality was superb and the technology is a major breakthrough for our country. I envision AET's services being utilized for virtually any medical specialty—from anesthesiology to cardiology to urology. Egyptian hospitals, medical clinics and medical centers will be able to connect to an AET medical telecom operations center, which will be invaluable in helping our physicians to better diagnose and manage their patients' medical conditions."
>
> *— Dr. Ayman KA. Magd, Associate Professor of Cardiology, Azhar University, Cairo, Egypt*

Additional live international interactive demonstrations have included: dedication of the Suzanne Mubarak (Egypt's First Lady) Telemedicine Center at Cairo University; demonstration to Japan's royal family during their visit to Cairo, which assisted in obtaining Japan's funding for a new pediatric hospital in Cairo; and, the grand opening ceremonies of Egypt's new broadband services.

Dramatic life changing results have been and continue to be witnessed, particularly with children. A 10-year-old Egyptian boy's life changed after he, his mother, and his physician in Cairo received a second opinion consultation for a rare neurologic condition affecting his vision and balance. This consultation was done via live videoconference with a neuro-opthalmologist at Washington University. The boy's physician reviewed his history, performed the requested exam and tests live (at the direction of the specialist in St. Louis), a diagnosis was made, and appropriate changes in the boy's medications were ordered. There was an immediate improvement in the child's condition and he fully recovered from his illness.

As this patient's physician stated: "You don't know all the answers all of the time, and it's really useful to be able to consult with someone else who gives you new insights into the same problem. This technology has tremendous applications because of the huge geographical expanse."

With today's teleconferencing systems, doctors are now able to have face-to-face discussions and share critical X-rays, electrocardiograms, echocardiograms (sonar-type studies of the hear and blood vessels), and angiograms (dye injection inside the heart and blood vessels) over the high-speed two-way information network. They can exchange opinions on diagnosis, treatment, surgical techniques, post-surgery treatment and even view diagnostic and therapeutic procedures in real-time.

As one noted pediatric heart surgeon, Dr. Peterz Einstein of the U.S. charity Children's Heart Project International stated:

> "All these numbers and pictures that are essential for taking care of a child with heart disease can now be communicated halfway around the world so both teams of doctors can simultaneously see the visual data. A phone call doesn't give you the immediate availability of visual data that you have with a real-time videoconference. There's almost no substitute for both teams of doctors looking at the same visual data simultaneously, discussing it, or arguing about it in a way that videoconferencing makes possible. Certainly, with the videoconference, the discussions that go on between doctors are as effective as when

the participating teams are in the same room with each other. All of this goes into the ultimate diagnosis and care of the child."

AET's international telemedicine and distance education services have expanded into Mexico and Latin America. AET's partner, the Universidad de Autonoma in Guadalajara, serves as the Latin American hub for in-country and international access to second opinion consultations. Unlike the high utilization of services from centers in the Middle East, where the government provides payment for the services, our experience in Mexico shows a tremendous interest and desire for the services, but reluctance on patients' part due to costs. We are currently working on the insurance reimbursement issue and feel that once this is resolved, utilization will increase.

It has become very apparent to us, that wherever we travel and present AET's products and services, the American healthcare system is highly revered for its quality and compassion. AET, for example, has just entered into a multi-year contract with the Ministry of Health in the United Arab Emirates. Their interest lies not only in second opinion consultations, but accessing continuing medical education for their health professionals. We are confident that as a result of this contract, we will be able to expand the services to the surrounding Gulf countries as well. Recent trips to Thailand and other Southeast Asian countries have demonstrated a similar interest in accessing the American healthcare system and education. I believe that AET's experience is an example of how a small U.S.based company can and has built relationships overseas, which can enhance U.S. diplomacy. It must be stressed, that considerable attention and respect for the social systems and culture of the various regions is paramount to any successful implementation of these services. Building these trusting relationships requires considerable time and patience.

AET will also be launching a round-the-clock health channel, initially in the Middle East, that will deliver content via satellite and the Internet. Programs will educate people on important healthcare issues such as diabetes, pediatrics, women's health, cancer, fertility, cardiology and more. Because of our numerous business, academic, and institutional healthcare industry alliances, we'll be able to deliver timely and cost-effective programming throughout the region, and eventually worldwide.

It is our goal that with the continued use of digital teleconferencing technology, we can help remove the boundaries to high quality medical care and help to provide access to specialized expertise and information to all.

Finally, I would again like to express my sincere appreciation to you Mr. Chairman and the committee members, for inviting me to testify today and I am open to any questions you may have for me.

Mr. FORTENBERRY. Thank you. We will move to questions after the panel speaks.

We have Mr. Carney.

STATEMENT OF MR. JEB CARNEY, VICE PRESIDENT, DEFENSE FORUM FOUNDATION

Mr. CARNEY. Thank you, Mr. Chairman, for the opportunity to testify before your Committee today and the Members here on the importance and value of telemedicine not only in forging direct working relationships between the institutions and citizens of the United States and those less fortunate and in need throughout the world but also in accomplishing good works which otherwise would not be logistically or financially possible.

My experience with telemedicine dates from July 2000 when, as the founder and chairman of the Sahara Marathon, I and other volunteers were in the Algerian camps of the 200,000 Sahrawi refugees from Western Sahara. We were there organizing the first Sahara Marathon, a humanitarian project developed through the U.S.-Western Sahara Foundation, which is an organization begun by the Defense Forum Foundation. I am vice chairman of that, Ms. Suzanne Scholte is the president, and the Honorable J. William Middendorf II is the chairman.

The purpose and the history of Sahara Marathon can be viewed at www.saharamarathon.org, but briefly it has become an effective, multinational humanitarian effort intended to raise awareness and funding for special projects in the Sahrawi refugee camps to supplement and reinforce the fragile medical infrastructure in the camps to care for the Sahrawi children.

