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This report represents a summary of the International Virtual e-Hospital's effort in coordinating and conducting the Third Intensive Balkan Telemedicine and e-Health Seminar on February 6-7, 2009 in Skopje, Macedonia. The seminar, which was cosponsored by the Ministry of Health of Macedonia, was attended by 289 individuals from the countries of Macedonia, Albania, Kosova, and Serbia. The international faculty included experts from the U.S. and Europe. Participants and special quests included 4 individuals from Bondsteel U.S. Army Base in Kosova; the Minister of Health, the Deputy Chief of Mission, U.S. Embassy, Macedonia; representatives from the U.S. Department of State; and representatives from US Agency for International Development (USAID). Telemedicine in this region has taken a strong foothold and the Minister announced plans to fully embrace telemedicine as component of the health system in Macedonia with linkages to other Balkan countries in the region.

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EXECUTIVE SUMMARY

The region, which consists of the countries of Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosova, Macedonia, Montenegro, and Serbia, takes its name from the mountain range, the Balkans. The Balkans, a Turkish word for 'chain of wooded mountains', covers an area of 700,000 km^2 region in South Eastern Europe and is home to over 55 million inhabitants. A decade of war and ethnic fighting in the 1990's destroyed the medical systems in place, creating a desperate need to rebuild a modern healthcare infrastructure. Telemedicine has been shown to be an effective tool in this regard.

The adoption of telemedicine in the Balkans is firmly underway. Since its inception in 2001, the International Virtual e-Hospital (IVeH) has promoted the design, growth and implementation of telemedicine in a variety of developing countries across the globe. Successful implementation of telemedicine in any region is based on a number of factors, each of great importance. However, one that is key is the education and training of community leadership. Over the past several years, the IVeH has held intensive seminars in the region to promote the application of telemedicine as an effective tool in healthcare modernization. This includes the First Intensive Balkan Telemedicine and e-Health Seminar in Prishtina, Kosova (2002) and the Second Intensive Balkan Telemedicine and e-Health Seminar in Tirana, Albania (2007). Recently the third installment of these seminars was held in Skopje, Macedonia (February 2009). These three seminars have provided a fertile foundation for telemedicine to emerge as a significant tool in enhancing healthcare in this region. Each has broadened the understanding of the immense capability that telemedicine can offer and has acted as a catalyst for the development of telemedicine in the region. The Republic of Macedonia is the latest country to invest in telemedicine, having a formal commitment from the Ministry of Health to establish a national telemedicine effort.

This report represents a summary of the IVeH's effort in coordinating and conducting the Third Intensive Balkan Telemedicine and e-Health Seminar on February 6-7, 2009 in Skopje, Macedonia. The seminar, which was cosponsored by the Ministry of Health of Macedonia, was attended by 289 individuals from the countries of Macedonia, Albania, Kosova, and Serbia. The international faculty included experts from the U.S. and Europe. Participants and special quests included 4 individuals from Bondsteel U.S. Army Base in Kosova; the Minister of Health, the Deputy Chief of Mission, U.S. Embassy, Macedonia; representatives from the U.S. Department of State; and representatives from US Agency for International Development (USAID). Telemedicine in this region has taken a strong foothold and the Minister announced plans to fully embrace telemedicine as component of the health system in Macedonia with linkages to other Balkan countries in the region.

BACKGROUND

Over the past several years, the concept of telemedicine in the Balkans has emerged as a key element in healthcare reform in the region. In the aftermath of the Balkans war in the mid 1990s, the energy and fortitude of a number of individuals helped establish the Kosova Foundation for Medical Development and would eventually become the International Virtual e-Hospital (IVeH), a nonprofit organization focused on developing telemedicine systems for healthcare delivery in developing countries around the world (www.iveh.org).

As a result of a continuous presence and the activities of the IVeH during the past eight years, the Telemedicine Program of Kosova (TPK) has grown from a virtual concept, envisioned by Dr. Rifat Latifi at the final health conference of the G8 Meeting in Berlin in 2000, to a nationwide telemedicine program consisting of the ultra modern Telemedicine Center of Kosova (TCK), located in the University Clinical Center of Kosova (UCCK) in Prishtina. The TCK is linked to six Regional Telemedicine Centers (RTC) in the Kosovar cities of Gjilan, Prizren, Gjakove, Peje, Mitrovice and the town of Skenderaj. The TCK has also created linkages to a number of academic institutions across Europe, the United States (U.S.), South America and other countries. The IVeH in partnership with the University of Arizona Telemedicine Program (ATP) is completing a three year program "Improving Healthcare in the Balkans Using Telemedicine, Advanced Technologies, and Cultural Exchange Program as a Platform" in which 48 future telemedicine leaders from the Balkans traveled to the U.S. for three weeks of intense training in telemedicine, e-health and electronic libraries. This training and professional advancement continues through virtual educational programs conducted on a weekly basis. Students from Kosova, Albania, Macedonia, and Montenegro have participated in this training. TCK has a number of active educational programs that involves institutions from around the world. In addition, the medical staff at the TCK has been linked to the medical personnel at the U.S. Army base at Bondsteel, Kosova for medical grand rounds.

In October 2002, the First Intensive Balkan Telemedicine and e-Health Seminar was held in Prishtina, Kosova. This subsequently resulted in the establishment of the TPK, thus starting telemedicine in the Balkans. This first seminar attracted over 400 participants and speakers representing 21 countries from around the world who have established telemedicine efforts in developing countries. This seminar and the first phase of the TPK were funded by European Agency for Reconstruction.

In 2006, the IVeH obtained a grant from U.S. Department of State's Bureau of Educational and Cultural Affairs (BECA) to implement a three-year project called "Improving Healthcare in the Balkans Using Telemedicine, Advanced Technologies and Cultural Exchange Program as a Platform". This program was aimed at improving healthcare delivery in the Balkans and to make this region part of the global health collaboration. This program has developed a powerful international medical educational network in the Balkans for further collaboration and regional development. As part of these activities, and with additional support from U.S. Agency for International Development in Albania (USAID/Albania) and the U. S. Army's Telemedicine and Advanced Technology Research

Center (TATRC), the Second Intensive Balkan Telemedicine and e-Health Seminar was organized in Tirana, Albania, October 21-23, 2007. This event was a great success, winning broad support from leaders in the field of health and an endorsement from the Prime Minister, Professor and Physician, Dr. Sali Berisha. Interest on the part of the Ministry of Health and directors of key hospitals in Albania has energized the government and the community to develop an Integrated Telemedicine and e-Health Program across all of Albania.

PROJECT DESCRIPTION

As momentum has been built on previous successes, IVeH partnered with TATRC, the Macedonian Ministry of Health, U.S. Department of State, Polycom, and others to conduct a third seminar in Skopje, Macedonia. Macedonia is like many developing countries, it suffers from a lack of resources for the health sector. What resources there are tend to concentrate in the larger cities, particularly the capital, which leaves regional healthcare facilities poorly equipped and staffed to handle anything but the most basic care. The Third Intensive Balkan Telemedicine and e-Health Seminar was organized and held in Skopje, Macedonia, February 6-7, 2009. The Minister of Health, Dr. Bujar Osmani as well as the leaders on the University, the Dean of Medical School and many leaders of medical associations in Macedonia fully endorsed the concept and stated their commitment to embrace the concepts of telemedicine. The Ministry of health has made telemedicine a priority, projecting to complete the first phase of a national telemedicine program by the end of 2009.

