Global Forum on Telemedicine:
Connecting the World through Partnerships

International Roadmap for Action

March 2008

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

Letter from Hon S. Pak M.D., President ATA

On behalf of the American Telemedicine Association (ATA) leadership, I am pleased to share with you the results of the *Global Forum on Telemedicine: Connecting the World through Partnerships.* Although there is a great deal of healthcare outreach efforts globally, there is a need to share resources and to leverage information technology to broaden their impact. The goal of the forum was to bring together key stakeholders in global healthcare outreach to explore a flexible framework and a sustainable business model to leverage telemedicine and information technology to extend outreach efforts. The forum resulted in an *International Roadmap for Action* that was developed by the authors based on the presentations and interactions from the 335 attendees and establishing a set of priorities and actions to improve healthcare using telemedicine and IT. This document is meant to be a start of an evolving dialogue to explore how the telemedicine community can be leveraged to improve the global disparity in healthcare. This report recommends a set of priorities and actions for improving health and healthcare through telemedicine and information technology (IT).

Recommendations fall into 6 categories: (1)Continue dialogue to create the telemedicine framework for multiple stakeholders; (2) Provide stakeholders with a way to identify and leverage existing resources; (3) Educate Grantors on the value of telemedicine as an enabler of medical outreach programs and to expand training programs and build competency in the healthcare workforce; (4) Alignment of international policy to support integration of telemedicine into country plans and support cross-country partnerships; (5) Development of communication infrastructure; (6) Integration of telemedicine programs for disaster relief.

We recognize the need for close collaboration and coordination with our partners, and we encourage continued international dialogue in creating a framework to broaden medical outreach using telemedicine.

Hon S. Pak, M.D.
President, American Telemedicine Association

EXECUTIVE SUMMARY

The American Telemedicine Association (ATA) *Global Forum on Telemedicine: Connecting the World through Partnerships* was held in Las Vegas in September 2007. The goal of the forum was to bring together key stakeholders in global healthcare outreach to explore a flexible framework and a sustainable business model that would leverage telemedicine and information technology (IT) extending global outreach efforts to a broader constituency of governmental and non-governmental organizations (NGOs).

Governmental and NGO international programs were presented by 19 speakers in five (5) key topical areas: (1) Component framework: The NGO perspective: understanding the mission, challenges and opportunities for international outreach; (2) Financial sustainability: funding, financial models, reimbursement, and grants: opportunities and challenges in international outreach; (3) Government/ military perspectives: challenges and opportunities for humanitarian missions; (4) Outreach for health emergencies and disaster response; (5) The co-creation environment: current and emerging opportunities for development and partnership in international telemedicine outreach programs. Additional presentations during roundtable discussions included presentations by 12 international programs.

Plenary addresses by major international stakeholders included, Joan Dzenowagis Ph.D., who is responsible for e-Health governance and international affairs covering global and regional development in health technologies for the World Health Organization (WHO) and Jean Claude Healy, M.D., Ph.D., Senior Advisor, United Nations (UN) Global Alliance for Information and Communities Technologies and Development (GAID). Reporters captured the dialogue, reoccurring themes/ trends and gaps which form the basis of this report and collectively identify a consensus toward action.

The forum resulted in an *International Roadmap for Action* that was developed by the authors based on the presentations and interactions from the 335 attendees and establishing a set of priorities and actions to improve healthcare using telemedicine and IT. A set of priorities and recommendations for action to improve health and healthcare delivery through telemedicine and information technology (IT) is presented. This document is meant to be the start of an evolving dialogue to explore how the telemedicine community can be leveraged to improve the global disparity in healthcare. Of note is the limited participation of some major NGO's that are involved in global relief efforts. There is a need to invite their participation in the continuing dialogue and development of the sustainable telemedicine framework and business model that will serve to leverage telemedicine and information technology (IT) in providing medical assistance to the global community.

Recommendations fall into 6 categories: (1) Continue dialogue to create the telemedicine framework for multiple stakeholders; (2) Provide stakeholders with a way to identify and leverage existing resources; (3) Educate Grantors on the value of telemedicine as an enabler of medical outreach programs and to expand training programs and build competency in the healthcare workforce; (4) Alignment of international policy to support integration of telemedicine into country plans and support cross-country partnerships; (5) Development of communication infrastructure; (6) Integration of telemedicine programs for disaster relief.

The recommendations presented in the *International Roadmap for Action* will be circulated for comment and further development to participating governmental and non-governmental organizations. The document will also be circulated to those who were unable to participate, in an effort to broaden the impact of the recommendations. The ATA welcomes participation by the many organizations seeking to provide healthcare and medical relief services worldwide and salutes their efforts.

OVERVIEW

The *Global Forum on Telemedicine: Connecting the World through Partnerships* was held September 28-30, 2007 in Las Vegas, Nevada. The vision for the Forum was to produce a seminal policy report by bringing together leaders from government, industry and academia to identify strategies that will produce a sustainable framework for international telemedicine outreach. Specifically, the Forum identified and prioritized key science, technology, clinical and policy obstacles that impede international telemedicine, and strategies to overcome these barriers. The meeting was well attended with **335 attendees**, representing **209 organizations and exhibitors**, from **14 countries**, converging to listen, to network and to learn more about how to successfully plan and sustain an international effort in telemedicine. A complete list of organizations and countries appears in Appendix A.

The theme of the meeting was **collaboration and partnership**. In the opening remarks by ATA President, Dr. Hon S. Pak, he stressed that this meeting was to start a dialogue and that the ATA is the right organization, with the experience, to lead the discussion in building a telemedicine framework for global healthcare outreach. He further stated that telemedicine has the potential to transform the allocation of healthcare resources on a global basis. His goals for the ATA include establishment of an international telemedicine resource center, creating an inventory of international telemedicine outreach efforts, and to create a community around a telemedicine framework to cultivate academic, government and industry partnerships that will support sustainable business models for international telemedicine.

Many health organizations, universities, non profits, non-governmental organizations (NGOs), governments, and international organizations such as the World Health Organization (WHO) and United Nations (UN) invest a significant amount of resources in international medical outreach. Although much is being done in international medical outreach, much of it is organization and location-centric, and there is an urgent need to improve collaboration among the various outreach organizations. Among the relief organizations, there is too much hard work and experience that are not being shared due to funding competition, politics, and lack of communication infrastructure. ATA envisions telemedicine as an enabler to "flatten" disparities in healthcare especially as it relates to specialty care. The vision will be realized through partnerships and collaboration rather than competing for scare resources.

Virtually all plenary speakers validated the real need for partnerships and collaborations as a necessary factor in the success of creating a telemedicine framework for international outreach. All successful and sustainable international telemedicine outreach programs presented at the various roundtables appear to be the result of collaboration and partnership.

After the plenary session, which set the tone and context for this global forum, leaders from the various sectors were brought together for a series of panel presentation and discussions. The topics and the leaders were selected by the program committee to stimulate a detailed discussion on the key topical areas:

Panel 1: Component Framework: The NGO perspective: Understanding the mission, challenges and opportunities for international outreach

Panel 2:   Financial Sustainability: Funding, Financial Models, Reimbursement, and Grants: Funding Opportunities and Challenges in International Outreach

Panel 3:   Governmental/Military Perspectives: Challenges and Opportunities for Humanitarian Missions

Panel 4:   Outreach for Health Emergencies and Disaster Response;

Panel 5:   The Co-creation Environment: International Telemedicine Outreach Programs, Current and Emerging Opportunities for Development and Partnership.

In addition to the panel discussion, there were two roundtable sessions with key presentations from international programs. The roundtables covered existing telemedicine programs and discussion of a framework for international telemedicine outreach.

Summaries of all plenary, panel and round table sessions were compiled by reporters and form the basis for this report.

SUMMARY PLENARY ADDRESS

Plenary speaker, Joan Dzenowagis Ph.D., is responsible for e-Health governance and international affairs covering global and regional development in health technologies for the WHO. She is the author of the published report "Connecting for Health". A number of themes were covered in the plenary address and supported throughout the day by other speakers and roundtable presentations. These included: growth of communications especially cellular service in developing countries where infrastructure is less available; potential effect on business development; need for partnership and collaboration in business as well as in and between countries; reality of the global healthcare situation; healthcare workforce development; and the potential for telemedicine systems of care. Dr. Dzenowagis reviewed the role of the WHO in the areas of public health and disease mitigation with supporting statistical data. She also presented the challenge of healthcare inequity – highlighted by a series of maps and graphs. Global child mortality, spending on health, information and communication technology (ICT) and education as a percentage of gross domestic products (GDP) were discussed. She shared that many countries are in conflict or transition, and most spend very little in these realms since resources are often in flux or not available.

Dr. Dzenowagis noted that the global interest in developing communications technology and connecting the infrastructure for ICT applications is high, but effective partnerships are needed to help individual users and worldwide organizations deal with new technologies. Globalization of healthcare, elimination of barriers to development and creation of entirely new networks is a goal of ICT efforts. IT and ICT via the Internet is providing access to health information and a foundation for new services, new players, and new markets. Using global maps, available on the WHO website, Dr. Dzenowagis illustrated how the world has embraced communications connectivity and illustrated the growth of mobile technologies, which offer tremendous potential for low income countries. Access to mobile devices and the high percent of penetration in the developing countries will serve the health communities in the future. She highlighted that although information may be accessible in areas with connectivity; it is typically not integrated with healthcare services and has a limited role in low income countries. Newer complex technologies are 'not appropriate' for poor countries. This is due to a variety of factors that

include but are not limited to; lack of infrastructure to provide electricity and bandwidth availability, cost of developing infrastructure, higher costs for Internet access and satellite connectivity, and unstable political situations.