The project of the first marathon was to create a basic satellite telecommunication system to provide telemedicine and internet distance diagnosing capability to the Sahrawi physicians and to establish some initial relationships between the doctors in the camps and those in American medical colleges.

Our reasoning was that a project that was quickly demonstrated, funded and conducted by volunteers and U.S. institutions would encourage government agencies and other humanitarian organizations to see the incredible value in the relatively inexpensive medical capability and use of volunteers and emerging technology at the time. It could quickly save lives.

With the help of Barbara Godwin, who is here with us today, Farhad Mohamadian, and other donors, we were able to secure commercially available satellite phones, modems, scanners, cameras, microphones, power supplies and computers that formed the core of the communications capability.

We were also fortunate to have Dr. David Gangemi, then from the Medical University of South Carolina, leading the medical/nutritional team that included not only Sahrawi physicians in the camps but also Dr. Peter Cotton and his associates located physically at the MUSC Digestive Disease Center in Charleston, South Carolina. We had onsite technical help from Abel Sanches of the University of Madrid and from my son, Jennings Carney, also present here today.

In July 2000, we conducted through Dr. Gangemi and Dr. Peter Cotton the first ever live, satellite video teleconference from the camps. This teleconference demonstration was attended by eight Sahrawi physicians and by Dr. Cotton and his associates who were located in Charleston, South Carolina, and the technical representatives from the University of Madrid.

We successfully scanned and transmitted high-resolution digital files of X-ray film of some of the physician's Sahrawi patients and conducted a general on-line video teleconference conversation about celiac disease and ways to offset the harsh effects by increasing assimilable vitamin D in the diet of young refugee children.

Attached to this testimony is a proclamation from the Sahrawi physicians attesting to their appreciation not only of our efforts but acknowledging the importance that they placed on the great value of potential direct contact with colleagues in medical institutions.

As a result of this demonstration, several medical universities were willing to volunteer their physicians, their medicines, and time as a contribution to help the refugees. Additionally, other supportive governments in Europe began looking for ways to support such a program being hatched based on the proof of concept that we demonstrated. During the past 5 years, a variety of programs have begun and stopped and rehatched, each for different reasons.

The conditions in the camps are quite harsh, with wind-driven powered sand and temperatures in the Sahara summer rising to

125 to 130 degrees Fahrenheit, presenting challenges to the individuals and sensitive medical equipment, but these issues were solved with some ingenuity.

A larger challenge, however, was to maintain the expense of replacement equipment and to fund the satellite communication uplink required to network the medical colleges to the camps. For instance, MUSC and the Medical College of Virginia in Richmond had at the time committed their resources. But for the lack of government or donor subsidy to make the program regular and dependable, this network today most likely would be active.

The expense of satellite air time at the time was $8 a minute for satellite transceiver/modem for the teleconferences, email and file transfers. Because of the low-horizon latitude of Sahrawi refugee camps in the southwestern desert of Algeria, access to low-cost European satellite telenetworks were problematic, and the cost of the available network exceeded the funding ability of the Sahara Marathon.

New technologies are now more affordable, but the challenge remains the same: In order for the humanitarian organizations and medical colleges to invest their time, medicines and energy, we need to know that the uplink will be relatively long-term.

On a larger scale, the prevention of certain preventable pre- and postnatal nutrition deficiencies and stress-induced diseases in children is possible through education and the collaboration between skilled physicians and field practitioners who can save millions of lives.

Forward thinking now can promote the public/private partnerships between medical communities who are helping physicians in developing countries. These provide care, diagnosis and treatment to refugees and at-risk populations suffering from stress, infections and insufficient diet resulting from poverty, war, famine and civil strife.

The functional centerpiece of distance diagnosis and telemedicine is technology, making available satellite modems or other equipment which allows physicians to communicate with other physicians via the internet by email, scan and send X-rays, cardiograms and medical records, or even to conduct live video teleconferencing for consultation and surgery and generally connect with the larger world body to request urgently needed supplies, funding and advice.

The philosophical centerpiece, however, is really driven by the people, the humanitarians and organizations already struggling to maintain infrastructures which currently provide medical care, facilities, many without any governmental support whatsoever. Long-term success is only possible if partnerships that have been formed have the needed support, equipment, structures, communications, and medicines, and nutritional supplements needed.

Creating this dependability is a natural role of government, which needs only to be the paymaster for the willing and capable partners already engaged and helping each other. Funding these direct connections promotes the values and compassion in ways not possible through other means.

In many cases, no new programs are needed, nor is new technology. The private and nongovernmental sectors have and are ex-

cellent Ambassadors representing the compassion and caring of the American people. The U.S. Government through its agencies can magnify and amplify its medical diplomacy simply by providing the financial guarantees that keeps these communications networks funded.

Thank you, Mr. Chairman, for this opportunity today to share these experiences and thoughts with you and the distinguished Members of the Committee.

[The prepared statement of Mr. Carney follows:]

PREPARED STATEMENT OF MR. JEB CARNEY, VICE PRESIDENT, DEFENSE FORUM FOUNDATION

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The conditions in the camps are quite harsh, with wind-driven powdered sand and temperatures in the Sahara summer rising to 125–130 degrees Fahrenheit, presenting challenges to the individuals and sensitive medical equipment. But these issues were solved with some ingenuity.

The larger challenge was to maintain the expense of replacement equipment and to fund the satellite communication uplink required to network the medical colleges to the camps. For instance, MUSC and the Medical College of Virginia in Richmond had at the time committed their resources. But for the lack of a governmental or donor subsidy to make the program regular and dependable, this network most likely would be active today.

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The philosophical centerpiece, however, is driven by the concerned people and organizations already struggling to maintain infrastructures which currently provide medical care and facilities, many without any governmental support or subsidy. Long-term success is only possible if partnerships that have been formed have the needed support, equipment, structures, communications, medicines and nutritional supplements.