The completion of the telemedicine program in Macedonia as in Kosova, Albania, and other countries, will create an integrated modern telemedicine and e-health educational network. Creation, development, and management of the technical infrastructure, medical and technical leadership, as well as policy and procedures, will provide a solid foundation for new innovation in healthcare in Macedonia. This program will foster new opportunities for partnerships between medical institutions and individual experts from Macedonia, the Balkans and renowned institutions in the U.S., Europe and other countries worldwide. It is expected that implementation of this telemedicine program in Macedonia will reduce the cost of healthcare and the efficiency at which the healthcare system operates, including reducing unnecessary patient transfers from regional hospitals to the major university hospitals or even international hospitals. This will have a profound effect on the limited healthcare budget of Macedonia.

Furthermore, this program will have a huge impact on continuing medical education for all healthcare providers. Hospital educators can utilize the system to broadcast educational lectures, conferences, and seminars to doctors, nurses, and other medical staff in regional centers, saving time, money, and resources that would be incurred traveling to these events.

METHODS

The IVeH organized the seminar with the Ministry of Health in Skopje, Macedonia. A conference grant was requested from TATRC. In addition, financial support from the Ministry of Health and Polycom was provided. Other non financial sponsors included the

State Department BECA, the American Telemedicine Association (ATA), International Society for Telemedicine and e-Health (ISfTeH) and USAID. The financial support from Ministry provided organization and coordination of all in country (Macedonia) expenses, including the meeting space, invitation of all participants and other meeting support.

The course directors, Rifat Latifi, MD and Charles R. Doarn, MBA were guided by co-program chairs, including Ronald C. Merrell, MD, Ronald Poropatich, MD, and Ronald Weinstein. Kadri Haxhihamza, MD, Macedonia's National Telemedicine Coordinator led the local organizing committee in Skopje. An international faculty (see Table 1) was invited to submit abstracts, which defined their assigned talks. All abstracts and presentations are appended to this report as Appendix C and D. Each participant was provided a program with this material included.

The meeting was organized to cover a wide range of topics and was scheduled for two full days. The agenda is in Appendix B.

The venue for the meeting was a centrally-located hotel in the city of Skopje, Macedonia.

The IVeH coordinated invitations to representatives of the U. S. Army base at Bondsteel, Kosova, the State Department, the U.S. Embassy, and USAID.

Table 1. Seminar's International Faculty

Faculty Member	Organization	Country
Gail Barker, PhD	University of Arizona, Arizona Telemedicine Program	USA
Charles R Doarn, MBA	University of Cincinnati / IVeH	USA
Georgi Graschew, PhD	Charité University of Medicine	Germany
Elizabeth Krupinski, PhD	University of Arizona, Arizona Telemedicine Program	USA
David Lam, MD	U.S. Army – TATRC	USA / Belgium
Rifat Latifi, MD	University of Arizona / IVeH	USA / Kosova
Frank Livens	Med e Tel	Luxemburg
Ronald C. Merrell, MD	Virginia Commonwealth University	USA
Steinar Pederson, MD	Norwegian Centre for Telemedicine	Norway
Ronald Poropatich, MD	U.S. Army – TATRC	USA
Andrew Watson, MD, MLitt	University of Pittsburgh	USA
Ronald Weinstein, MD	University of Arizona, Arizona Telemedicine Program	USA

PREVIOUS WORK

This seminar is the third such event in the Balkans; the first being in Prishtina, Kosova in 2002 and the second in Tirana, Albania in 2007. Each of these seminars resulted in the following publications.

Kosova (2002) - Establishing Telemedicine in Developing Countries: From Inception to Implementation. Ed Latifi R. Studies in Health Technology and Informatics 104. IOS Press, Amsterdam 2004.

Albania (2007) - Doarn CR, Latifi R, Merrell RC. Meeting Summary: Second Balkan Intensive Seminar on Telemedicine and e-Health. *Telemed E Health* 2008; 14(1):85-7 and

Latifi R, Merrell RC, Doarn CR, Poropatich R, Latifi Q. Balkan Abstracts: Second Balkan Intensive Seminar on Telemedicine and e-Health. *Telemed E Health* 2008; 14(1):88-106.

In addition, the faculty have a well known track record on teaching telemedicine around the world.

SYMPOSIUM SUMMARY

Seminar Summary

The seminar was held in a hotel conference site in the city center of Skopje along the Vardun River. The meeting was attended by a wide variety of individuals with diverse backgrounds ranging from medicine, government, psychiatry, law, and technology. The total number of attendees was 289, representing the countries of Macedonia, Kosova, Albania, and Serbia. The breakdown of the attendees included 252 physicians, 12 nurses, two psychologists, two lawyers (one a retired member of the supreme court of Macedonia), one member of the Macedonian Parliament; three information technology (IT) professionals; one from USAID, 15 medical students, and two journalist/producers from Macedonian television.

There were also participants from the U.S. Army Base at Bondsteel in Kosova. These included COL Linda C. Shackelford, MC, USA (RES), LTC Lisa M. Breitenbach, MC USA (RES), and their respective drivers. The Deputy Chief of Mission of the U.S Embassy in Skopje, Mr. Thomas Navratil, was a key note speaker. He was accompanied by Ms. Amy Storrow, Assistant Public Affairs Officer. USAID-Albania personnel William C Hansen, Executive Officer and Dr. Zhaneta Shatri, Health Specialist attended. Ms. Christine Miner, Managing Director, Professional and Cultural Exchanges, BECA, U.S. Department of State attended the meeting. Ms. Miner is managing director of the IVeH project in the Balkans.

The faculty included individuals from the U.S. and Europe (Table 1). Some faculty participated via video-teleconferencing. The faculty also included the current and two previous presidents of the American Telemedicine Association (ATA). Dr. Rifat Latifi and Mr. Charles Doarn served as seminar directors. The faculty is shown in Figure 1.

Figure 1. Seminar faculty (l to r, David Lam, Frank Livens, Giorgi Graschew, Steinar Pedersen, Rifat Latifi (Course Director), Kadri Haxhihamza, Charles Doarn (Course Director), and Ismet Lecaj).

All lectures where given in English, with interpretation in both the Macedonian and Albanian languages.

Day 1

Mrs. Sevdije Metaj, a news anchor for Macedonian Television, served as the master of ceremony. The meeting started with remarks from the Macedonian Minister of Health, Dr. Bujar Osmani and Mr. Thomas Navratil and the Scientific Chairman of the Seminar Dr. Rifat Latifi. Their remarks, which appear below, endorsed strongly the concept of telemedicine in Macedonia and in the Balkans. They stated that a telemedicine network in Macedonia and throughout the region would have a significant impact on the delivery of healthcare, stressing that cross border collaborations would build bridges for the future of the region.