Dr. Dzenowagis pointed out that health literacy remains an open question. With a shortage of health workers in many developing countries, qualified individuals are needed to use, manage and maintain the systems. She discussed that telemedicine systems are ideally suited to provide at least a part of the necessary training for healthcare workers. The central message of Dr. Joan Dzenowagis keynote address was that a networked world is redefining healthcare. These networks create new services, players, markets and issues, and a global environment where there is no monopoly on information. The driving forces compelling this change include: expanding connectivity and telecommunications capacity, the growth of mobile telecommunications, exploding global internet traffic flows, and a rise in new media leading to greater public awareness, multi-stakeholder action, and discussion of values & justice. These advances are changing attitudes towards the use of ICT in healthcare; from one of skepticism to an embrace of its promise. By combining forces in; (1) research and development (R&D), which creates value; (2) delivering and implementing, which delivers value; and (3) market development (profit and impact), which captures value, global health can be changed. Dr. Joan Dzenowagis concluded that diversity drives innovation and ended her remarks with a quote "Without computers and the Internet, we are fighting 21st century problems with 19th century tools."

SUMMARY LUNCHEON ADDRESS

Jean Claude Healy, M.D., Ph.D., Senior Advisor, United Nations (UN) Global Alliance for Information and Communities Technologies and Development (GAID) presented the history, structure, goals, results to date and road forward for the program. The UN established GAID in 2006 to provide a global forum on the use of ICT for enhancing the achievement of internationally agreed development goals, notably reduction of poverty, illiteracy and disease.

The alliance's structure is a unique blend of public and private sector organizations, the first of its kind within the UN. Partners include: governments, member states, enterprises, corporations, civil society, academia, NGO's, community-based organizations, ICT for development (ICT4D) practitioners, and UN system organizations. To date, GAID has leveraged public/private resources to establish three Flagship Partnership Initiatives, 17 communities of expertise, including telemedicine, from the four thematic areas of education, health, entrepreneurship and governance. GAID has five regional networks: Africa, Asia-Pacific, Europe, Latin America and transitional countries. GAID's ongoing activities that include publications and hosting conferences and have produced a number of articles ranging in focus from regional concerns to sustainment issues on subjects concerning ICT in Africa, the role of ICT in global development, and how to develop and connect kiosks. GAID has a number of planned activities for sessions in Europe and Africa that include:

- Event to be held in September 2007 in Geneva to help youth harness the creativity needed to explore ICT for the benefit of peers and communities, and to advance ICT development
- "Connect Africa" a global multi-stakeholder partnership to mobilize human financial and technology resources to bridge gaps in ICT. The meeting to be held in Kigali, Rwanda

October 2007 is being organized by ITU, African Union, World Bank Group, GAID, heads of state, ICT Ministers, plus 600 stakeholders. The meeting's goal is to develop an action plan for broadband communications that will increase the penetration and access to broadband for Africa in support of development from a rural economy to a knowledge economy

- Flagship Partnership Initiative, a multi stakeholder activity to leverage joint resources and to spur visible actions across four GAID focus areas

Presently, digital inequity is the greatest challenge for GAID. High income nations have 16% of the world's population, 94% of Internet hosts and 89% of the health spending, whereas low income nations have 84% of the population but only 6% of the Internet hosts and 11% of health spending. The Millennium Development Goals (MDGs) seeks to reduce this growing digital gap, since this divergence will not sustain security and peace.

Dr. Healy noted that one of GAID's identified goals is to make sure that 80% of the African population will have access to broadband communications in the next five years. Such milestones can transform rural economies into venues for knowledge exchange. While poor countries are lacking basic information technology and infrastructures, middle class countries such as Brazil, India and China desire to respond to public needs for better health care systems with telemedicine solutions.

Dr. Healy's presentation reviewed UN data and supported common themes stressed throughout the day. These included: (1) Inequity of ICT resource distribution; (2) Need to continue the dialogue; (3) Partnerships; (4) Development of infrastructure and; (5) Need to align policy to support ICT development as a foundation to assist in reaching the MGDs of a reduction of poverty, illiteracy and disease.

The needs, trends and challenges identified in the opening remarks, plenary and luncheon addresses include:

Trends
- Collaboration among multiple agencies and organizations is growing and has been shown to be effective
- Mobile and wireless technology is fuelling growth in developing countries and will be part of the solution for necessary infrastructure in delivering healthcare
- Regional networks using ICT are effective

Challenges/ Barriers/ Gaps
- There is a generalized lack of knowledge regarding the use of telemedicine in the NGO sector
- Lack of a telemedicine framework inhibits development
- Need to develop partnerships with a multiplicity of configurations
- Need to eliminate barriers to entirely new networks
- Need to better address issues related to privacy and security and prevent cyber crime
- Need to develop integrated systems for disease surveillance as disease does not recognize territorial boundaries

- Need for more efficient ways to train new and current healthcare workers secondary to a critical shortages of health workers
- Important to understand what countries and areas are best assisted with technology and in what way i.e. matching the appropriate technology to the local setting
- Understand how resource spending can and does change with the development of ICT in the healthcare sector
- Address gaps in ICT that exist between urban and rural populations

Recommendations
- Assist in development of national e-health strategies to link government planning with local/regional information and networks. i.e. identify technology solutions regionally
- Set a vision and key priorities for the telemedicine outreach framework (partnerships, resource center, sustainable business models)
- Target areas for telemedicine development: humanitarian relief, health emergencies, and disaster response
- Find ways to handle business transactions for patients needing remote care as part of a business model
- Leverage ICT to plan and coordinate biosurveillance across sectors and borders
- Set international healthcare outreach policies leveraging this global forum and its partners (WHO, UN, etc.)
- Establish annual meetings/forums to execute the priorities set forth

Panel 1: Component Framework: The non-government organization (NGO) perspective: understanding the mission, challenges and opportunities for international outreach

Moderator: William Smith M.D., President, Center for International Rehabilitation Organization, Adjunct Clinical Instructor, Northwestern University Medical School, Founder and President, Physicians Against Landmines, Chicago, IL

Speakers: (1) Rabih Torbay, Vice President of Operations, International Medical Corps, Washington, DC; (2) Rifat Latifi, M.D., FACS, The International Virtual e-Hospital: The Balkans Project, Professor of Clinical Surgery, University of Arizona, Director, Telemedicine for Trauma and Critical Care, University Medical Center, Tucson, AZ; and (3) Frank J. Brady, Chairman, CEO, Medical Missions for Children, Paterson, NJ

Rabih Torbay's presentation entitled "From Relief to Self Reliance," is the International Medical Corps' (IMC) goal for areas of the world where relief efforts are fielded. IMC fields 4,000 health personnel who served 6 million people in 2006 in some of the most desperate and dangerous places on earth. They performed 3 million consults in 500 fixed and mobile clinics. Their sites of service often have no power, water or telephony. There are usually no local medical personnel other than community health workers, non-professionals frequently trained on site. IMC does not use telemedicine but believes that telemedicine is "absolutely" needed. However, at a cost of $8 per megabyte for satellite (only viable option) connectivity the costs seem prohibitive. The plan for sustainability for IMC has been the training of community health workers. It is likely that modern health workers trained to function in an information continuum

would be less able to provide the healthcare interventions supported by technology in the absence of some form of connectivity. Additional training will be required to use telemedicine in this type of field situation.

The International Virtual e-Hospital (IVeH), a Kosovo Program in the Balkans has as its' goal the restoration of comprehensive medical services. Dr. Latifi reported that the International collaboration is a critical factor in the substantial success of the program. Telemedicine, e-health and distant learning have been the tools. The program advances to Phase 2 in October with connectivity to areas outside Kosovo by broadband. Currently six health centers connect to the University Hospital in Prishtina for consultation and e-health. The most valuable lessons learned included finding ways to work with the political realities of the region by including regional participation in operations, partnership with organizations that can provide support and recognizing that the timeline to implement a successful program internationally is elongated.

Medical Missions for Children based in Paterson, NJ is committed to the transfer of medical knowledge in addition to teleconsultations. Medical Missions for Children is FCC licensed as a medical broadcast service. They have found that approximately 30% of diagnoses are changed after teleconsultation. The program provides public medical information in addition to professional material and has been endorsed by the NIH. Current technology on the US side has evolved from ISDN to Internet based with Internet 2 preferred. Lessons learned include: (1) referring doctors are reluctant to acknowledge clinical knowledge gaps and sensitivity is needed during consultation; (2) when the barrier is breached by diplomacy there is an urgency to encourage early intervention to circumvent the natural history of a disease; (3) there is a critical mass issue in telemedicine and when reached the local interaction predominates over reliance on US consultants; (4) reliance on a single mentoring hospital has lead to overload and exhaustion; (5) the legal landscape demands certified physicians on the requesting end who take ultimate responsibility for patient care; (6) additional points can be summarized as a need for confidentiality, creative funding, emphasis on the importance of follow-up. The ultimate success of international telemedicine is independence i.e. when regional and in-country networks have developed to the point that they are no longer depend on US practitioners and services) and active use of international informational sources.