Creating this dependability is a natural role of government, which needs only to be the paymaster for the willing and capable partners already engaged and helping each other. Funding these direct connections promotes the values and compassion in ways not possible through other means. In many cases, no new programs are needed, nor is new technology. The private and non-governmental sectors can and are excellent ambassadors representing the compassion and caring of the American people. The U.S. government through its agencies can magnify and amplify this medical diplomacy simply by providing the financial guarantee that keeps these communication networks funded.

Thank you, Mr. Chairman, for this opportunity today to share these experiences and thoughts with you and your distinguished members of the committee.

Mr. FORTENBERRY. Thank you, Mr. Carney, for your good work. We appreciate it.

Dr. Chen, I am sure your testimony about the pandas on the campus of Omaha and the advanced technology that are linked to them in a very integrated way.

STATEMENT OF BING CHEN, PH.D., DEPARTMENT OF COMPUTER AND ELECTRONICS ENGINEERING, COLLEGE OF ENGINEERING AND TECHNOLOGY, UNIVERSITY OF NEBRASKA-LINCOLN

Mr. CHEN. We hope to bring them to Omaha as well. I would like to make some introductory remarks first.

I want to thank you, Congressman Fortenberry, and your staff for this opportunity to address the Subcommittee on Africa, Global Human Rights and International Operations, and to share several thoughts with you.

Mr. FORTENBERRY. Doctor, if I may interrupt. If you would press that.

Mr. CHEN. Press the button here?

Mr. FORTENBERRY. We use advanced technology here.

Mr. CHEN. Right. I am professor and chair of the Department of Computer and Electronics Engineering, also called CEEN, located on the Omaha campus. CEEN is part of the Peter Kiewit Institute of Information Science, Technology and Engineering known as PKI, and it is a collaboration between two NU universities and local industry.

Adjacent to PKI is the Scott Technology Center research park, and our local leaders have invested in the neighborhood of $200 million in the STC/PKI complex over the last decade.

We have worked with military, public and private entities such as STRATCOM, Henry Doorly Zoo, Ameritrade, SCOLA, which stands for Satellite Communications for Learning, L3 Communications, Level 3 Communications, Union Pacific Railroad, Kuka Robotics and the University of Nebraska Med Center. Our research work with the aforementioned entities could have health care and medical applications in underdeveloped regions of the world.

Some of the problems that are being studied by CEEN are focused on studying real world problems which are responsive to Nebraska economic development interests and exploring projects with societal impacts. These projects involve CEEN students and faculty in a number of ways.

Students participate from all levels, ranging from freshmen feasibility studies such as the portable classroom concept, which you and I discussed on an airplane flight together, senior thesis projects involving wireless biometric sensing and RFID tracking of patients, and graduate research, wireless video monitoring with pattern recognition at the Henry Doorly Zoo's Lied Jungle. These have applications which may translate to foreign aid interests which the House may wish to consider and pursue.

We also work with the University of Nebraska Medical Center to identify applications of new technologies such as RFID and Wireless Sensor networks in the Omaha metropolitan area hospitals, clinics, and other medical facilities, applications such as patient and medical assets tracking and monitoring in the health care facilities.

I am going to list a few examples of some of the projects that our students have been involved in and which may translate to your Subcommittee.

Duchesne Academy of the Omaha Archdiocese pushed its parishioners to extend its "Computers for Africa" program, which focuses on schools in Uganda to providing live education in subjects such as physics and mathematics. Ameritrade Chairman Joe Ricketts has had us explore the feasibility of delivering education to Africa via satellite. PKI has links to European Command and the potential use of underused satellite time. CEEN is exploring the use of satellite connections from Omaha to Ugandan schools.

Then we are exploring the possibility of distributing this downloaded satellite data to distribute to neighboring schools within a 20- to 30-mile range via new wireless technologies such as the IEEE standards 802.16 to receive lessons from stateside.

We intend to employ photovoltaic, PV, and/or wind power systems with full signal conditioning to provide backup AC power whenever and wherever called for. We have made visits to NSF to discuss and determine what is currently available in Africa. PKI has the state-of-the-art "near presence classroom," which employs Access Grid technology, permitting multiple formats to be transmitted live for Big 12 electrical career engineering schools for us to share our curriculums. That engages students from different campuses to participate in an active manner.

This technology could be used for real-time meetings between continents if bandwidth, power and communications requirements can be adequately addressed. This infrastructure could easily be adapted to provide medical and health care training and education for different areas in Africa. Medical advice and alerts could be directly delivered to people in Africa as part of these educational outreach activities.

The second project: Wireless biometric monitoring systems worn by patients in rural areas who need not be in hospitals but which can alert medical parties and medical data which can be accessed by physicians. This is a project that was started by one of my first senior groups. Beginning in 2000, a sequence of senior thesis projects collected biometric data which includes pulse rate, oxygen, blood pressure and ECG. We have added GPS data to track the patients should they need to be found.

Prototype designs have successfully demonstrated technical feasibility with existing wireless technologies such as Bluetooth and cellular phones. Developing a biosensor that could detect diseases that are endemic to a region could alleviate the lack of health care professionals by having some combination of AI, artificial intelligence, and on-board digital signal processing available for diagnosis in the field. With wireless biometric monitoring devices such as those we have experimented with, it could enable medical teams and personnel to monitor health issues remotely through wireless links.

Three, portable classroom project to perform a feasibility study by freshmen CEEN students for a portable classroom for up to 50 students or personnel that could be shipped via C–130 cargo planes.