Dr. Osmani publicly announced a commitment on behalf of the Macedonian Ministry of Health to initiate and complete the first phase of telemedicine implementation by the end of 2009.

Remarks from the Macedonian Minister of Health

Distinguished colleagues,

Ladies and gentleman,

Respected media representatives,

It is my exceptional honor and pleasure to greet you on the start of Third Intensive Balkan Telemedicine and e-health Seminar. The great interest shown for this seminar is real confirmation of the fact that we are on the right path concerning implementation of up-to-date principals and practice of telemedicine and e-health in the Republic of Macedonia.

This Seminar is organized as partnership between Ministry of Health of Republic of Macedonia and International Virtual e-Hospital. This is only a part of the global strategy of the Government

of the Republic of Macedonia and its' Ministry of Health aimed at development of informatics technology and bringing up to date the electronic infrastructure of our healthcare system.

Technical and technological advance is important segment of the reforms in healthcare system so it is of crucial importance for our country to stay in line with latest technologies which, as we are all aware, are advancing on daily basis.

Today, at this seminar, the possibilities of connection with telemedicine centers in the region, Europe and U.S. will be demonstrated, during which we will see practically how does "distant medical consultation" looks like. This will be demonstrated by our speakers, top experts in telemedicine and in their fields, both clinical and non-clinical.

I would like to stress that using Internet and satellite communications we will be able to provide medical care in places where, at the moment, we don't have specialist care facility. In one word, telemedicine will make possible specialist treatment for the patients that are far from this kind of facility (and care) so that, without this technology, they would not be able to get specialist treatment and care.

Telemedicine also provides other possibilities such as use of expertise from foreign specialists. Connections with partner hospitals in Europe and U.S. will provide us with the opportunity of using their capacities for the improvement of our healthcare.

We must not forget the possibility of widening and deepening the work of so called electronic library, through which our medical doctors and students will be able to beneficiate from electronic libraries of the most eminent Universities in Europe and U.S. Searching through medical databases, which is part of our Medical Faculty now, will be elevated on higher level with a possibility that allows every healthcare professional to connect to medical databases of Universities in Europe and U.S.

In a second phase of this project, until the end of this year, interconnection of six regional hospitals throughout Macedonia (Kumanovo, Tetovo, Struga, Shtip, Bitola and Strumica) with a Center in Skopje is expected to happen. Ultimately, this means that a patient in Bitola, for example, would have on disposition consultation of specialists and sub specialists at home and abroad.

We must not forget the education component of telemedicine: when the regional telemedicine network will be established it will make it possible to attend presentations of best medical and non medical professionals from these centers. In this way, in the comfort of their cabinets, workplaces even of their homes, our colleagues will be able to attend lessons of eminent world experts, to share experiences and ask questions. This way knowledge and skills of our colleagues would increase because, as we all know-"knowledge is power".

At the end, I would like to express my deepest gratitude to Dr. Rifat Latifi who made it possible for this project to be implemented in Macedonia, as it was implemented in Kosova and Albania in the past and as it will hopefully be implemented in Montenegro in near future, where the next Seminar is planed. His work is an example of how cooperation between medical capacities in our region should be intensified.

I hope that this seminar is only the first step towards successful establishment of telemedicine in our country. This will help our country maintain the title of country that is developing parallel regional and global cooperation, as well as developing a modern healthcare system which will be patient centered.

Thank you!

Bujar Osmani, MD, Minister of Health, Republic of Macedonia

Remarks from the Deputy Chief of Mission, U.S. Embassy Skopje, Macedonia

Good Morning! I am honored to welcome you to the third Balkan Telemedicine and e-Health Seminar.

I want to thank all who have worked so hard on this project, especially Dr. Latifi.

Over the past two and a half years the U.S. Department of State, through the Educational and Cultural Affairs Bureau, has been pleased to support the International Virtual e-Hospital Foundation project to bring telemedicine to the Balkans.

As part of the project over 45 medical professionals, including doctors, nurses and telemedicine specialists, have traveled to Alaska and Arizona for exchanges that have provided an opportunity for Americans, Kosovars, Montenegrins, Albanians and Macedonians to share their professional expertise, experiences and cultures with each other.

Two recent participants from Macedonia, Dr. Gjeorgi Damjanovski, a radiologist, and Dr. Kadri Haxhihamza A, a psychiatrist, participated in this program and brought their knowledge here to Macedonia. Dr. Haxhihamza has become a leader in the field of telemedicine, joining the rest of the Balkan participants who participated in the program in Alaska and Arizona. He has become the National Coordinator of Telemedicine and e-Health in Macedonia and is the chair of the local organizing committee for this event. This is just one example of how the exchange program is making a difference in creating leadership for telemedicine in the Balkans.

This project and seminar bring attention to how telemedicine and advanced technologies can reach across borders to make electronic libraries and the latest medical practices available to every healthcare provider.

The creation of a telemedicine network will have significant impact for Macedonia and the region, where the patient will become a true and full partner in his or her care and where these technologies will bring healthcare to every citizen no matter where they live.

More and more I have noticed that cross-border collaborations are innovative ways to solve problems, especially for small countries with scarce resources. In March, the Macedonian American Alumni Association will host a cross-border workshop on disaster preparedness and emergency response, in cooperation with alumni of U.S. government-sponsored programs from Slovenia.

We talk often about building bridges of mutual understanding, of person-to-person “coffee diplomacy.” These cross border projects build such bridges both by virtual means and in person, and they save lives. They are the future.

Thank you for participating in this conference, and I hope you have a productive and stimulating experience today.

Thomas J. Navratil, Deputy Chief of Mission, Embassy of the United States of America, Skopje, Macedonia

Remarks from the Seminar Chairman

Dear Friends,

On behalf of the organizing committee, welcome to the Third Intensive Balkan Telemedicine and e-Health Seminar in the beautiful city of Skopje, Macedonia. The Third Intensive Balkan Telemedicine and e-Health Seminar is being organized by the IVeH in collaboration with the Ministry of Health of Macedonia and our partners. This is a significant step forward in the process of establishing the regional Balkan Telemedicine and e-Health Network that will bring

people, countries, and medical systems closer as we strive to improve healthcare in the region.

This seminar is dedicated to practical clinical applications and evidence-based outcomes of current technologies, principles, practices, and applications of telemedicine and e-health. It is designed as an advanced seminar to prepare future leaders of telemedicine and e-health and to impact the medical profession by changing the standards of clinical practice using an integrated and multidisciplinary approach.

This intensive seminar is part of the scheduled activities of IVeH as implementation of the thee-year project: "Improving Healthcare in the Balkans Using Telemedicine, Advanced Technologies and Cultural Exchange Program as a Platform", funded by the U.S. Department of State Bureau of Educational and Cultural Affairs.

The speakers for this year's seminar have been selected from the best in the world and represent true authorities in their fields. They come from various backgrounds of clinical, research, technical, administrative, as well as global strategic and organizational expertise.