In summary, the NGO perspective identified the following trends, challenges/ barriers/ gaps and offered these recommendations:

Trends
- Increase in global penetration of Internet and wireless infrastructure
- Successful programs seen in niche sectors (insurance claims processing in India, computer training in China, developing local entrepreneurs by providing free cell phones)
- Governments and agencies evidence an increasing interest in inclusion of ICT in programs
- Growing emphasis in using ICT to address public health issues

Challenges/ Barriers/ Gaps
- General lack of knowledge about potential use of telemedicine in the NGO community

- Lack of framework and incentives to bring the outreach community together to share resources and information
- Lack of infrastructure (electricity, communications) to support many broadband applications
- Significant variation in policies governing international consultations
- Changing political climate and changing focus of in-country health ministries impedes progress and sustainment

Recommendations
- Establish an international telemedicine forum to educate and assist governments and NGOs
- Establish a formal dialogue with NGO's regarding telemedicine applications and their potential use within their respective programs
- Identify proven low-cost technology solutions for developing countries
- Work with partners to explore options for creation of "Internet-Free" zones in developing countries

Panel 2: **Financial Sustainability: Funding, financial models, reimbursement, and grants: funding opportunities and challenges in international outreach**

Moderator: Bernard Harris, Jr., M.D., M.B.A., President and CEO, Vesalius Ventures, Inc., Houston, TX

Speakers: (1) Meri Helleranta, M.P.H., Ph.D., Inter American Development Bank (IADB), Washington, DC; (2) Kristin Parsley Atkins, Senior Manager, Government Affairs, QUALCOMM, San Diego, CA; and (3) Pramod Gaur, Ph.D., President, Gaur Associates, Katonah, NY

Meri Helleranta presented the "Role of Multilateral Institutions in Financing Sustainable Economic and Social Development Projects." The Inter Agency Development Bank (IADB) provides funding for public and private projects that are country-wide, regional and community oriented in South America. IADB is a low profit bank with priorities to address issues of poverty, humanitarian issues and infrastructure. IADB makes most loans to the public sector, with comparatively few to the private sector. Specific challenges for the developing world include infant mortality and the fragmented delivery of healthcare services.

The IADB timeframe for application review is fairly long and represents the need for due diligence and review timeframes of Development banks. An overview of how the Bank functions with regards to funding in the health sector was provided and currently ICT is now included in all bank funded projects. Many projects in the health field are based on epidemiology data for regional health issues. Public Health improvements are a major area of funding, and currently there is a project with Brazil to improve health care delivery. Guidelines for financing projects include augmenting existing spending level, supporting universal healthcare and providing ICT to facilitate specialized healthcare and education. Strict scrutiny of the loan includes careful project planning and preparation, such as assessing capability for health policy reform with

specific aim to provide added value to the loan by considering sustainability and integration with existing policy and practice.

Ms. Helleranta stated that the value proposition for telemedicine as a part of the programs IADB funds is not well understood, and that the banks, as part of due diligence, need to understand better the role and implications for telemedicine programs.

The QUALCOMM "Wireless Reach Program - Empowering Communities Worldwide" fosters use of telemedicine with a focus on building a regional/local market through donations of technology, hardware, and training at the local level in developing countries. QUALCOMM's strategy is to broaden market penetration and expansion. Kirsten Parsley Atkins of Qualcomm described the Wireless Reach Initiative to demonstrate advantageous use of mobile phone technology in the developing world. This includes projects to connect health users on the islands of Thailand to the mainland hospital. Projects include not only provision of the mobile phone infrastructure but also computers and supporting technologies. The program's guidelines for funding include impact on local culture and sustainability. QUALCOMM evaluates the ability of a local community to sustain the project prior to funding and initiation. QUALCOMM then competes in the community through the sales of mobile technologies. Emphasis is on low tech applications and technologies. QUALCOMM's experience indicates that developing countries are an appropriate setting for the "Wireless Reach Program."

Pramod Gaur of Viterion presented "The Role of Community Coordinated e-Healthcare Business Models in Creating Sustainable Programs."   Factors important for sustainable telemedicine services in the developing world were presented. This included: primary identification of need for telemedicine services, recruitment of a local champion, affinity to public policy, use of local communication service providers for technology services, establishing relationships and financing with a local bank, positioning the effort as a community initiative, recruiting corporate support, providing financial incentives to professional and local health care providers, and when possible, create competition in the same vicinity to avoid complacency. He used Drishtee Kiosk in India as an example to highlight the need to consider the micro-economic model for financial sustainability (www.drishtee.com).

In summary, this session identified several important factors when considering financing and establishing sustainable projects in the Developing World: addressing local need, considering local culture, avoiding projects in isolation, and creating a plan for self sustainment. The presentations covered the wide-variety of funding mechanisms that have supported telemedicine from grants and corporate sponsorships - to longer term community investment. The panel identified the following trends, challenges/ barriers/ gaps and recommendations:

Trends
- Increasing global penetration of internet and wireless infrastructure
- Successful programs are in niche opportunities with multiple value propositions
- Increasing interest of governments and agencies in inclusion of ICT in all possible projects
- Public health issues of great importance, more so than specialized care

Challenges/ Barriers/ Gaps
- Need for better funding and facilitation of partnerships between public and private agencies
- Development banks require additional information to clearly assess funding streams related to telemedicine
- Major funding organizations take a long time to process, analyze and approve projects
- Corporate projects tend to be self generated due to its nature of expanding the market size
- Internet penetration is growing but lacking in many developing countries
- Education at local level for both service and applications is needed in technology deployment and use

Recommendations
- Develop funding models. Funding agencies and specifically development banks need to understand the telemedicine sector and business model as in relates to local community, regional and country wide development
- Development banks traditionally fund community and regional projects so telemedicine needs to be involved in the planning and development process early on in partnership with its' communities of practice
- Document and market the value proposition for telemedicine and telehealth activities to increase support from governments, foundations, and the global development community
- Look for opportunities among ICT activities underway in the public and private sectors to lobby for the inclusion of telehealth related programs and projects
- Enlist local corporations to support developing ICT capabilities across disciplines
- Sustain a dialogue between the telehealth community – practitioners and providers of hardware and software and specific services with corporate partners, international organizations and individual development agencies
- Align public policy development to support telemedicine integration in areas related to crossing country boundaries to provide telemedicine services and inclusion in country planning for health services
- Broaden the focus beyond the health and medical sector when looking for partners

Panel 3: Governmental/Military Perspectives: Challenges and opportunities for humanitarian missions

Moderator: Jean-Louis Belard, M.D., Ph.D., Scientific Chair, Senior Clinical Advisor, Telemedicine and Advanced Technology Research Center (TATRC), U.S. Army Medical Research and Materiel Command (USAMRMC), Fort Detrick, MD

Speakers: (1) COL Ronald K. Poropatich, M.D., Deputy Director, Telemedicine & Advanced Technology Research Center (TATRC), U.S. Army Medical Research and Materiel Command (USAMRMC), Fort Detrick, MD; (2) Craig H. Llewellyn, M.D., M.P.H., Colonel, U.S. Army (Ret.), Founding Director, Center for Disaster and Humanitarian and Assistance Medicine (CDHAM), Bethesda, MD; and (3) Robert Mayes, R.N., Senior Advisor, Center for Primary Care, Prevention & Clinical Partnerships, Agency for Healthcare Research & Quality, Rockville, MD

Dr. Poropatich provided a comprehensive overview of the efforts provided by the U.S. Army telemedicine programs to support its' soldiers, its' allies, and NGOs. He stated that the military has contributed significantly to the international effort in the development of telemedicine systems to provide healthcare services for deployed troops around the world. NATO allies currently share a memorandum of understanding to assure common policy and practice in deployment and use of these systems.

Dr. Poropatich described the U.S. Army's theatre store and forward telemedicine system utilized by 15 specialties. A total of 2941 consultations were completed between April 2004 and August 2007. The highest utilization was for dermatology and the majority of consultations were from the areas of conflict in Iraq and Afghanistan, with 14% of the consultations for international patients. The outcome of the program is highlighted by increased quality of care and decreased need for medical evacuations. He specifically discussed the collaboration between the Virtual e-Hospital program in Kosovo and Camp Bondsteel, to highlight the value of such collaboration in areas recovering from conflict.

Lessons learned included the simplicity and the power of e-mail and attachments, the importance of equipment that is compatible with 110 and 220 volts electrical conduits, and a reliable power supply. Of paramount importance is the use of official policy to make telemedicine integral to military healthcare operations. Dr. Poropatich included this statement about the importance of policies within the military, "If not written down, it's not getting done." It would be very reasonable for any regional program to seek assistance from US ARMY activities that happen to be in the area, and in the near future cooperation with local NATO activities may prove to be a huge resource for international telemedicine. Consistent innovative practices and development of technologies make the military lessons priceless for international development.

Dr. Craig Llewellyn, of the Center for Disaster and Humanitarian Medicine at the Uniformed Services University of the Health Sciences (USUHS), provided an historic overview of the efforts of the US military in telemedicine and humanitarian assistance. Entitled, "Telemedicine in Humanitarian Relief Operations: Observations and Opinions," Dr. Lewellyn called for continued planned dialogue at the global and local levels. Efforts to create partnerships and educate the relief communities and agencies to the real benefits of technology will need to be planned and sustained over time to support these efforts. Suggestions included identification of major agencies that he considers critical to overall success. Targeting countries where a telemedicine plan is already incorporated into the overall goals for healthcare and providing assistance to support operations would be an initial starting point.

Dr. Llewellyn referred to the chapter "Conflict and Catastrophe Medicine", in the book "Telemedicine in Disaster", and identified the need for lightweight, low tech, 'flyaway' telemedicine systems to use in disaster situations. Lessons learned include the need for careful planning from concept to integrated system (from the most forward point of care, use of the most appropriate telecommunications, thorough training, utilizing well planned protocols). He discussed the 8Rs for success: required, reasonable cost, reliability, robust, really easy, resource constrained, routine use, and review/ evaluation.