Characteristics: Portable structures would be lightweight, quickly erecting and depending on need—desert, jungle, mountain region—utilizing satellite downlinks to plasma screens for full duplex, i.e. two-way communications with Access Grid capability—that means multiple formats received simultaneously, including video, audio, Power Point and overheads—and laptops driven by software appropriate to the regions and specific subjects such as medical, K through 12 education being supported, and other subjects.

Learning can be with direct link to educators and consultants or individually by self-learning depending on the availability of local human resources. Power can be generated from various possible sources: PV, photovoltaics, which we would probably advocate the use of flexible wrap-around solar arrays, smaller wind generators

under 10 kilowatts, wood-burning electric generators when wood/cellulose is available, ocean wave power for coastal and island applications.

Direct communication back to the United States via satellite or to host country ministries could be established from the portable classrooms. Application of remote video transmissions in real-time will enable medical groups to remotely diagnose and provide advice for patients.

Four, CEEN is working with the Henry Doorly Zoo, which is located in Omaha, Nebraska, to develop wireless video links with the goal of monitoring wildlife in general and specifically pandas in Foping Nature Reserve using the new IEEE wireless standard 802.16 with a telecom network that transmits data from node to node in a daisy chain fashion.

Live data will be transmitted via satellite and/or internet link back to Omaha. The wireless video links can include biometric data such as IR sensors as well, or infrared. These units can even provide passive and active monitoring to other locales with different applications such as intrusion detection across borders or throughout a region.

Similarly, this approach could be utilized to monitor environmental changes which may have medical impacts when certain vectors which contribute to endemic diseases are detected early enough for timely action to be brought to bear.

From CEEN's initial observations from our studies: Africa's internet resources are spotty at best, power is either unavailable and/or unreliable, and ground communication infrastructure to remote areas is as yet underdeveloped.

Recommendations that we would like to make for your Committee to consider: One, we would propose that economic feasibility studies be performed to assess the need for an Africa-specific satellite with direct links back to the United States; estimate the rate at which internet technologies are and will be distributed throughout Africa in the years ahead and extrapolate the need for a satellite dedicated to Africa. The main focus will be the medical applications and how technology can facilitate this goal.

Two, we propose that potential uses of such a satellite platform to provide education, from a temporary basis such as in Darfur to something more permanent such as a church school in Uganda, especially for medical applications; assess the reliability of power in each of these instances and internet availability and reliability; in each case determine what power resources are available and tailor a solution which could employ sweeping solutions from wind, PV, bio-fuels and tidal power.

Three, we propose that when it is determined that economic resources should be made available to regions which are under stress from food and water shortages, political, tribal and religious unrest, environmental and climate duress, or endemic disease crisis, that technological solutions which are reliable and self-sufficient can be employed and deployed to impact the health care and education in that area.

Finally, I would like to conclude my remarks with a quote from Albert Schweitzer, who is one of my childhood heroes:

"Only by means of reverence for life can we establish a spiritual and humane relationship with both people and all living creatures within our reach. Only in this fashion can we avoid harming others, and, within the limits of our capacity, go to their aid whenever they need us."

And I would thank you very much.

[The prepared statement of Mr. Chen follows:]

PREPARED STATEMENT OF BING CHEN, PH.D., DEPARTMENT OF COMPUTER AND ELECTRONICS ENGINEERING, COLLEGE OF ENGINEERING AND TECHNOLOGY, UNIVERSITY OF NEBRASKA-LINCOLN

Introductory Remarks: I want to thank Congressman Jeff Fortenberry and his staff for the opportunity to address this subcommittee on Africa, Global Human Right and International Operation and to share several thoughts. Let me introduce myself. I am Bing Chen from the University of Nebraska's College of Engineering. I am professor and chairperson of the Department of Computer and Electronics Engineering (CEEN) located on the Omaha campus. CEEN is part of the Peter Kiewit Institute of Information Science, Technology and Engineering (PKI) and is a collaboration between two NU universities and industry. Adjacent to PKI is the Scott Technology Center research park and our local leaders have invested $200M in the STC/PKI complex over the last decade. We have worked with military, public and private entities such as STRATCOM, Henry Doorly Zoo, Ameritrade, SCOLA (Satellite Communications for Learning), L3 Communications, Level 3 Communications, Union Pacific railroad, Kuka Robotics and the University of Nebraska Medical Center. Our research work with the aforementioned entities could have healthcare and medical applications in underdeveloped regions of the world.

Problems being studied in Nebraska by CEEN are focused on studying real world problems which have are responsive to Nebraska economic development interests and exploring projects with societal impacts. These projects involve CEEN students and faculty. Student participate from all levels: ranging from freshman feasibility studies such as the portable classroom (spring 2006), senior thesis projects (wireless biometric sensing and RFID tracking of patients) and graduate research (wireless video monitoring with pattern recognition at the Henry Doorly Zoo's Lied Jungle) have applications which may translate to the Foreign Aid interests which the House may wish to consider and pursue. We also work with the University of Nebraska Medical Center to identify applications of new technologies such as RFID and Wireless Sensor Networks in the Omaha metro area hospitals, clinics, and other medical facilities. Applications such as patient and medical assets tracking and monitoring in the health care facilities.

Examples of projects being performed by CEEN which may have applicability to the House Subcommittee's interests:

1. Duchesne Academy of the Omaha Archdiocese wishes to extend its "Computers for Africa" program which focuses on schools in Uganda to providing live education in subjects such as physics and mathematics. Ameritrade chairman Joe Ricketts had us explore the feasibility of delivering education to Africa via satellite. PKI has links to European Command and the potential use of underused satellite time. CEEN is exploring the use of satellite connections from Omaha to Ugandan schools. Then we are exploring the possibility of distributing this downloaded satellite data to distribute to neighboring schools within a 20–30 mile range via new wireless technologies such as the IEEE standard 802.16 to receive lessons from stateside. We intend to employ photovoltaic (PV) and/or wind systems with full signal conditioning to provide back up AC power whenever and wherever called for. We have made visits to NSF to discuss and determine what is currently available in Africa. PKI has a state-of-the-art "near presence classroom" which employs Access Grid technology permitting multiple formats to be transmitted live for Big 12 ECE schools to share curriculum that engages students from different campuses to participate actively. This technology could be used for real time meetings between continents if bandwidth, power and communications requirements can be adequately addressed. This infrastructure could easily be adapted to provide medical and health care training and education for different areas in Africa. Medical advice and alerts could be directly delivered to people in Africa as a part of these educational activities.