The previous two Balkan intensive telemedicine seminars have resulted in the creation of the country-wide and now renowned telemedicine program in the Republic of Kosova (www.telemedks.org) and initiation of the implementation of an integrated telemedicine and e-health program in Albania. The proceedings of the seminar in Kosova were published as a book "Establishing Telemedicine in Developing Countries: From Inception to Implementation", (IOS Press, Amsterdam, 2004), while the proceedings from Albania seminar were published in the Telemedicine and e-Health Journal (http://www.liebertonline.com/toc/tmj/14/1).

I would like to express my appreciation and thanks to everyone who helped make this seminar possible. In particular, I wish to thank the Minister of Health of Republic of Macedonia, Dr. Bujar Osmani, for his leadership and vision in supporting this seminar as a pioneering event in establishing telemedicine and e-health in Macedonia and for hosting this event. Also, I want to thank the local organizing committee, led by Dr. Kadri Haxhihamza, the National Telemedicine Coordinator of Macedonia, for making this seminar possible. Special thanks to Ms. Chris Miner and the Bureau of Educational and Cultural Exchange of the State Department and the Telemedicine and the U.S. Army's Advanced Technology Research Center in Fort Detrick, Maryland, and Dr. Ronald Poropatich, for supporting our efforts in the Balkans. Finally I wish to thank my co-chairs, Mr. Charles R. Doarn, Dr. Ronald Merrell, Dr. Ronald Poropatich, and Dr. Ronald Weinstein for their help in every aspect of the program, as well as the countless number of volunteers of the IVeH. In particular I want to thank all the speakers of the Third Balkan Telemedicine and e-Health Seminar for making this event a first class international telemedicine and e-health seminar. Special thanks to Polycom for their support as well as the engineers and experts from the Telemedicine Program of Kosova, led by Dr. Ismet Lecaj and Mr. Flamur Bekteshi, for their leadership and expertise.

It is my hope that this Seminar in Macedonia will act as a catalyst for the adoption of advanced technologies and will establish the basis for the implementation of telemedicine in Macedonia as part of a regional telemedicine project. Personally, I see this as an incredible step for Macedonia and the modernization of its healthcare system. Thank you.

Rifat Latifi, MD, FACS, Program Chairman Professor of Surgery, University of Arizona, Tucson, Arizona, President and Chairman, IVeH

Prior to the scientific portion of the seminar, a press conference was held, where a number of regional news organizations questioned the Minister of Health, Dr. Osmani and the seminar director, Dr. Latifi, regarding the seminar and the impact of this technology on

healthcare in the region. Throughout the seminar, there was continuous and very positive media coverage.

The talks were broken up into four sessions where the faculty introduced the basics of telemedicine, technology, education, and research in telemedicine, telemedicine for trauma, emergency, and disaster management, and the new horizons in telemedicine. The sessions followed the agenda in Appendix A. These presentations generated lively discussion between the participants and faculty.

One of the showcases of the conference was the linking of a small hospital in Tetova, Macedonia to the conference hall in Skopje to illustrate the capabilities and benefits of telemedicine. A case presentation was made by the remote physician, which included comments made by physicians in the conference hall. The connection between the two sites was accomplished using a Polycom HDX9000 and HDX4000 units (Polycom, Pleasenton, CA) and a connection between the two sites of 512 kilobits per second (Kbps). Additionally, the seminar presentations and lectures were streamed live on the Internet via 10 megabits per second (Mbps) fiber optic connection using Polycom RSS2000 recording and streaming server which transmitted images from Polycom VSX7000 and two professional High Definition (HD) Sony Handycam Camcorders. All these devices were linked together to broadcast video from different angles. An additional connection with Guy's and St. Thomas Hospitals in London, England was initiated using a Polycom gateway in Germany. This gateway was used to interconnect Internet Protocol (IP)-based connection with Integrated Services Digital Network (ISDN) connection at the hospital in London.

Day 2

The second day of the seminar was filled with lectures on clinical telemedicine applications and the management of telemedicine in developing countries. It closed with two key presentations on the business aspects of telemedicine and strategies for sustainability. Several presentations were given by live video conference and the last two presenters, Dr. Weinstein and Dr. Barker, from the Arizona Telemedicine Program were simultaneously connected from two different locations, allowing them both to present, watch, and comment on each other's talks.

There was an awards ceremony at the conclusion of the seminar where each participant received a certificate of attendance from the Minister of Health and IVeH.

PROJECT DELIVERABLES

This seminar has resulted in several deliverables that compliment this report.

1) Renewed interest of military medical personnel from Bondsteel U.S. Army Base working with the Telemedicine Center in Kosova in grand rounds and other educational venues
2) The meeting summary and all abstracts are being published in the *Telemedicine and e-Health Journal*

a. Doarn CR, Latifi R, Hadeed G, Haxhihamza K, Bekteshi F, Lecaj I. Third Intensive Balkan Telemedicine and e-Health Seminar: A Meeting Summary. *Telemed J E Health.* 2009; 15(5):##-##. *At Press.*
b. Doarn CR, Latifi R. Abstracts from the Third Intensive Balkan Telemedicine and e-Health Seminar, Skopje, Macedonia – Introduction. *Telemed J E Health* 2008; 15(5):##-##. *At Press.*

3) A commitment by the Minister of Health of Macedonia to pursue the implementation of telemedicine across the region
4) Further resolve for the US AID in Albania to support a growing e-health strategy not only in Albania but across the Balkan's region.

FINANCIAL SUMMARY

The funding provided to IVeH to support this meeting through the TATRC grant of $29,426 was used to cover the cost of faculty travel to and from Skopje, Macedonia, faculty honoraria, printing of course booklets, and miscellaneous administrative functions. All grant dollars were spent in accordance to the approved budget as submitted.

SUMMARY

The Third Intensive Balkan Telemedicine and e-Health Seminar, organized by the IVeH, was held on February 6-7, 2009 in Skopje, Macedonia. As with the previous two seminars, the idea was to introduce telemedicine in a robust way to healthcare personnel, politicians, and the public and to draft an action plan for the implementation of a national telemedicine program. This technique has become effective in establishing telemedicine in the region and could serve as a good strategy for other developing countries. It was attended by international faculty and participants from the region. All participants were engaged in the presentations and discussion, which sparked effective dialogue and interest in learning what telemedicine can offer for the region. The seminar was a tremendous success and participants were introduced to the principles and practices of telemedicine and e-health from an outstanding faculty through a series of lectures, videoconferences, and live demonstrations. This seminar has set the stage for an evolutionary change in healthcare for Macedonia as part of the Balkan telemedicine program.