Robert Mayes's presentation "Partnering in the Global Response to HIV/AIDS", reviewed the President's Emergency Plan for AIDS Relief (PEPFAR) which has committed $18B over 5 years to HIV/AIDS assistance, with the first 5 years ending in 2008. A comprehensive review of the program with insightful observations was presented. The government organizations involved include the U.S. State Department, Departments of Defense (DoD), Commerce and Labor, Health and Human Services (HHS) and the Peace Corps. The PEPFAR program crosses all governmental agencies to coordinate a "One Government Response' in nations where AIDS relief is needed. A fundamental issue in the HIV/AIDS effort is ICT capacity to provide the conduit for teleconsultation and the needed training and distant learning for healthcare workers. Data presented indicated that approximately 65% of Africa is currently covered by GSM, with coverage estimated to reach 90% by 2010 and 3G entering the market (www.gsmworld.com). Despite the growth of connectivity, trained human capital is the challenge.

Mr. Mayes identified areas where the use and application of telemedicine, as part of the response for global health assistance in HIV/AIDS, has the potential to make a dramatic difference. In the partnerships for this initiative, he emphasized the critical transition from "donor/recipient to partnership". Consultations would occur mostly within country, not back to the U.S., and in developing this transition we need the community support with local district hospitals. He corroborated with the WHO observation that cellular service penetration will have a large potential for impact in the health sector and pointed to an effective use of GSM cell phones in Rwanda for AIDS telemedicine and a program entitled "Phones for Health".

Mr. Mayes indicated that telecommunication is the most successful business enterprise in Africa and thus a natural opportunity for partnership with the telemedicine community. He felt that the military and government mission priorities could be leveraged to great effect for the cause of international medical development and relief through telemedicine.

In summary, the government panel identified the following trends, challenges/ barriers/ gaps and recommendations:
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Trends
- IT and communications infrastructure is expanding in developing countries
- Coordination of multiple agencies is effective

Challenges/ Barriers / Gaps
- Disaster planning requires complex coordination between government agencies, local community and NGO's
- Disaster planning is a long term process that requires commitment over time for pre disaster, post disaster and the recovery phase
- Lack of infrastructure in poorer countries
- Lack of understanding and training in the use of telemedicine technologies

Recommendations
- Call for series of meeting to continue dialogue and increase programmatic awareness with government agencies, international and NGOs

- Convene an annual meeting on "neutral turf" with broad sponsorship, from the government and foundation communities - support, and participation should be sought from government development agencies such as; USAID, DFID in the United Kingdom, Canada, and the European Community; International Organizations: UNDP, UNHCO, WHO and UNICEF; NGO's and other entities, such as Interaction, VOICE, International Rescue Committee and Oxfam
- Identify needs and target those identified that can be enabled through Telemedicine (link services to reality)
- Target currently funded countries for assistance in reengineering healthcare services and systems. CDHAM is currently funded to support the Afghan Ministry of Health in such a venture. Dialogue between CDHAM, ATA and TATRC could be a step toward involving ICT and telemedicine in the establishment of a new health system.

Panel 4: Outreach for Health Emergencies and Disaster Response: moving from assistance to sustainable programs

Moderator: Jay H. Sanders, M.D., FACP, FACAAI, President & CEO, The Global Telemedicine Group, Professor of Medicine at Johns Hopkins University School of Medicine (Adjunct), McLean, VA

Speakers: (1) Arnauld Nicogossian, M.D., Ph.D., Office of International Medical Policy, School of Public Policy, George Mason University, Fairfax, VA; and (2) Jonathan D. Linkous, Executive Director, American Telemedicine Association, Washington, DC

Jon Linkous reviewed the interests and activities of the ATA in disaster management. There is an increasing interest and opportunity to utilize telemedicine as knowledge about it's capability in medical disaster situations has grown. This is coupled with the growth of the Internet which can now provide global access. Mr Linkous stated there is broad recognition of the value of low tech applications, such as synchronous communications (store and forward), and ATA is currently working with the U.S. government to find a way to incorporate telemedicine into disaster planning.

Dr. Nicogossian reviewed the history of disaster telemedicine at NASA from the Armenian earthquake in 1988 to the more recent Hurricane Katrina in 2005. The NASA experience from Armenia to Katrina identifies the difference between the acute phase when infrastructure is gone and communication assets must be brought in, through the recovery phase when rebuilding is needed. Infrastructure returns incrementally in these situations. Historically NASA has utilized commercial satellites out of necessity as the agency does not have independent satellite assets.

NASA has used telemedicine for 1029 space travelers, 784 U.S. Astronauts, including four of the 10 years of Russia's MIR station during collaboration, and currently for 7 years on the International Space Station. Experience with long term telemedicine is based on space station activity. In 2007 NASA began a Medical Policy Initiative to establish evidence based medical standards in a frame work that will be presented in collaboration with the World Medical Association in 2008. Part of that policy initiative is a distance learning curriculum for emergency global health threats. The 6.5 billion world population includes 2.75 billion living in coastal

areas and one billion in areas prone to disaster. In recent decades the toll on injured and killed from natural disaster has increased, as the density of population increased, in vulnerable areas. The greatest natural disasters causing loss of human life are flood, and the majority of casualties are in Asia. Actions for greater response planning include acceptance that in the coming years the number of casualties or those at risk will increase, at least until mid-century when the global population may stabilize.

Attention to disasters requires a commitment that extends from preparation, to urgent interventions through a recovery phase. A lack of policy, linking telemedicine use during disasters to planning efforts, inhibits coordination and planning at local, national and international levels. Agreement at all levels in policy and intervention is required as disasters cross jurisdictions. The need for training and a redundant communication infrastructure is inescapable for disaster preparation. Funding at the moment a disaster is recognized is a commitment that comes too late and cannot serve the early victims. In reality it may not last beyond the publicity of the disaster into a reasonable phase of recovery. The commitment must be made in policy and with pre-placement of materiel and trained personnel prior to the chaos caused by a disaster.

In summary, the emergency and disaster panel identified the following trends, challenges/ barriers/ gaps and recommendations:

Trends
- There is a greater recognition of the value of telemedicine in disaster response
- Emergencies around the globe are becoming more frequent with greater impact

Challenges/Barriers/Gaps
- Dialogue must be sustained and more inclusive of the potential users (development agencies, response agencies, foundations, NGO's and individual governments)
- Need to review "use cases" and what has been done by others
- Need to identify resources for telemedicine opportunity within the disaster response community of organizations
- Long term planning and coordination will need to be supported with a commitment in policy
- Training is needed in methods to integrate and coordinate telemedicine services into disaster plans
- Training is needed to effectively integrate telemedicine in emergency response to disasters, rehabilitation after disaster, post-conflict situations, and economic development situations – each requires different strategies for deployment and sustainment
- Lack of pre-coordinated mobile communication technology for disaster
- Need to educate governments, development and emergency response agencies and offices, international organizations, and NGOs regarding the capabilities and applications of this technology across the whole of response and development programs

Recommendations

- Launch a pilot program for international relief with in 1-2 targeted NGO/USG organization sites that are clinically operational in the relief community and could benefit from teleconsultation
- Meet with FEMA and other federal and state agencies to Explore ways to integrate telehealth with the National Disaster Medical System (NDMS) for national and international response and remediation (include funding)
- Engage policy makers to incorporate telemedicine into disaster planning (encourage involved departments, offices, agencies and organizations to establish and appropriately staff a position within their organization for ICT and its' applications)

Panel 5: Outreach Initiatives: Current and Emerging Opportunities for Development and Partnership

Moderator: Dale Alverson, M.D., Medical Director, Center for Telehealth, University of New Mexico Health Sciences, Albuquerque, NM

Speakers: (1) Lord Roger Swinfen and Lady Patricia Swinfen, Directors, the Swinfen Charitable Trust, Wingham, Canterbury, United Kingdom; (2) David J. Loftus M.D., Ph.D., Ames Research Center Life Sciences Division, National Aeronautics and Space Administration (NASA); (3) Ferial Ara Saeed, Deputy U.S. Coordinator, Communications and Information Policy, U.S. State Department, Washington, DC

Panel presentation included the moderator's review of the Ecuador telemedicine program. This program provides services integrating primary care activities in remote jungle locations with health services in the capital of Ecuador. The program combines the proven strategy of community health workers "promotores de salud", with telemedicine. The promotores are practitioners of indigenous medicine with strong links to the population and great allies in bringing in patients and especially children for telemedicine and primary care when appropriate. The Ecuadorian government has supported a national telemedicine network linking major medical centers with free satellite communications. Advice to "use technology where it is meaningful" applies to all telemedicine efforts.

The Swinfen Charitable trust provides telemedicine consultation via the Internet using Store and forward applications. Lord and Lady Swinfen presented, "A Study of cases from the Middle East and Central Asia: 2002- 2007." Initially the Trust focused on teledermatology services but has broadened to include multiple specialties and has seen an increase in need for maternal-child health consultation. E-mail requests with image attachments for teleconsultation are supported for 118 participating hospitals by consultants on a purely voluntary basis. The dialogue between requestors and specialists and its ability to leverage low bandwidth have been the key to its success. Initial teleconsultation services were provided in Asia with the majority from Nepal and Iraq. Between December 2002 and June of 2007, 902 consults from the Middle East were completed of which 265 were surgical and 301 were related to internal medicine.