2. Wireless biometric monitoring systems worn by patients in rural areas who need not be in hospitals but which can alert medical parties and medical data that can be accessed by physicians. Beginning in 2000 a sequence of senior thesis projects collected biometric data which includes pulse rate, oxygen, blood pressure

and ECG. We have added GPS data to track the patient should they need to be found. Prototype designs have successfully demonstrated technical feasibility with existing wireless technologies such as Bluetooth and cellular phones. Developing a biosensor that could detect diseases that are endemic to a region could alleviate the lack of health care professionals by having some combination of AI and on board digital processing available for diagnosis in the field. With wireless biometric monitoring devices such as those we have experimented with could enable medical teams and personnel to monitor health issues remotely through wireless links.

3. Portable classroom project to perform a feasibility study by freshman CEEN students for a portable classroom for up to 50 students that could be shipped via C–130 cargo plane. Characteristics: portable structures would be lightweight, quickly erecting and depending on need (desert, jungle, mountain region, utilizing satellite downlink to plasma screens for full duplex (both way) communications with Access Grid capability (multiple formats being received simultaneously (video, audio, Power Point and overheads) and laptops driven by software appropriate to the regions and specific subjects (medical, K–12 education being supported, other subjects). Learning can be with direct link to educators/consultant or individually by self learning depending on the availability of local human resources. Power can be generated from various possible sources: PV (flexible wrap around arrays), smaller wind generators of under 10 KW, wood burning electric generators (when wood/cellulose is available), ocean wave power (for coastal/island applications). Direct communications back to US via satellite or to host country ministries could be established from the portable classrooms. Application of remote video transmissions in real-time will enable medical groups to remotely diagnose and provide advice for patients.

4. CEEN is working with the Henry Doorly Zoo (Omaha, Nebraska) to develop wireless video links with the goal of monitoring wildlife in general and specifically pandas in Foping Nature Reserve using the new IEEE wireless standard 802.16 with a telecom network that transmits data from node to node in a daisy chain fashion. Live data will be transmitted via satellite and/or internet link back to Omaha. The wireless video links can include biometric data such as infrared (IR) sensors as well. These units can provide passive and active monitoring to other locales with different applications such as intrusion detection across borders or throughout a region. Similarly, this approach could be utilized to monitor environmental changes which may have medical impacts when certain vectors which contribute to endemic diseases are detected early enough for timely action to be brought to bear.

Observations:

From CEEN's initial observations from our studies: Africa's internet resources are spotty at best, power is either unavailable and/or unreliable and ground communication infrastructure to remote areas is as yet underdeveloped.

Recommendations that the House Subcommittee on Africa, Global Human Rights and International Operations may wish to consider:

1. We would propose that economic feasibility studies be performed to assess the need for an Africa specific satellite with direct links back to United States. Estimate the rate at which internet technologies are and will be distributed throughout Africa and extrapolate the need for a satellite dedicated to Africa. The main focus will be the medical applications and how the technology can facilitate this goal.

2. We propose that potential uses of such a satellite platform to provide education (from a temporary basis such as in Dhafur to something more permanent such as a church school in Uganda) especially for medical applications. Assess the reliability of power in each of these instances and internet availability and reliability. In each case determine what power resources are available and tailor a solution which could employ wind, PV, bio-fuels and tidal power.

3. We propose that when it is determined that economic resources should be made available to regions which are under stress from food and water shortages, political, tribal and religious unrest, environmental and climate duress, or endemic disease crisis that technological solutions which are reliable and self sufficient can be employed to impact the health care and education in the area.

I would like to conclude my remarks with a quote from Albert Schweitzer,

> *"Only by means of reverence for life can we establish a spiritual and humane relationship with both people and all living creatures within our reach. Only in this fashion can we avoid harming others, and, within the limits of our capacity, go to their aid whenever they need us."*

Mr. FORTENBERRY. Thank you, Dr. Chen. We commend you all as well for your excellent work and your excellent insights today. I think we have got right here a very, very balanced perspective

on many multiple aspects of what is now developing, and as you suggested, Dr. Vrbicky, the potential opportunities before us are now just being explored.

So I am very gratified by what occurred today. Again, as I mentioned earlier, we are in the seminal phases of this. There are a lot of mystery elements to it. One of the reasons for the hearing is to explore the possibility of how you potentially leverage, as you suggested, and this would be my question to you if you all want to comment, governmental resources to potentially provide or overcome the barriers of the high market to implement this in a more pervasive fashion.

We have got top academic, technological specialists here, you who are working in the academic arena with technology but also the current methodologies that were used to deliver resources. Dr. Vrbicky the same, except you are also involved in a commercial enterprise and you upon your good will have demonstrated a project that through an act of horror has come about with the advanced technology.

So if you can go back and explore that question, I would be grateful.

Dr. RHEUBAN. Thanks. I think that is an excellent question. In fact, we do not have an international telehealth resource center, and I am delighted to see Dr. Dena Ruskin here, who directs OAT, Office for the Advancement of Telehealth. That program really has put together all the elements that are critical to the deployment of domestic telehealth, but they don't have an international mandate.

We have wonderful funding from a number of different agencies, but really the true commitment to the deployment and coordination of telehealth comes from OAT, and I would propose that perhaps OAT be a home for the coordination of such international outreach efforts.