APPENDICES

Appendix A

Acronyms

ATA	American Telemedicine Association
ATP	Arizona Telemedicine Program
BECA	Bureau of Education and Cultural Affairs
HD	High Definition
ISDN	Integrates Services Digital Network
IStTeH	International Society for Telemedicine and eHealth
IT	Information Technology
IVeH	International Virtual e-Hospital
Kbps	Kilobits per second
RTC	Regional Telemedicine Centers
TATRC	Telemedicine and Advanced Technology Research Center
TCK	Telemedicine Center of Kosova
TPK	Telemedicine Program of Kosova
UCCK	University Clinical Center of Kosova
USAID	United States Agency for International Development

Appendix B

Third Intensive Balkan Telemedicine and e-Health Seminar
Current Principles and Practices of Telemedicine and e-Health Clinical Applications and Evidence-Based Outcomes
Program Agenda

Day 1, February 6, 2009

8:00-08:30	Registration
8:30-09:30	Welcoming Remarks Dr. Bujar Osmani, Minister of Health of Macedonia Prof. Rifat Latifi, Program Chair, and other Distinguished Guests
Session:	**Introduction to Basics of Telemedicine, e-Health, and the Modern Electronic Library**
Moderators:	**Steinar Pedersen, Remzi Izairi**
09:30-10:00	Telemedicine and e-Health in Modern Medical Practice: Arizona Program as a Model - Keynote - **Rifat Latifi**
10:00-10:30	Requirements for Successful Telemedicine Consultation and Telemedicine Program - Keynote - **Charles Doarn**
10:30-10:45	Coffee Break

Session: Technology, Education and Research
Moderators: Georgi Graschew, Kadri Haxhihamza

10:45-11:00	Current Technologies - **Charles Doarn**
11:00-11:30	Telepresence, Telementoring and Continuous Educational Programs - **Andrew Watson -Via Video**
11:30-12:00	Telemedicine and Research Aspect: Need for Continuous Improvement - **Steinar Pedersen**
12:00-13:30	Lunch
Session:	**Telemedicine for Trauma, Emergencies and Disaster Management**
Moderators:	**David Lam, Vladimir Popovski**
13:30-14:00	Telemedicine and Telepresence for Trauma and Emergency Management - **Rifat Latifi**
14:00-14:30	Military Telemedicine and e-Health from the Battlefield: Lessons for Civilians - **Ronald Poropatich**
14:30-15:00	Telemedicine in Disaster Management - **Ronald C. Merrell - Via Video**

15:00-15:15	Break
Session:	**New Horizons of Telemedicine**
Moderators:	**Charles Doarn, Florije Latifi**
15:15-15:45	Telemedicine Networking: The Science and the Logistics - **Georgi Graschew**
15:45-16:15	Telemedicine in Disaster Management: The Military Perspective - **David Lam**
16:15-16:45	Sessions in Review: What Did We Learn Today? - **Rifat Latifi**

Day 2, February 7, 2009

8:30-09:00	Registration
Session:	**Telemedicine in Clinical Applications**
Moderators:	**Steinar Pedersen, Emilia Pemova**
09:00-09:45	Clinical Telemedicine - **Charles Doarn**
09:45-10:30	Telepresence and Telesurgery - **Georgi Graschew**
10:30-10:45	Break
Session:	**New Horizons**
Moderators:	**Charles Doarn, Gjorgji Damjanovski**
10:45-11:15	Globalization of Telemedicine: The Grass Root Approach - **Frank Lievens**
11:15-11:45	From Nanotechnology to Clinical Applications: The Future of Telemedicine - **Georgi Graschew**
11:45-13:00	Lunch
Session:	**Chronic Diseases and Telemedicine**
Moderators:	**Rifat Latifi, Vladimir Borazonov**
13:00-13:30	Telemedicine in Chronic Diseases and Diabetes - **Steinar Pedersen**
13:30-14:00	Telemedicine in Extreme Conditions - **Rifat Latifi**
14:00-14:30	Telemedicine for Home Health - **Andrew Watson - Via Video**
14:45-15:00	Teleradiology and Telepathology - **Elizabeth Krupinski - Via Video**
15:00-15:15	Break
Session:	**Establishing Telemedicine in Developing Countries**
Moderators:	**Charles Doarn, Lulzim Agai**
15:15-15:45	The Business Aspects of Telemedicine and e-Health - **Gail Barker** - **Via Video**

15:45-16:30	Strategies for Institutionalizing and Achieving Long Term Sustainability of Telemedicine and Telehealth Programs and Services- **Ronald Weinstein - Via Video**
16:30-17:00	Development of Telemedicine Network and Activities in the Region: The Do's and Don'ts When Establishing Telemedicine Programs- **Rifat Latifi**
17:00 –17:30	Closing Ceremony and Awarding of Certificates
17:30– 18: 30	Adjourn

Appendix C

Abstracts

Telemedicine and e-Health in Modern Medical Practice: Arizona Program as a Model

Rifat Latifi, MD, FACS[1,2,4], Ronald Weinstein, MD[1,2], Ana Maria Lopez, MD[1,2], Gail Barker, PhD[1,2], and Charles R. Doarn, MBA[3,4]

[1]University of Arizona, [2]Arizona Telemedicine Program, Tucson, Arizona; [3]Center for Surgical Innovation, Department of Surgery, University of Cincinnati, Cincinnati, Ohio; and [4]International Virtual e-Hospital Foundation, Anchorage, Alaska

Telemedicine and telehealth development has brought hope to developing countries and the most remote areas around the world. There has been an incredible journey from the early days of telemedicine implementation via rudimentary technologies to today's advanced technologies, including advances in telecommunications, super computers, diagnostic imaging, robotics, voice activated machines, and remote controls that have changed hospitals and operating room theaters around the western world. Essentially, geography and distance have become abstract nouns and are meaningless in modern times. At the same time, the world equilibrium has not followed the punctuation of an industrial world directed by the broad bandwidth, although this gap is getting smaller and smaller every day. The patient has become an educated and informed consumer who questions the decisions of the practitioner and demands explanations and evidence-based medical approaches. The physician's expertise is validated through the Internet and other forms and the patient insists on care that is up to current world standards. In this environment, what we call today telemedicine and e-health has become a necessity and not a luxury or marketing tool for large medical corporations. Every aspect of clinical medicine has room for telemedicine applications. The Arizona Telemedicine Program (ATP) has become a world premier program that integrates multiple partners and technologies to improve access to specialized medical care throughout the State of Arizona through the use of telemedicine technologies such as digital imaging and real-time video conferencing. Currently, ATP is providing medical services via both real-time and store-and-forward technologies in over twenty communities. The program is a real model not only for developed countries, the innovative programs in clinical telemedicine, dedicated network creation, business model, and partnerships with universities, industry, and political leadership, makes the program unique and affordable model for developing countries. Bridges built by the ATP between state agencies, local governments and legislative bodies are fostering a high level of awareness of the importance of telemedicine and e-health to achieving the state's healthcare goals. The program also serves as a platform upon which the state's only College of Medicine can demonstrate its value to exceptionally broad constituencies throughout Arizona and the nation as a clinical research center, a tertiary care facility, and as an educational institution.