David Loftus, M.D., Ph.D. from NASA Ames Research Center, Life Sciences Division, and Stanford University presented the telemedicine challenges and opportunities at NASA. He

reviewed NASA telemedicine over the last 45 years and emphasized the importance of using appropriate telemedicine technologies for very great distances to assure astronauts' well being. He mentioned that NASA is currently interested in alternative, novel information acquisition technologies, which require no healthcare workers. NASA is currently seeking partners to develop this type of novel healthcare delivery technologies at celestial distances. It is also interested in development of test beds (rural and frontier areas of countries are thought to provide a test bed for harsh environments) where system integration and validation of future telemedicine technologies can be assured before space deployment.

Ferial Ara Saeed, Deputy US Coordinator for Communication and Information Policy at the State Department, gave a very encouraging message that the U.S. State Department's mission includes expansion of telecommunications around the world and to promote Internet connectivity. Our state department is interested in working with other countries to provide advice on regulation and infrastructure. Furthermore, the State Department is available to identify and advise US companies interested in communication work outside the US.

In summary, the Outreach Initiatives panel identified the following trends, challenges/ barriers/ gaps and recommendations:

Trends
- Small focused programs using low-cost technology are effective
- Programs based on identified need show a natural growth curve
- Convergence of technology and applied research is creating a variety of funding sources and partnerships

Challenges/Barriers /Gaps
- Additional security and confidentiality for providers using telemedicine systems is especially necessary in conflict areas
- Identifying sources of potential funding requires a level of sophistication and assistance to access resource information is needed

Recommendations
- Convene a working group of stakeholder organizations to identify and prioritize countries/regions for telemedicine program development, identifying those countries that currently have funding to develop or reengineer their health care systems
- Develop a strategy and evaluation framework to identify best methods for development in prioritized countries

ROUNDTABLE SESSIONS

The roundtable presentations are listed in attachment B. Short summaries of the presentations are provided and where applicable reporters and participants have identified challenges/ barriers/ gaps and recommendations. These have been identified from the discussions and reflect the experience and perspective of the telemedicine programs presented.

1. **The iCons in Medicine (iCon) Initiative: A Program of the Center for International Rehabilitation**

Speaker: William K. Smith M.D., Founder, Physicians Against Land Mines (PALM)

Summary: In 1996, Physicians Against Land Mines (PALM) was founded. PALM serves as part of the international working group on Mine Victim Assistance and on the Steering Committee of the United States Campaign to Ban Land Mines. In 1998, PALM expanded its activities in the area of land mine victim assistance to include rehabilitation services and advocacy for people with disabilities. The Center for International Rehabilitation developed a distance learning program in prosthetics, orthotics and amputee care. Experience was gained in supporting a land mine victim network and prosthetic assistance in ex-war zones. Courses are now being taught in six countries to over seventy students from thirty rehabilitation centers. The centers in which these students are employed treat an estimated 8,600 war wounded and other amputees each year.

ICON is a program modeled after the military store and forward telemedicine systems to provide remote consultation. The army experience found a high technology approach difficult to manage and moved to simple email and attachments for the highly mobile deployed setting. The work demonstrates the value of a network approach to support physician to physician consultation and an educational approach of shared experiences and learning. The Initiative is planning to hold conferences to foster face to face interaction between the volunteers and create communities of expertise. Development of a web application to allow remote physicians to submit requests for consultation is being developed.

2. **Amazon Virtual Medical Team: Telemedicine in the Jungle of Peru and Brazil**

Speakers: (1) Mateja de Leonni Stanonik, M.D., Ph.D., University of Virginia, Carilion Clinic, Roanoke, VA; (2) Rifat Latifi, M.D., FACS**,** Professor of Clinical Surgery, The University of Arizona Director, Telemedicine for Trauma and Critical Care, Associate Director, Arizona Telemedicine Program, Telesurgery and International Affairs The University Medical Center, Tucson, AZ; (3) Ronald C. Merrell, M.D**.,** Professor of Surgery, Director, Medical informatics and Technology Applications Consortium, Virginia Commonwealth University, Richmond, VA; (4) Ronald Weinstein, M.D**.,** Arizona Telemedicine Program, Tucson, AZ

Summary: The Amazon Virtual Medical Team project was established to provide medical support for a swim along the length of the Amazon River. The program represents an effective partnership that contributes its' success to medical diplomacy and high-level political support by the Ministers of Health in the participating countries. Local media followed this story over time to raise the awareness, and highlight the benefit of the provision of medical service and the use of telemedicine in the remote areas of the Amazon.

The project created a virtual team of 18 physicians from various medical specialties to advise one physician permanently on shipboard who supported the swimmer and his support team. A satellite was used for communication of data, video and voice. Store and forward was the primary telemedicine application utilized for consultation with images, MP3 sound and video clips.

The telemedicine systems were demonstrated to local dignitaries along the river. There is great hope to return to assist in the introduction of telemedicine in the region. Telemedicine successfully supported multiple specialty consultations. Problems encountered included stolen or confiscated equipment, connectivity, weather and security.

"Give us hope, opportunity can't wait for you to teach us how to help ourselves" (unknown source)

3.   Cyber-Sight: ORBIS International Telemedicine

Speaker: Eugene Helveston, M.D., Ophthalmologist, Chief OBRIS International

Summary: ORBIS International is a twenty-five year old NGO with a mission to fight preventable blindness. The program is known for operating the world's first flying eye hospital. They have provided an annual three week ophthalmology teaching program for physicians since 1982.   Five permanent country programs were established in Bangladesh, China, Ethiopia, India and Vietnam in 1998. ORBIS has conducted over 60 one week hospital-based training programs in support of these ongoing country programs since 1994.   The on-site training programs are augmented and complemented by the ORBIS Cyber-Sight 2003 telemedicine website, in 3 languages (English, Spanish, and Portuguese) that promotes sustainability through an extended presence.

The ORBIS e-Consultation program within the site has provided 3,400 patient consultations with over 30,000 images to date. Over 140 expert ophthalmology mentors serve the Cyber-Sight website in a voluntary capacity. The requesting sites are staffed by partner members and eye healthcare providers in the developing world.   Interested providers are enrolled in the e-Consultation program through the internet, and all new partner-members are provided with a digital camera. Some are also provided with a computer and internet connection. Barriers encountered include lack of incentives for providers, who are not actively seeking new knowledge or changes in practice, and motivating experienced physicians to serve as mentors for younger providers.

The goal of the consultation process is to provide assistance with the care of a specific patient. Historical patterns suggest that initially partner-members are 70% correct on initial diagnosis and 50% correct on treatment plan, but evidence indicates improvement over time. The program concept is to provide the world's best telemedicine ophthalmology program in an easy to use, low-bandwidth venue. The long term goal of

the ORBIS program is to expand both infrastructure in developing countries and membership. Presently there are 368 e-Consultation partner members and 1,100 e-Learning partners and include St. Jude and the University of Tennessee.

The system is designed as a low-bandwidth, store and forward application, and the 800 x 600 jpg images appear to be adequate for most cases. The cost of slit lamps is expensive ($60K). ORBIS is interested in expanding the imaging equipment to sites for more robust consultation capability in the future. A study in diagnostic concordance is also being considered to validate patient outcomes.

4. International Disaster Assistance Using Telemedicine

Speaker: Randy Roberson, Founder/President H.E.L.P. (Humanitarian Emergency Logistics & Preparedness)

Summary: H.E.L.P. has been doing disaster relief work for 10 years in Kosovo, Turkey, Central America, South America, Africa, and Asia. H.E.L.P uses a superstructure, a converted cargo container, to deploy modular medical units to support disaster response - mostly for trauma related injuries. The humanitarian work has been focused on post disaster response, and key elements of this effort have been communications and collaboration. The Katrina disaster and the Los Angeles County basin mock riot disaster response activity were discussed as examples. The Los Angeles event used Interstates I-10, I-8 and I-5 to move people. This movement required close coordination between California and Arizona. The challenge of linking communication across boundaries and between organizations (state, local, fire, National Guard, and FEMA) was significant. This challenge is further exacerbated when more than one state is involved. Challenges highlight the need for careful advance planning.

Mr. Roberson discussed their system, which is designed as an open source model and contains a database to facilitate dynamic resource allocation during disaster response (medical personnel - who have been deployed in Africa, local and regional situational awareness information and resource availability to plan and manage the response). A test project is underway in Arizona.

5. National Cancer Institute (NCI) All Ireland Cancer Consortium

Speaker: Kenneth M. Kempner, Chief, Telemedicine and Applied Imaging Section, Center for Information Technology, NIH

Summary: The Ireland-Northern Ireland - National Cancer Institute Cancer Consortium was established by Memorandum of Understanding to transfer an NIH developed telemedicine system to Ireland in 1999, and began clinical operations in 2002. A major goal for the NCI is to strengthen the capacity of cancer centers in the Republic of Ireland and Northern Ireland, conduct cancer clinical trials, and improve access to new cancer therapies. To date, it has expanded to 9 sites, where it is used routinely to link community hospitals and oncology centers in Ireland and internationally. The telemedicine link is

between St. Luke's and St. James's hospitals in Dublin and oncology centers that include Tullamore, Mullingar, Sligo, Limerick, and Letterkenny. Telemedicine suites are located in Belfast City Hospital, Cork University Hospital, St. Luke's Hospital Dublin, St. James's Hospital Dublin, and University College Hospital Galway. The system continues to expand throughout Ireland.