I was delighted to learn about some of the work that is being done in USAID and some of the work that is done in other elements of the State Department because, in truth, I have no way of accessing that information. Again, a network facility such as OAT to maintain a database of available funds and technologies would be extraordinarily helpful to us.

We have no shortage of doctors who wish to provide outreach services. We just need to find a distribution network to do so. We also have no shortage of people who approach us and say can you help, and again, we don't always necessarily have the funding to be able to do that. So creating a central facility and repository would be essential in my view.

Mr. FORTENBERRY. Well, repository is a good word because again, all of you are working to one degree or another in the private sector as well as leveraging public resources, and the innovation that you have brought out, that you have brought to the market has been through your own initiative with the government applying minimal direction as well as minimal resources.

So again, my thought is how do we rethink essentially that problem so it does not lead to fear but it begins to help the private sector to to deliver in a more pervasive global fashion these services.

But the interesting link to this or any restrictable link to it as well is the objective that you are going to serve the world's poor,

the most underprivileged the most important objective is a good relationship with people with all of the gifts that we have been given in our country.

So, Dr. Vrbicky, if I could turn to you for a moment. You gave a very nice, specific example. I think it would be helpful to anyone reading this testimony in the future or watching this now to go back and to actually explore how this happened.

You talked about a young boy with a neurological disease. Just talk about the scenario as to how that unfolds. What does the doctor from a distance do? What is the actual method of communications that is deployed, and how is that communicated back, as you suggest, in a culturally sensitive manner to the patient and the family?

Dr. VRBICKY. A schedule and call center was established through the AET network with Cairo University, and the availability of a access consultation specialist in the United States was then given to the faculty at Cairo University, and this particular physician, pediatrician of the child recognized that he had a patient with a very different, unique medical condition, the 10-year-old boy, so he contacted the call center.

The call center in Cairo contacted our center in Omaha. Because of the uniqueness and the requirement of a pediatric neuroophthalmologist, it took us 48 hours to identify where was such a doctor, and we found one in Washington University in St. Louis who was very excited, by the way, to participate.

Then as a result, the time was scheduled. The doctor, because of the 7-, 8-hour difference in our time zones, was very willing to get up at six o'clock Central Standard Time to be able to then participate in this live video conference between the patient, the 10-year-old boy, his mother, and the pediatrician in Cairo at their tele medicine center.

The physician was then asked by the specialist at Washington University to examine the patient with certain technologies that we have available in this field of telemedicine and did a complete neurologic exam on the child. But again, he is seeing this happen in front of his eyes.

Mr. FORTENBERRY. May I interrupt you? So he is instructing the doctor there to touch here, to look in the eyes this way?

Dr. VRBICKY. Exactly.

Mr. FORTENBERRY. And in that, was there a language barrier?

Dr. VRBICKY. No, there wasn't, and we had a translator.

Mr. FORTENBERRY. You did.

Dr. VRBICKY. The physician spoke English. And subsequently as a result, the physicians interacted with each other, and the diagnosis of this child was changed from what the physician in Cairo thought that the child had.

Subsequently to that, the physician at Cairo agreed, a medication change was made, and a reconsultation was scheduled 2 weeks later. So again, the call center set up that consultation, and 2 weeks later, another live video conference with repeat exam, and the child was completely back to normal after 2 weeks of medication change.

Mr. FORTENBERRY. Well, it is a fascinating model in that you have set up a call center or repository as you say that would link,

using the technology available, and then employ the resources of a doctor who may never have thought about being involved in this or who on their own would never be able to acquire the advanced types of technology because of expense and other demands on time, which again you bringing that to the private through just your initiative with private resources I think is very admirable.

It ties in very well to what your comments are in terms of how is this made more pervasive, and Dr. Chen, if you want to comment on that, particularly your comments that are very in depth technologically. But how would we leverage some of the available technological resources out there?

You suggested this satellite network for Africa designated to Africa. Would that be an opportunity that would allow the private sector to aggressively expand into more remote areas other than Cairo, which has transportation and other communications resources?

Mr. CHEN. One of the things that the students were enjoying to try to attempt was to develop as low a cost system, a satellite downlink system, which could utilize alternative energy sources to power them up.

The cost for such a system can be gotten for probably less than $20,000 is what their estimate was, totalling up the satellite downlinks, the photovoltaic arrays, the laptop computers that we would have available to us, the video cameras that we would have to utilize. If there is more than one camera, that needs to be available.

So we think that it can be done. We haven't tried it yet, but we believe that with the technologies that we have currently that a fairly low-cost downlink or reception system could be developed.

Mr. FORTENBERRY. You have been there. You have done this. Why don't you comment on the potential again barriers to delivering better services and if such a scenario that Dr. Chen just painted would have been very helpful to you?

Mr. CARNEY. Well, thank you. I think the doctor is right. I think that if there were a clearinghouse where two things could happen, one, information on telemedicine and where private sector organizations could go so they would not have to Lewis and Clark this. I spent 2 years doing this, and if I could share that with somebody and have it in some place that other people could find it, then the mystery would not be so great.

The other issue I think is that, and the doctor is quite right, the system that we put together was in Force-3 cases, it was about $15,000, and that was in 2000 money. Today the technology is a little bit better, and it is not quite so sensitive. It is a little more robust.

I think the big issue is in terms of barrier, there really is not a barrier per se I think except right now financial. I think that there are more elegant systems that could be created perhaps, but I think in the meantime, I think this government and leadership within this government, if they would just be a paymaster, because you are such a bulk buyer of satellite time right now, to put together really sort of a CostCo of satellite times so that private sector organizations could come in and buy time for, you know, 10

cents on the dollar, 15 cents on the dollar. It would be quite remarkable.