Requirements for Successful Telemedicine Consultation and Telemedicine Program

Charles R. Doarn, MBA[1,2], Rifat Latifi, MD, FACS[2,3]

[1]Center for Surgical Innovation, Department of Surgery, University of Cincinnati, Cincinnati, Ohio; [2]International Virtual e-Hospital, Anchorage, Alaska; and [3]University of Arizona, Tucson, Arizona

The goal of a telemedicine program must be to provide access to quality healthcare when barriers to service such as geography or distance exist. A successful telemedicine program requires a number of key components to be in place. First there must be an unmet need. This could be gauged as a lack of clinical expertise at the patient location or it could be a desire to implement a more cost effective strategy in addressing health needs. The second and most critical step is to conduct a needs assessment. This critical step provides a review of the clinical need; identifies the technology and communications capabilities and challenges; provides a strong platform for implementation; and a needs assessment outlines a process from which to proceed. During this step, one should include as many disciplines as well as political and local leadership support. The needs assessment will also identify who the consultants are and what clinical disciplines they are interested in supporting. Systems, which exist throughout the world, have demonstrated the usability and efficacy of second opinion or distant healthcare management through telemedicine. A local champion must be identified and he/she must provide vision and leadership and build trust in a system or service. The third key step must include a business model. Such a model implies that revenue will flow for services provided between the clinician and the patient. This payment model may be based on insurance reimbursement or the payer maybe the patient. In any case, a program must add value. A fourth component for a successful telemedicine program is a reliable telecommunication infrastructure. The fifth requirement to ensure sustainability is political acceptance and support of the program and the transparency of the program. The telemedicine program should become an integral part of clinical practice of a personal healthcare provider, an institution, or country. The sixth step is integration of multiple, clinical disciplines and collaboration with local universities, medical schools and other

institutions. The seventh and final step is continuous evaluation of the programs and publications of such evaluations. While each of these aforementioned steps is important, there must be acceptance by the providers and patients alike, otherwise it will not be successful.

Current Technologies

Charles R. Doarn, MBA[1,2], Rifat Latifi, MD[2,3]
[1]Center for Surgical Innovation, Department of Surgery, University of Cincinnati, Cincinnati, Ohio; [2]International Virtual e-Hospital, Anchorage, Alaska; [3]University of Arizona, Tucson, Arizona

The advent of telemedicine was made possible by technology. Technology and its unabated growth throughout the 20th century provided fundamental changes in everything we do in human society. From travel to food production, to communications, the sociology of the human existence has changed more in the last twenty years than at any time in all of human history. Today, you can carry a small device in your hand and talk to someone in another part of the world; you can send an instant message between two culturally diverse places and communicate a thought or an idea; you can operate on someone in another country; you can get instantaneous news on events as they are happening; or you can walk on the surface of the moon. The very way we learn is not the same as it has been for generations. This has been made possible by the technological revolution in telecommunications, information technology, sensors, and a whole host of other disciplines. New social tools such as MySpace, FaceBook, Twitter, YouTube, etc. provide a profound change in how we communicate. Letters sent by post are now replaced with instant messaging (IM) and short message service (SMS). Terms like Worldwide Interoperability for Microwave Access (WIMAX), broadband, 4G, iPhone, and Voice Over Internet Protocol (VOIP) are now commonplace in the connection of people-to-people in healthcare. Technologies in robotics, sensors, and imaging, provide fundamental change in the approach to diagnosis, treatment and management of disease. Current technologies being deployed in telemedicine are key to understanding what and how this growing field can add value to health across the globe. What kind of technologies one decides to use, depends on many factors. The standardization of technologies is narrowing the gap between different products and fulfilling the key principle in telemedicine: seamless communication between the patient and healthcare provider, while ensuring security, HIPAA compliance and reproducibility of such connectivity.

Telepresence, Telementoring and Continuous Educational Programs

Andrew R. Watson, MD, MLitt
Department of Surgery, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania

The face of surgical education has changed forever. Limitations on work hours to 80 per week may become more stringent with the recent Institute of Medicine report. Experiential time that was the bastion of a resident's education is being limited. Concerns have arisen about a graduating resident's experience and ability to practice independently. Physicians will be monitored for complications and outcomes, which will increase the pressure on recent graduates or surgeons looking to learn new skill sets.

Efforts are underway to ensure graduates of residency are well trained, such as the Surgical Council on Resident Education. Furthermore, major advances in technology are enabling integration of laparoscopic operating rooms. These laparoscopic suites represent the leading edge of surgical telementoring.

The creation of a surgical telementoring network will be critical for the future of surgery. Such networks will enable physicians to communicate between locations with full audio / visual interfaces in conjunction with telestration. This process must include real-time data such as vital signs, radiology, and live video of surgery. A remote physician can help mentor and guide key steps or prevent complications during surgery.

The technology behind a fusion of data for a telementoring network requires cooperation between hospital administration, laparoscopic vendors, and hospital IT developers. Open standards and an open-source internet backbone within a hospital are critical for the success of telementoring.

Surgical telementoring represents the future of transitioning surgical residents into their practice. It will also enable remote cooperation between surgeons regardless of location within or between hospitals or while at home. A complex technological infrastructure is critical and will require broad-based cooperation with the healthcare IT enterprise.

Telemedicine and Research Aspect: Need for Continuous Improvement

Steinar Pederson, MD
Norwegian Centre for Telemedicine, University Hospital of Northern Norway, Tromsø, Norway

The Tromsø Telemedicine Laboratory (TTL) was established in 2006 as a Centre for Research-based Innovation (SFI). The centre combines human caring with new technologies, in order to provide better healthcare and reduce the increasing burden on the healthcare system.

The Research Council of Norway's Programme of Centres for Research-based Innovation is intended to build up or strengthen Norwegian research communities that work in close interaction with innovative business and industry. The objective is to support long-term research that promotes innovation and competitiveness in the business sector.

The TTL is a centre for research and innovation in the field of advanced telemedicine and e-health systems for chronic, age, and lifestyle related diseases. In TTL, we focus on sensor-based systems for vital signs and surveillance (SBS), extended decision-support (EDS) and computer-supported cooperative work (CSCW).

Research at TTL will cover subjects such as how new “smart sensors” and personal terminals can be adapted to the steadily growing group of people with chronic diseases. These systems will be wireless and invisibly integrated with computer-based extended decision support. One of the objectives is to reduce the pressure on the health service. For elderly people or chronically ill patients, this may improve quality of life through better control and follow-up of their own illness.

The centre aims at supplying the healthcare industry with viable and sustainable technologies that will promote global health, wellness, and disease management by facilitating technological advances in the collection, processing, and sharing of medical information. These will generate new products and services within telemedicine and e-health.
Some TTL projects will be presented.