The program is based on a sophisticated ISDN enabled telemedicine suite that protects patient privacy with secure switched circuit networks. The "Telesynergy" suite provides multi-disciplinary teams with high resolution medical image acquisition, peer-to-peer audio/video/ethernet interactivity over multi-channel conference communication hub servers in Bethesda, Maryland and Dublin, Ireland. The technology consists of a Tandberg VTC, document imager, VCR, camera enabled microscope, personal computer, hi-definition monitors and software tools for annotating images and documents. The US, Ireland, and Northern Ireland are working to improve the infrastructure needed for the project, develop interactions among the research communities, and conduct joint educational exchange programs.

6.   **ANGELS in Russia**

Speaker: Julie Hall-Barrow, Ed.D., University of Arkansas for Medical Sciences Center for Distance Health, Little Rock, AK

Summary: The Antenatal and Neonatal Guidelines Education and Learning System (ANGELS) is a Maternal-Fetal Medicine and Neonatology Support Network designed to maintain and support healthcare protocols and guidelines, provide education to providers and patients, and develop active learning systems for sub-specialty support to patients and practitioners across the State of Arkansas. It is a collaborative telehealth strategy that was initially established between the University of Arkansas for Medical Sciences (UAMS), the Arkansas Medical Society and the Arkansas Department of Health and Human Services (DHHS). Funding was provided by an Arkansas Medicaid contract. This network is unique to Arkansas, and was driven in part by the limited resources, there are only three material fetal specialists in the state; all are located in Little Rock.

ANGELS equipment is all commercial-off-the-shelf (COTS) and includes real time video teleconferencing, a high-performance portable ultrasound device and an ultrasound storage system. ANGELS has provided telemedicine equipment to rural providers in 20 sites at no-cost allowing high-risk pregnant patients to receive real-time telemedicine, level II ultrasounds and consultation.

In December 2006 the network has was expanded to include an international collaboration with the Volgograd State Medical University (VMS) in Russia. A collaboration with the Russian Society of obstetrics and gynecology has also been initiated. Video teleconferences (VTCs) are routinely conducted between VMS and UAMS utilizing a VTC system that is augmented with ultrasound equipment.

7.   UC Berkeley Teleophthalmology/Diabetic Retinopathy Project in Guanajuato MX

Speaker: Jorge Cuadros, O.D., Ph.D., Director of Informatics Research, School of Optometry Clinical Research Center, University of California Berkeley, CA

Summary: The Central Valley Teleophthalmology Network was established to meet the need for one of the major public health problems in the State of Guanajuato, Mexico: adult onset diabetes mellitus and its complications. The overall goal was to establish an eye screening program for diabetic patients in the state Public Health Department's Program for Diabetes Mellitus.

A lack of a regular public health eye screening program, to detect diabetic retinopathy at an early and treatable stage was the identified need. Program Support was provided by the California Telemedicine and eHealth Center.The University of California, School of Optometry developed the program in Guanajuato, and now the Central Valley Teleophthalmology Network extends into the mountainous regions with 10% of the encounters requiring further care for diabetic retinopathy.

The Clinical Research Center, University of California, Berkeley School of Optometry, provides and maintains the software and servers. This simple web based system called EyePACS is a license-free software program that has been successfully used at 13 clinics and expects to expand to 100 or more clinics during the next cycle of grant funding. Over 5000 patient encounters have been recorded in EyePACS from August 2006 to August 2007.

8.   Sustainable Partnerships for International Telemedicine

Speaker: Ronald C. Merrell, M.D., Professor of Surgery, Director, Medical informatics and Technology Applications Consortium, Virginia Commonwealth University, Richmond, VA

Summary: Several programs representing sustained partnerships in Telemedicine were described (Ecuador, Kosovo and Pakistan).

Ecuador has a population of 13 million with a per capita income of $4000 USD. They spend, according to WHO statistics, $261 per person per year on healthcare. Ecuador has remote communities with identified health problems such as diarrheal and infectious disease that are being addressed by telemedicine consultation predominantly through store and forward applications with email and video. The program utilizes Skype when needed for communications. Multiple telecommunications companies have provided the communication infrastructure with Cinterandes, the local telecommunications company, working in partnership with the project. Energy for telemedicine is predominantly from hydroelectric power.

Kosovo, due to conflict, experienced a loss overnight of all medical personnel, leaving a void in medical resources to the entire region. The Kosovo project connected

the US Army with the University of Arizona and other partners to bring together resources to re-educate medical personnel, provide consultation and rebuild a network of shared services. The results have been positive with the further development of the Virtual e-Hospital project and linkages with multiple sites within the country, the European Union and United States.

Pakistan has a population of 158 million people, and spends $48 USD per person per year on healthcare. About 62% of the telemedicine network is cellular service. This project brought together identified clinical need in a poor country and developed partnerships as peers between participants. Partnerships are dynamic with realistic goals, and the project is self-sustaining with an eventual shift of costs to be borne by the patient. The system uses satellite telephones on a rucksack (grab and go telemedicine suitcase) that includes basic medications. The program is an excellent model of a realistically scoped telemedicine program being successfully sustained in a poor country.

9. **Using Patient Care Pathways to Introduce a Teleradiology Service in Rural Thailand**

Speaker: Malcolm Clarke, Ph.D., Senior Lecturer in Data Communication Systems and Telemedicine, Department of Information Systems and Computing, Brunel University, Uxbridge, Middlesex, United Kingdom

Summary: The Teleradiology project was funded through arrangements between the British government, British Aerospace, and the Ministry of Health in Thailand. The basic premise was to implement teleradiology as a strategy to increase interaction between the various stages of care and levels of healthcare providers. Using new technologies in digital imaging, the primary care physician can remain engaged in the management of the patient's healthcare as the patient moves through a system of care. Workflow charts developed by graduate students were developed based on the project. These workflows assisted the program in documenting improved efficiencies in care delivery and changes secondary to the introduction of teleradiology. Changes within the government and new priorities ended the project.

10. **Panamanian Telemedicine Program and Arizona Telemedicine Program: An International Cooperation Model in Telehealth**

Speaker: (1) Silvio Vega; (2) Manuel Lobo; (3) Juan Ramon Arosemena; (4) Ivette Marciscano; and (5) Ronald S. Weinstein M.D.

Summary: The Panamanian Telemedicine initiative began in August 2000. The objective was to focus on the development of a partnership with the University of Arizona to develop solutions for rural outreach via teleconsultation to the indigenous population and remote clinics in Panama. Clinics have traditionally been lacking in communication assets to provide appropriate clinical care. The Arizona Telemedicine Program provided assistance to develop the engineering support, technical support, facility design, and operations expertise in order to provide a primary clinical presence

for telepathology, and teleradiology, including video-teleconference capability to support operations and meetings for research. Implementation of the program was planned with an international consortium to share lessons learned and investigate emerging technologies that have been successfully deployed to rural environments in other developing nations.

The program set up two physician consultation sites in Panama City and two remote mountain sites, managed by nurse assistants for face-to-face patient encounters. The telemedicine equipment at the remote sites is powered by solar cells since there is an inadequate power grid infrastructure. The successful demonstration of this telemedicine program provides a valuable model for other Latin American countries to follow.

11.   Cross Border Telehealth in India: A Matching Grant Telemedicine Project

Speaker: Sanjeev Mehta M.D.

Summary: The country of India is challenged to provide improved health care to its' rural population, representing more than 70% of the total inhabitants. While urban areas are well developed, it is not uncommon for remote villages to be lacking basic amenities, presenting medical opportunity to improve life expectancy and reduce infant mortality. Ahmedabad is the seventh largest city within the Indian nation, and it has a large local Rotary Club, of which 25 members are medical specialists who have volunteered their specialty services to a telemedicine outreach effort in the surrounding rural communities.

Local sponsorship allowed the telemedicine outreach program to begin serving adjacent, medically underserved rural villages. Community service is a mainstay of the Rotary Clubs, and this effort secured $30,000 USD of start-up funding from Rotary International and the Rotary Club of Birmingham, England. The effort, which was initiated in summer 2007, is beginning with local resources, but has already recruited physicians overseas to expand it's network to regional specialty hospitals in India and abroad. Presently the telemedicine network established by this NGO effort has been in operation for sixty days, but has already supported 82 consultations.

12.   Obstacles to International Telemedicine in Africa

Speaker: Maurice Mars, Professor and Head of the Department of TeleHealth, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, South Africa

Summary: Africa has 24% of the burden of illness in the world with 3% of health care workers, and 1% of world health expenditures. The most prevalent illnesses are HIV/AIDS, tuberculosis, and malaria. It is forecasted that by 2050, 1.8 billion people will be affected with these illnesses. Approximately 1,000 people per day die of these diseases. In addition, the African population is growing with 900 million now, and it is expected to double by 2050. In 47 sub-Saharan countries, there is a lack of medical personnel with 10 doctors per 100,000 people. Other key health issues include improving the water supply, training health workers and decreasing child-birth and infant mortality.

Obstacles or barriers to telemedicine in Africa include a lack of political will, sheer numbers, telecommunications infrastructure (3.6 per 100 for cell phone use), political and cultural barriers and trained workers. The average cost of Internet access in the U.S is $14.75 for 20 hours, but in Africa, the cost for the same amount of time is $55 dollars. Funding sources and policy alignment are needed to make it possible for telemedicine technologies to operate effectively.

Advances in technology are creating opportunities for telemedicine. There is a movement toward utilizing telemedicine, as part of the solution, in providing needed healthcare and training for a health workforce. Cellular service with telemedicine represents hope for the future of health equality in Africa.