We could offer, for instance, in 1 week, we could be throughout the world right now with four suitcases, each of us, setting up distance diagnosing with 128K up and downlink, you know, full duplexing using N4tron and trons that are multiplexed together, being able to do a full array of any kind of communication necessary.

And they are solar busts. The military uses them in Afghanistan and Iraq. The stuff is practically indestructible now. And what we need to do now is put that in the hands of humanitarians and physicians and people over there in the field that can readily put this stuff up. Power is an issue, but today's technology, it is just not a barrier anymore. Those flexible solar panels you talked about are very simple to buy from any yacht catalog, you know, boating catalog. You can buy these things now, and they will drive 24-volt, 12-volt systems.

There is just an enormous amount of European interest in this as well, and so this government can really reach across the pond there, so to speak, and to build those direct relationships, not only with European not-for-profits and private sector organizations, but also African organizations that are really striving to do this.

There are some Middle East companies that are getting ready to deploy a satellite, Thoria. If you are not familiar with that, it is becoming almost sort of the standard over there. It is low speed, but it still affords some level of technology, and you can buy little cards on the satellite for about $800.

So the only barriers really I think right now are the financial barrier to allowing the organizations that are currently working to multiply and augment what they are currently doing, and I think that within just a very short period of time, just some help supporting the cost of the satellite time would do more than anything, for instance, in being able to project this capability in a level of magnitude that it is today.

Mr. FORTENBERRY. Yes, Doctor.

Dr. RHEUBAN. Three more points. There are lower technology alternatives to be considered. Store-and-forward technology where an image is captured and sent for a second opinion is very useful as well. Just 2 or 3 weeks ago we evaluated a woman with uterine cancer in Kazakhstan. This consult started with the electronic transfer of images to our pathologist and then continued with actually an appointment with her and her physician, so we can certainly integrate various levels of technology.

The other important piece to consider is human capacity development in terms of training people and developing these relationships. That is critical. We cannot do this on our own. We have to have the engagement of individuals on the ground, and as well, be respectful of the governments, the health ministries.

And then last but not least, it is wonderful if we could have someone someplace to help us with whatever might be potential regulatory challenges. Ironically, it is harder for me to practice medicine across the state border. I cannot do telemedicine to West Virginia, but I can probably do it to a number of African countries and even European countries without the same challenges I face

within the United States. So someone has to help us to maneuver all of the regulations, however. That would be useful as well.

Mr. FORTENBERRY. That is a peculiarity in our system, isn't it?

Mr. Carney and Dr. Rheuban, you begged the question that I was going to ask earlier in regards to do you see a possibility of U.S. Foreign Service personnel becoming more integrated into these fields and then would be the people there on the ground to coordinate, facilitate when the private sector sees an opportunity, whether or not it is to facilitate the relationship with local persons, indigenous persons, or be involved somehow in the implementation and care and ongoing maintenance of technologies, particularly in the remote.

I realize we are talking at multiple levels. There are already resources out there for those with resources to do wonderful things. Then on the other side, there are remote places with no even power resources to even make this thinkable. So there are a lot of points in between. Would that be a consideration that you think would be worthwhile for us to examine the role of the Foreign Service in this regard?

Dr. RHEUBAN. I think it is a wonderful idea. The Peace Corps as well could be another resource for us.

Mr. FORTENBERRY. One reason I say Foreign Service is the thinking long-term into integrating this again into our normal diplomatic relations and service deliveries to other countries, because when people are coming and going in the Peace Corps, which would be wonderful in the short-term, but to think through this model as a long-term transforming effort of our diplomatic relations, primarily to help other people, to me has huge potential, but I wanted to hear, you all have done it, you have all implemented this. I wanted to see if that might be helpful.

Dr. VRBICKY. I definitely agree with the doctor that, you know, we have to respect their culture and their societal norms. You know, for example, it took us over 2 years to close on a contract because we had people on the ground there full-time getting to know us, we getting to know them.

I think historically, some U.S. companies have maybe dumped technology, here is your technology and run away, and it does not work and it failed. We can't do that. We have to be there. We have to manage their expectations and make sure that we are there for the long term. And once we have proven that, then indeed we enter into these strong relationships.

Mr. FORTENBERRY. Mr. Carney?

Mr. CARNEY. Absolutely. The problem with a bunch of equipment that costs, you know, $100,000 and its got sand in it and it doesn't work for lack of one small piece, it looks like a good gesture, but it doesn't help anybody.

If there was a person on the ground that was helping get that little piece through Customs to the equipment, then all of a sudden that is a hero. In many ways, that is what the Foreign Service personnel can be.

And I know they are very busy with other things, but I think your idea is an absolutely excellent idea, because I think it gives a larger mission to an already important role that this government has projecting not only its interests but also its image overseas.

Mr. CHEN. I agree with the other three speakers. I think what you are looking at is a very robust technology that I think we are in a process. I just came from NSF, and they were complaining to me, can't you guys design a data logger that is going to exist in the desert or in the mountains or in the jungles? And I said well, yes, I believe we can. We just have not been given the opportunity to look at this market.

And I just spoke with the president of SCOLA, Satellite Communications, and he indicated to me, he says, you know, Bing, we are bringing in five channels from Africa for redistribution in the United States, satellite channels. The problem that we have is we are paying somewhere close to $10,000 an hour. So you can't afford to have a slow video link from some country and then you are now at a teleport station and you are paying $10,000 an hour waiting for a very slow bit stream coming in. You have got to collapse everything together and do it very, very efficiently.

I happen to feel very strongly about SCOLA's mission and in redistributing it over our internet two links to all of the primary universities in the United States, and so what you have is now we are a window on the world, and so anybody in the United States has access to the television stations of all these countries. I think this type of interconnection among countries is in my mind a very valuable service. How do you then do this in reverse without some kind of an infrastructure that can move quickly and responsively?