Telemedicine and Telepresence for Trauma and Emergency Management

Rifat Latifi, MD, FACS[1,2], George Hadeed, MPH[1], Charles R. Doarn, MBA[2,3]
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Despite being relatively new, the concept of teletrauma and telepresence is evolving and is being integrated into modern care of trauma and surgical patients. Recent technological developments have made possible telemedicine application in the management of trauma and emergency care, especially in remote and isolated communities. As such, telemedicine for trauma and emergency management is emerging as a new frontier in telemedicine and is becoming an integral part of the modern practice of trauma care. The biggest benefit of teletrauma and teleresuscitation is the transformation of the concept of the “golden hour” into the “golden minute” which facilitates the rapid stabilization of the patient and safe transport to the trauma center when indicated. The University Medical Center and the Arizona Telemedicine Program (ATP) in Tucson, Arizona has one functional teletrauma and emergency telemedicine program and one ad-hoc program, the mobile telemedicine program. The Southern Arizona Telemedicine and Telepresence (SATT) program is an inter-hospital telemedicine program, while the Tucson ER-Link is a link between pre-hospital and emergency room system. Both programs are built upon the world-renowned ATP and the technical infrastructure of the city of Tucson. These two programs represent examples of integrated and collaborative community approaches to solving the lack of trauma and emergency care issue in the region. These networks will not only be used by trauma, but also by all other medical disciplines, and as such have become an example of innovation and dedication to medical care in Tucson.
The first “teletrauma” case managed over the telemedicine trauma program was an 18-month old child who was the only survivor of a car crash with three fatalities. Using the teletrauma system, the child was quickly resuscitated and transferred to a level I facility within minutes of arriving in the emergency room where she made a full recovery from her injuries. The success of this case and the SATT pilot project led to the development of a regional teletrauma program serving close to 1.5 million people. The telepresence of the trauma surgeon, through teletrauma, has infused confidence among local doctors and communities. It is also

being used to identify knowledge gaps between healthcare providers and address the need for instituting new outreach and educational programs.

The acceptance of the program by trauma surgeons, referring physicians, nurses, and other providers, as well as patients, has been excellent thus far. Other clinical specialties are making preparations and creating protocols to utilize the system as well. As technology becomes friendlier and cheaper, the concept of teletrauma, telepresence, and teleresuscitation are evolving into key telemedicine applications which are being integrated into modern care of trauma and surgical patients.

Military Telemedicine and e-Health from the Battlefield: Lessons for Civilians

COL, Ronald Poropatich, MC and David Lam, MD, MPH
Telemedicine and Advanced Technology Research Center, United States Army Medical Research Medical Center, Ft. Detrick, Maryland

Telemedicine support for forward deployed Army Combat Support Hospitals in Iraq and Afghanistan was initiated in 2004. Current capabilities have evolved from simple email to sophisticated medical equipment monitoring. Clinical reach-back consultation for 19 medical specialties is accomplished with a low cost electronic mail system and includes digital image attachments. As of 1 January 2009, over 4900 non-radiology consults were completed with dermatology (52%), infectious disease (9%) and ophthalmology (5%) comprising the top 3 medical specialties. This same capability will be offered to deployed NATO forces in Afghanistan commencing 1 Feb 2009, on a 6-12 month interim basis. A new application deployed in 2008 – remote medical maintenance – has been deployed to 6 sites in Iraq and includes monitoring of 10 CT scanners and medical devices (blood analyzers). It provides uninterrupted monitoring and software maintenance over the Internet thereby reducing equipment down time. Funding for establishing dedicated bandwidth for deployed medical facilities in Iraq was also initiated in late 2008 and provides the capability to transmit large data files – CT scans (300 MB size), more rapidly thereby improving remote consultation. This same network will be utilized for establishing a telesurgical mentoring program from one facility in Iraq with reach-back consultation to the U.S. for assistance from surgical specialists mentoring a general surgeon through sophisticated trauma surgery. All these applications are low cost and easily implemented in civilian programs that are resource constrained.

Telemedicine in Disaster Management

Ronald Merrell, MD, FACS
Virginia Commonwealth University, Richmond, Virginia

Disaster whether natural or human in origin, disrupts services critical to medical care while increasing demand. Infrastructure may be destroyed or strained and relief must usually come from a distance. This situation seems to beg for augmentation of health services through telecommunications and therefore telemedicine. Electronic satellite communication may be able to predict or assess disaster as in hurricane or war events. Telemedicine can use the immediate application of satellite links to provide logistics and decision support for disaster managers and for medical practitioners as well. However, telemedicine has played its most important role thus far in remote assessment and reconstruction because there is not a coherent plan for telemedicine application in the immediate disaster event. Such utilization requires prior training, pre-placement of some equipment and a clear role for telemedicine in the planning and implementation of disaster plans. There are excellent examples of telemedicine opportunities and failures reported. Armenia was an early example of the role to be played in reconstruction and Katrina Hurricane and the Pakistan Earthquake offered excellent examples of the potential of telemedicine in very early response. Although disaster almost always means loss of ground telecommunications and cellular systems are either destroyed or fail by saturation, satellite is reliable and available. Mobile WiMax may be useful to reach a nearby area of intact telecommunications or satellite may only need to bounce to a nearby area of integrity rather than many thousands of kilometers. There is a telecommunication solution for almost any contingency and it is the incumbent upon the telemedicine community to create, test and deploy successful systems. Continued dialogue with disaster managers is need supported by publication of applicable experiences.

Telemedicine Networking: The Science and Logistics

Georgi Graschew, PhD
Surgical Research Unit OP 2000, Max-Delbrueck-Center for Molecular Medicine and Charité University of Medicine, Berlin, Germany

Over the past several years, OP 2000 has implemented various satellite-based networks for telemedicine support especially real-time interactive telemedicine applications and online intraoperative, interactive multipoint consultations via satellite link for the connected clinics during patient treatment. Examples include EMISPHER, MEDASHIP, DELTASS, GALENOS network applications in the fields of e-learning and distance training, teleconsultation, telementoring, etc. Such networks contribute to the improvement of the quality of medical care, to the cost-effective use of medical resources and to quick and reliable decisions. The high-end interactive video communication system WinVicos enables real-time telemedical applications like teleconsultation and second opinion and offers a superior image quality at a moderate transmission bandwidth of 0.5-1 Mbps. Not only video and audio connections can be provided, but also interactive manipulations can be performed remotely.

Implementation of emerging information and communication technologies into healthcare have lead to the e-Health era, characterised by new ways of healthcare delivery through a broad range of teleservices. However, to fulfil the promise of e-health and telemedicine, namely ubiquitous access to high-level healthcare for everyone, anytime, anywhere (so-called u-health), it requires a real integration of the various platforms and services into virtual hospitals.

Telemedicine in Disaster Management - The Military Perspective

David M. Lam, MD, MPH
University of Maryland Medical School, National Study Center for Trauma and Emergency Medical Systems, Baltimore Maryland, and U.S. Army Telemedicine and Advanced Technology Research Center Ft. Detrick, Maryland

One of the most commonly-cited uses for telemedicine found in the literature is that of use in disaster relief. However, a careful review of the literature demonstrates little real analysis of the utility of the modality in various disasters. The literature usually is favorable, but it is very difficult to tease out actual case reports in which the use of telemedicine altered case management and many of these reports appear to be enthusiastic anecdotes by telemedicine advocates rather than a careful analysis of benefits.