Roundtable Themes
- Partnerships and collaboration have been and will be critical for success
- Establishing a sustainable international telemedicine services in developing countries require significant planning and resources
- Development of a centralized resource center is needed to support sharing of information, experiences, and tools to the international outreach community. Many countries would benefit from the sharing of information and possibly resources to initiate limited telemedicine capabilities within their regions.
- Shortages are significant in healthcare workforce shortages in most developing countries
- The importance of the return of skilled expatriates to their country of origin represents a significant skill transfer from highly technological economies in North America, Europe and Asia to lesser developed regions of the world. This trend is being replicated around the world and will facilitate the transfer of Telemedicine to medically underserved areas.
- Drop in cost of telemedicine equipment and decreasing costs of ICT will accelerate the proliferation of telemedicine supported medical access in lesser developed countries
- Growth in cellular service worldwide
- Growth in mobile technology that is significant in economically challenged countries who lack infrastructure
- Lack of infrastructure in developing countries in ICT
- High cost of service (satellite, Internet) in developing countries
- Cultural considerations (language interpretation, etc.) needs to be taken into consideration in developing telemedicine systems of care
- Mechanisms for on-going communication between sites on a regular basis are essential to manage and grow telemedicine networks
- Telemedicine is effective in disaster response situations
- Self-sufficiency: people want to be educated in order help to alleviate some of the problems themselves
- Transfer of knowledge effect between programs can have a significant effect
- Relationship building between the international partners is essential and requires some direct exchange visits

Roundtable Challenges/Barriers /Gaps
- Limitation in connectivity and high bandwidth infrastructure cost
- Lack of a trained and available medical work force
- Cultural variation (language and customs)
- Changing priorities of health ministries
- Government policy in-country and between countries and regions is not aligned
- Funding is needed to provide equipment (especially high cost equipment such as slit lamps for vision programs), expand programs and develop staff
- Lack of planning and integration of telemedicine in all types of disaster programs
- Training specific to the management of ICT and telemedicine networks is needed to address administration of programs and changes in workflow
- Technology facilitates new complex working partnerships between institutions and may create fundamental changes in work practice
- Additional training resources are required for nurse assistants, physicians and operators
- Resources are needed to facilitate telemedicine training and needs to be included in planning
- Collaborations and projects take time to establish and require patience and persistence
- Accommodation of differences in multi-institutional processes are critical to success
- Multi-institution development and adoption of practice guidelines, standard operating procedures (SOPs) and protocols is needed early in the implementation process and complex

Roundtable Recommendations
- Cultivate partnerships and collaborations with academia, government and/or industry to ensure long term access to human capital, funding and resources
- Develop healthcare workforces where needed using technology (ex. Virtual e-Hospital Program in the Balkans)
- Survey the needs of countries and regions to assess the benefit and impact of implementing a telemedicine network
- Create a virtual telemedicine resource center to provide assistance in accessing developed standards, tools, and workflows for telemedicine
- Training in the use and management of telemedicine systems is specific and needs to be planned for nurses, nurse assistants, physicians and operators of the equipment
- Extend and leverage cellular networks for healthcare services and model successful existing networks
- Explore strategies to provide satellite connectivity for healthcare programs
- Develop impact assessment and cost-effectiveness analysis evaluations as part of initial planning for all projects
- Identify or develop local expertise - "Champions for Telemedicine"
- Simplify policy and regulatory requirements

THE ROAD FORWARD

The overall goal of this conference was to explore methods and opportunities to seed knowledge, ideas and strategies for a framework for international medical outreach using telemedicine. The 'Road Ahead' and summary recommendations provide a framework to accomplish this overall goal. Summary recommendations and next steps for the road forward are compiled from the proceedings and are meant to represent the common themes and strategies expressed by participants. Recommendations are numbered to provide reference and are not presented in any one order of priority.

The need to continue the dialogue and momentum with multiple stakeholders was voiced by every group, and it remained a strong theme throughout the day. The need to educate various global stakeholders about telemedicine was also a reoccurring theme for all levels of participants.

The NGO sector has traditionally not used telemedicine in a measurable way, needs to know what technologies to use, how to use them, and where telemedicine technologies would be most useful. NGO participants validated their need for technical assistance to integrate telemedicine capability into their existing outreach programs. Funding organizations voiced a need to know how to evaluate proposed telemedicine programs for return on investment factors, as well as knowing when telemedicine is appropriate and in what setting.

RECOMMENDATION 1

Craft a strategy to continue dialogue and planning with NGO, international and government communities and agencies to identify synergies between organizations, create partnerships and provide education on telemedicine applications and use.

Strategies:
1. Support a series of meetings to continue dialogue and increase programmatic awareness.
2. Provide Telemedicine educational presentations to regularly scheduled meetings in the NGO community and with aid agencies.
3. Seek support for an ATA International mid-year meeting 2008.
4. Convene an annual meeting with broader sponsorship, from the government and foundation communities (such as; USAID, DFID in the United Kingdom, Canada, and the European Community; International Organizations: UNDP, UNHCO, WHO and UNICEF; NGO's and other entities, such as Interaction, VOICE, International Rescue Committee and Oxfam).
5. Target currently funded countries for assistance in reengineering healthcare services and systems for assistance in developing telemedicine programs. CDHAM is currently funded to support the Afghan Ministry of Health in such a venture. Dialogue between CDHAM, ATA, TATRC and IMC could be a step toward involving ICT and telemedicine in the establishment of a new health system.
6. Publish Global Forum white paper and follow with an article in the Telemedicine and eHealth Journal

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Access to telemedicine program information that identifies successful programs, models and strategies is essential for development of new programs. Sharing this information is key to

collaboration and success. Compilation of assistive resources to evaluate need, identify current assets and resources is fundamental in the planning and development process for a sustainable telemedicine program. An international resource center with the functional capacity to link a virtual network of partners and individuals, with knowledge and expertise in telemedicine, will provide a powerful asset to develop and promote best practices in telemedicine.

RECOMMENDATION 2

Develop a collaborative *International Resource Center* to support the flow of information to the international community.

Strategies:
1. Link with international organizations in a common/shared digital environment to defray cost to any one organization (development, maintenance), provide linkages to already identified resources, develop easy to use resource search capability.
2. Expand and refine the existing ATA Resource Center for the international community. Include functionality and connectivity that will support a virtual network.
3. Expand identification of resources in the following categories: expertise, technology (new, low-cost), finance, program management, medical and clinical management (emergency, non-emergent) and telemedicine program models.
4. Identify major programmatic efforts identifying medical need, current use of various technologies to meet the medical and public health need and provide contact information for all sectors.

Broad education in the applied use of telemedicine technologies is needed to understand what value is provided by their integration into health systems. A clearly identified value proposition that recognizes the multiplicity of functions that can be served across all healthcare sectors is the responsibility of the telemedicine community. Specifically how telemedicine systems contribute to the foundations of quality medicine by transferring knowledge across time and distance, training health workers, identifying public health threats and providing early warning. Telemedicine has the capacity to significantly flatten the disparity of global healthcare.

Participants identified the need to develop a strategy in the following sectors: (1) NGO and governmental organizations that are considering telemedicine to expand their outreach programs; (2) development banks, venture capital firms, private funding organizations who do not understand the role and potential for the return on investment in the telemedicine sector. Telemedicine is a subset of the IT/ICT technology areas funded by these institutions. Distinction between IT/ICT and telemedicine should be identified and quantified with evaluations and studies that identify the value proposition and; (3) health ministries and government agencies that develop policy decisions impacting IT/ICT integration.

There is an urgent need to develop a healthcare workforce and enhance the skills of existing healthcare workers in many regions of the world, especially in Africa. Successful development of a healthcare workforce, reintroduction of expatriates and keeping the remaining local/regional providers in-country by supporting their need for on-going professional development, are effects of providing education and support at the local level. Development of telemedicine programs like the Virtual e-Hospital in Kosovo is a prime example of the transfer-of-knowledge effect. This

effect is further evidenced in the improvement of diagnostic capability and skill sets of healthcare workers as distant sites receive on-going clinical education through consultation and collaboration.

The use of telemedicine applications and equipment requires training for medical providers and healthcare workers (both in equipment training and in the use of telemedicine applications in a clinical setting). In general, current educational curricula do not provide experience with these tools. Much of this can be done virtually through video-conferencing or Internet based training programs. Although appropriate course materials have been developed through partnerships with academic and specialized institutions, most training is not standardized nor readily available for the larger community.

RECOMMENDATION 3

Develop strategies to provide on-going education to the financial industry, NGO community of organizations, government agencies and country health ministries. Encourage the development of regional virtual medical education programs for health workforce education and training

Strategies:
1. Establish a dialogue and institute on-going presentations to the financial industry, NGO community and government agencies dealing with international health programs
2. Develop healthcare worker training and education through collaboration with international organizations, U.S. Department of State and Ministries of Health
3. Develop an ATA international training program to provide education and build human capacity.

The need to align policy in and between countries and jurisdictions was a repeated and high-priority theme. Current policy development is often done without sufficient knowledge of the ramifications and impact at a local level. Alignment and development of healthcare policies and strategies that support the use of telemedicine and information technologies in healthcare across national borders is needed. The recommendation to align efforts in this area will require not only national support but also international agency participation (e.g. UN, WHO, U.S. State Department).

RECOMMENDATION 4

Support policy alignment in-country and between jurisdictions to remove barriers inhibiting development of telemedicine programs

Strategy:
1. ATA pro-actively align with International organizations and the U.S. Department of State to identify areas and countries enacting legislation that will impact Telemedicine programs

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and was voiced universally throughout the forum. Issues include availability and cost of satellite transponder time, need to develop cellular applications in telemedicine and the appropriate expansion of cellular networks to support telemedicine programs.