So if you need a doctor in Darfur or you need a school set up in Uganda, what organization can actually fulfill this, and I think perhaps the Foreign Service is an excellent solution.

Mr. FORTENBERRY. Yes, Doctor?

Dr. RHEUBAN. One more comment if I might.

The Department of Commerce has actually connected us to video conference opportunities through the Embassies in Chile and in Hungary, so I think your point is very well taken, and that could be a partnership with the Department of Commerce and their development arm to bring these technologies to foreign countries.

Dr. VRBICKY. It took us 4 weeks to get a polycom video conference piece of equipment into Egypt, 4 weeks. And a person on the ground, as you were speaking, would do that in probably 1 or 2 days. So it would break down barriers.

Mr. FORTENBERRY. Wonderful. Well, this is certainly a high point and an appropriate place to probably end, but I do have one specific question for you, Dr. Vrbicky.

You mentioned reimbursement from insurance companies. Were you referring to insurance companies overseas?

Dr. VRBICKY. In Mexico, primarily. Yes, there is a number of Americans that now have moved or vacation in Mexico and Latin America, and their insurance typically does follow them, American health insurance, but those insurance companies have not been willing to provide the international telemedicine reimbursement.

Fortunately within the States here, they are starting to provide the consultation services that doctors may charge, but it is extremely frustrating here in the States, as the doctor mentioned, in that we cannot cross state lines, and it is much easier to do telehealth services internationally than it is to do within the United States right now.

Mr. FORTENBERRY. Well, thank you again for your wonderful insights today. As I mentioned earlier, this is a seminal discussion. I am trying to get in front of a new wave of technology that is coming and to rethink the delivery systems not only for commercial purposes but for governmental, diplomatic, and humanitarian purposes, because I think we are at a confluence right now of all of this, so your willingness to participate in this hearing has been very helpful to me, and again, those who are on the Committee that will look at this I am sure will take away some wonderful ideas. And you have given us not only a broad overview of some of the possibilities but of some specific things that can be entertained by the Congress.

So we look forward to continuing to dialogue with you, and thank you so much for your willingness to come today and your time. Our hearing is adjourned.

[Whereupon, at 4:02 p.m., the Subcommittee was adjourned.]

APPENDIX

MATERIAL SUBMITTED FOR THE HEARING RECORD

PREPARED STATEMENT OF THE HONORABLE CHRISTOPHER H. SMITH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY AND CHAIRMAN, SUBCOMMITTEE ON AFRICA, GLOBAL HUMAN RIGHTS AND INTERNATIONAL OPERATIONS

I regret I am unable to be present for today's hearing of the Subcommittee on Africa, Global Human Rights and International Operations, due to the funeral of my good friend and former colleague, the Honorable G.V. "Sonny" Montgomery. However, I am pleased to lend my strong support to the effort today to explore how the U.S. government can enhance its diplomatic and foreign assistance efforts to remote and overlooked populations in need by leveraging technology solutions focused exclusively on extending basic healthcare, such as easily preventable issues, eye and ear infections, etc.

Africa and other parts of the developing world are desperately in need of assistance to help improve basic health care. Sub-Saharan Africa has 11% of the world's population and 24% of the global burden of disease, but only 3% of the world's health workers. According to the World Health Organization's World Health Report of 2006, at least 1.3 billion people worldwide lack access to the most basic healthcare, often because there is no health worker. The burden is greatest in countries overwhelmed by poverty and disease where these health workers are needed most. A lack of personnel, combined with a lack of training and knowledge, is also a major obstacle for health systems as they attempt to respond effectively to chronic diseases and bird flu.

African government officials are requesting donor nations to adjust their assistance programs to meet these great needs. For instance, in January, I traveled to Uganda and met with Uganda's Minister of Gender, Labor and Social Development, Mrs. Zoe Bakoko-Bakora. She said that what Ugandan women really needed—and wanted—was basic pregnancy care assistance and help in giving birth safely, especially in rural areas where health clinics and doctors are hard to come by.

The availability of communications technology to bring medical expertise together with under-trained medical personnel is one of the best good news stories to come along in years. For instance, telemedicine diagnostic equipment and live video conferencing is enabling doctors to have face to face discussions and share critical x-rays, electrocardiograms, echocardiograms, and angiograms over high-speed, two-way information networks. Medical professionals can exchange opinions on diagnosis, treatment, surgical techniques, post-surgery treatment and view diagnostic and therapeutic procedures in real-time. The relatively low cost to the government of providing such technology, along with leveraging the good will of humanitarian groups and top-ranked universities to donate their time and expertise, mean that implementation of programs using this technology and best practices learned from programs to reach remote populations in the U.S. could save millions of lives.

I thank my good friend and colleague, the Honorable Jeff Fortenberry, for chairing this hearing today and leading the effort to encourage the United States government to creatively use medical outreach technologies and applications developed in the U.S. to spur new action to raise the profile of basic health outreach in our assistance efforts abroad.

We the undersigned:

On behalf of us all, the Physicians of Western Sahara, we would like to express to you personally and to the Medical University of South Carolina, our thanks and to tell you how greatful we are in establishing this connection, and our desire to continue those contacts for diagnosis purposes, and exchange of knowledge.

1. DR. ABDALLAH MOHAMED SALEH – CARDIOLOGIST
2. DR ABDELKADRIC HAMDETTI MOHAMED – GENERALISTA.
3. Dr. Abderrahaman Mohamed Lehabib – Esp. Pediatria
4. Dr. SAID Mohamed EMBAREK Mohamed – Medecine Generale
5. Dr. Abdelyalil Ali Abeid – medico General
6. Dr. Hussein Ragrugui TUM-BACHIR – Esp. ort y traumatologia
7. Dr. Salek Ali Bachir – medico General.
8. Dr. mustafa Abdl. Abdala – medico General.