The cost of satellite service was addressed with several strategies identified for consideration. These include: (1) free transponder space on commercial satellites with small aperture antenna and wifi access point and/or cellular base station (latency for voice); (2) explore the possibility of having MoH/MoTelecom (Ministry of Health, Ministry of Telecommunications) give up rights to telecom revenue for humanitarian use (medicine, education); (3) explore the possibility of commercial telecom for Africa providing 5% of transponder space at no cost for education and medicine; (4) develop "Internet Free World Regions" (e.g. Africa, Asia, South America)- similar to Radio Free Europe, to provide inexpensive, ubiquitous satellite-based Internet as a way to promote access to information.

Penetration and proliferation of cellular market in many regions of the world will positively impact the use of telemedicine. The telemedicine community needs to understand and be prepared to leverage and support these networks in order to provide needed healthcare services.

> **RECOMMENDATION 5**
> **Assist in development of new models and strategies to support connectivity and infrastructure requirements for telemedicine**
> Strategies:
> 1. Complete a market analysis of existing cellular based networks
> 2. Identify appropriate lower-cost strategies
> 3. Develop cellular network services model based on successful existing networks
> 4. Explore strategies to provide satellite connectivity for healthcare programs through an international forum of stakeholder agencies

The final recommendation calls for integration of telemedicine into disaster relief planning and response. The ability to bring medical services to regions immediately following a disaster or conflict and sustain medical services for a period of time until infrastructure can be rebuilt is a clear role for telemedicine. In order for telemedicine to become an asset to the International community for disaster relief, it must be integrated into the planning process. Organizations that traditionally respond to disasters such as the Red Cross, Red Crescent and UN would need to be involved in planning the integration of telemedicine assets into their respective planned responses. Recent events such as hurricane Katrina in the US, mud slides in South America, conflict in Africa and the tsunami in Indonesia highlight the urgency with which this needs to occur.

RECOMMENDATION 6

Develop a collaborative virtual network for disaster relief efforts and establish dialogue and strategies to institute telemedicine as part of the worldwide emergency response to disasters.

Strategies:
1. Leveraging the ATA membership
   a. Identify members in Centers of TM Excellence who would be willing to participate in the program. To accomplish this, a questionnaire via email and on the ATA website to solicit participation.
2. Include disaster relief as a separate area within the ATA Resource Center. This would provide a system to support opportunities such as outreach, medical missions with NGOs and others, disaster response, opportunities for collaboration with industry and knowledge sharing.
3. Identify emergency relief organizations and facilitate dialogue and planning to integrate TM as an available asset and part of the overall response in emergent, on-going and rebuilding efforts post disaster.
4. Seek funding for an international forum for disaster relief planning.
5. Identify 1 or 2 disaster response agencies to initiate a dialogue and planning effort for incorporating TM services.

SUMMARY

Just as economy is now global, there is a greater recognition that healthcare is also global. This has become clear with the recent threats of bird flu, disasters and other world threats. Most importantly, there is a significant disparity in healthcare around the globe despite significant efforts by universities, citizens, governments and NGO's. In this information age, we have a responsibility to leverage information technology to broaden and expand our outreach. We have the technology today to bring healthcare, education and resources to bear in this global effort, but resources are limited and the effective way to develop this framework is through partnerships. We propose to create a sustainable telemedicine framework for international outreach through public and private partnerships.

Volunteers, NGO's universities, granting organizations, and international organizations such as WHO, UN, must play a role. In fact every nation must play a role; IT/ICT are the fabric that link us closer, especially as we deal with global disease threats, and disaster response. The challenges we face today are different then a generation ago, and we now have the opportunity to flatten the disparity of healthcare through telemedicine-empowered outreach. Technology has given us the ability to reach more people around the globe, now it is up to us to bring the right people and organizations together to leverage the technology. Time is now. The telemedicine community must create a partnership first within its' community then bring international partners to meet this challenge and opportunity.

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9. World Development Indicators, World Bank (2004)
10. WHO, UNESCO, World Bank 2005
11. The World Health Report, WHO (2003)
12. World Health Statistics, WHO (2007)
13. World Telecommunication/ICT Indicators, ITU (2006)

Appendix A

MEETING STATISTICS

Attendees: 335 (from 209 different organizations/companies)

Exhibitors: 24
AMD Global Telemedicine, Inc.
ARINC Healthcare Solutions
California Telemedicine & eHealth Center
Cardiocom LLC
GlobalMedia Group,
H.E.L.P.
Health Hero Network
Honeywell HomMed
Interactive Medical Developments, L.C.
LifeLink Monitoring
McKesson Corporation
MedApps, Inc.
Philips Consumer Healthcare Solutions
Polycom
Providea
Second Opinion Software, LLC
Talk Autism
TANDBERG
VA San Diego
ViTel Net
VisionTree
VIASYS Healthcare
VISICU
Zydacron)

Countries Represented: 14
Australia
Denmark
Egypt
France
India
Japan
Korea
Mexico
Panama
South Africa
Spain
Switzerland
United Kingdom
United States

Attachment B

Acronyms

CDHAM	Center for Disaster and Humanitarian and Assistance Medicine
ATA	American Telemedicine Association
FCC	Federal Communications Commission
DFID	Department for International Development in the United Kingdom
GAID	Global Alliance for Information and Communities Technologies and Development
FEMA	Federal Emergency Management Agency
GDP	Gross Domestic Product
IADB	Inter Agency Development Bank
IT	Information Technology
ICT	Information and Communications Technology
ICT4D	Information Communications Technology for Development
IMC	International Medical Corps
ISDN	Integrated Services Digital Network
IVeH	International Virtual e-Hospital
MDG	Millennium Development Goals
NATO	North American Treaty Organization
NDMS	National Disaster Medical System
NIH	National Institutes of Health
NGO	Non-Government Organizations
R&D	Research and Development
TATRC	Telemedicine and Advanced Technology Research Center
TM	Telemedicine
WHO	World Health Organization
Oxfam	Non-government organization in the United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNHCO	United Healthcare Organization
UNICEF	United Nations Children's Fund
UNESCO	United Nations Education Scientific and Cultural Organization
USAID	United States Agency for International Development
USD	United States Dollar
USUHS	Uniformed University of the Health Sciences
VOICE	A non-government organization

List of Roundtable Presentations

PRESENTERS	PROGRAM
1. William K. Smith, MD Center for International Rehabilitation Chicago, IL	The iCons in Medicine (iCon) Initiative: A Program of the Center for International Rehabilitation
2. Mateja de Leonni Stanonik, MD, PhD[1], Rifat Latifi, MD, FACS[2] Ronald C. Merrell, MD[3], Ron Weinstein, MD[4] [1]UVA - Carilion Clinic, Roanoke, VA [2]Professor of Clinical Surgery, The University of Arizona Director, Telemedicine for Trauma and Critical Care Associate Director, Arizona Telemedicine Program, Telesurgery and International Affairs The University Medical Center, Tucson, AZ [3]Professor of Surgery, Director, Medical informatics and Technology Applications Consortium, Virginia Commonwealth University, Richmond, VA [4]Arizona Telemedicine Program, Tucson, AZ	Amazon Virtual Medical Team: Telemedicine in the Jungle of Peru and Brazil www.Amazonswim.com
3. Eugene M. Helveston, MD Orbis International Indianapolis, IN	Cyber-Sight: ORBIS International Telemedicine www.cybersight.org
4. Randy Roberson Founder/President H.E.L.P. (Humanitarian Emergency Logistics & Preparedness) *Payson, AZ*	Telemedicine in Current Global Disasters, Humanitarian Relief and Preparedness Applications
5. Kenneth M. Kempner Chief, Telemedicine and Applied Imaging Section Center for Information Technology National Institutes of Health Bethesda, MD	National Cancer Institute All Ireland Cancer Consortium
6. Julie Hall-Barrow, EdD University of Arkansas for Medical Sciences/ANGEL Little Rock, AR	ANGELS in Russia
7. Steven L. Fowler, MHA Jorge Cuadros, OD, PhD Technical Program Manager California Telemedicine and eHealth Center Sacramento, CA	UC Berkeley Teleophthalmology and Diabetic Retinopathy Project in Guanajuato, Mexico
8. Ronald C. Merrell, MD	Sustainable Partnerships for International

	Professor of Surgery Director, Medical informatics and Technology Applications Consortium Virginia Commonwealth University Richmond, VA	Telemedicine
9.	Malcolm Clarke, PhD Senior Lecturer in Data Communication Systems and Telemedicine Department of Information Systems and Computing Brunel University Uxbridge, Middlesex, United Kingdom	Using Patient Care Pathways to Introduce a Teleradiology Service in Rural Thailand
10.	Ron Weinstein, MD[1] Silvio Vega, MD, Msc[2] Juan Ramon Arosema, MD[2] M. Lobo, MD[2] Ivette Marciscano, RN[2] [1]Arizona Telemedicine Program Tucson, AZ [2]Panamanian Telemedicine and Telehealth El Dorado, Panama	Panamanian Telemedicine and Telehealth Program- Arizona Telemedicine Program Collaboration
11.	Sanjeev Mehta, MD Chairman, Telemedicine Committee Rotary Club of Ahmedabad Metro Ahmedabad, India	Cross Border Telehealth in India
12.	Maurice Mars, MBChB,MD Professor and Head of TeleHealth Nelson R Mandela School of Medicine University of KwaZulu-Natal Durban, South Africa	Obstacles to International Telemedicine in Africa