This presentation will depict the current military view of the utility of telemedicine during a disaster, and may vary somewhat from the views of civil experts. This presentation will describe the use of Telemedicine by a U.S. Army hospital during the 2005-2006 Pakistan earthquake relief operation, in the late acute and early recovery phases, which has documented patient results as a result of the use of telemedicine. The telemedicine augmentation support to the 212th MASH was fully operational and well-accepted by the medical staff. Though only used in the recovery phase, telemedicine was felt to be of primary use during the early phases of the deployment, when the medical staff was learning about diseases endemic to the disaster area, or when dealing with diseases new to the practitioners, rather than in dealing with acute or subacute trauma. During this early phase, telemedicine consultation was used regularly, and was felt to be of significant assistance. This level of use peaked quickly, and by the end of the deployment, when the practitioners were more familiar with the endemic problems of the area, was felt to be needed only occasionally. Telemedicine usage was felt to have been of benefit in arranging some evacuations or transfers, though perhaps the primary benefit of the telemedicine/Comms capability was the general communication support it was able to provide the hospital and its staff.

Clinical Telemedicine

Charles R. Doarn, MBA[1,2], Rifat Latifi, MD[2,3]
[1]Center for Surgical Innovation, University of Cincinnati, Cincinnati, Ohio; [2]International Virtual e-Hospital, Anchorage, Alaska; and [3]University of Arizona, Tucson, Arizona

The ability to link patients with their providers or expertise not resident where the patient is has provided profound changes in healthcare. From its earliest application, telemedicine has been applied to communicate

medically-relevant issues between a remote patient and healthcare provider. This linkage has been enabled by radio, telephone, satellite, Internet and a number of other communication modalities. All clinical disciplines in medicine can utilize and integrate telemedicine in practice. Over the past two decades, a plethora of research has been undertaken that has aptly demonstrated the efficacy and importance of such integration. Images of pathology, radiology, and photography can be easily transmitted. Data from monitoring devices and sensors can be easily acquired and shared at a distance. Patients in one location can be operated on by a surgeon in another location. The application of telemedicine can be applied in all clinical areas with simple tools. A digital camera and an e-mail account can serve as the simplest approach. More complex systems must be installed to facilitate surgical intervention. Clinical telemedicine can be simple or complex. It has been shown to be a significant adjunct to the delivery of healthcare services by overcoming barriers of distance and time. In world that is becoming more interleaved and with an impending shortage of healthcare providers, telemedicine is a significant tool. Every clinical discipline from pre-anesthesia consultation to robotic surgery and emergency consultation for major trauma or for injuries from war zones is amenable to telemedicine applications. Some of the most common clinical forms of telemedicine included teleradiology, teledermatology, telepsychiatry, telecardiology, telepathology and home healthcare. In addition, many other clinical disciplines are being developed using new and advanced technologies with great success.

Telepresence and Telesurgery

Georgi Graschew, PhD
Surgical Research Unit OP 2000, Max-Delbrueck-Center for Molecular Medicine and Charité University of Medicine, Berlin, Germany

The surgical-oncological workplace 2020 represents trend-setting telesurgical technology by the use of a high-tech system configuration on the basis of linked application-specific modules. The further design, implementation, validation and optimization of the workplace 2020 in which the various clinically required modalities are to be integrated is an important component for peri-operative research. This medical workplace 2020 shall provide the users with all required information at the right time and place and most important in optimally processed form. Important for a workplace 2020 is an integration of the following aspects: high-resolution (HD) and stereoscopic visualization; interactive real-time video communication with remote control of medical devices for telementoring, teletraining and distributed collaborative work; virtual reality simulations with tracked visualization and haptic feedback; optimized user interfaces for intraoperative use, etc. By a modular design of the workplace 2020 the various functional groups in the daily clinical routine gain a tailored access to all required medical information, video communication, simulation, etc.

For collaboration the following methods of telepresence are used: interactive remote control of the volume rendering software, remote and local control of the pathological microscope, surgical microscope, stereoscopic camera integrated in the operating light, shared video mouse, etc. Examples show that without such an environment modern IT-based technologies will be isolated and cannot be used routinely and intuitively.

Globalization of Telemedicine: The Grass Root Approach

Frank Lievens[1,2], Marlina Jordanova, MD, PhD[3,4]
[1]International Society for Telemedicine & eHealth, Switzerland;[2]Med-e-Tel, Grimbergen, Belgium; [3]Med-e-Tel, Bulgaria; and [4]Solar-Terrestrial Influences Institute, Bulgarian Academy of Sciences, Sofia, Bulgaria

Starting with recalling the century long history since first successful telemedicine experiments in 1905, the presentation reveals the “grass root” development of e-health, i.e. in most cases ideas, projects, technologies and products were developed and implemented from the bottom up rather than from the top down.

Understanding that e-health strategic goal is patient care and healthcare delivery the presentation summarizes several main e-health issues:

- What are e-health promises and what e-Health offers today? Practical examples of systems, devices, smart solutions are presented answering the questions: Show me what? Where? How? And supporting the movement towards citizens centered healthcare are listed.
- How e-Health support optimization of patents’ care? Optimizing healthcare as: access to services; increased available types of services; timely and controlled care; cost effectiveness and investment return, etc., are outlined.

- Who are the key international e-health players? The importance of improved and continuous cooperation and coordination is emphasized.
- Finally, attention is focused on the necessity always to be aware about what is globally going on trough international networking initiatives! Two leading initiatives are presented:
  - The International Society for Telemedicine and e-Health (ISfTeH) (www.isft.net), a not-for profit organization, international representative body of national and international Telemedicine and e-Health organizations, dedicated to broadly promoting telemedicine, telecare, telehealth, e-Health around the world. ISfTeH supports the start up of National Associations or Societies and facilitates their international contacts; disseminates knowledge, information and experience and provides access to recognized e-Health experts.
  - Med-e-Tel (The International e-Health, Telemedicine and Health ICT Forum for Education, Networking and Business, http://www.medetel.eu), a highly specialized event bringing together suppliers of equipments, service providers, buyers, healthcare professionals, scientists, decision and policy makers from all over the world, a forum where state-of-the-art products, ideas, projects are presented and discussed, a nesting place for new cooperation and partnerships.

From Nanotechnology to Clinical Applications: The Future of Telemedicine

Georgi Graschew, PhD
Surgical Research Unit OP 2000, Max-Delbrueck-Center for Molecular Medicine and Charité, University Medicine, Berlin, Germany

During the last several years, numerous different telemedicine projects, aiming to bridge the digital divide in healthcare area, have shown the need for further integration of different telemedical systems. Therefore, the creation of a Virtual Hospital (VH) is proposed that aims at accelerating the integration of the various telemedical services and technological platforms developed by different organizations at different sites. The methodologies for the VH are medical-needs-driven instead of technology-driven. Through the integration of different telemedical solutions in one platform many medical services can be supported and isolated "island"-solutions are avoided. The technologies of the VH, like satellite and terrestrial links, Grid technologies, etc., will be implemented as a transparent layer, so that the various user groups can use the services such as expert advice, e-learning, etc. without knowledge of the technological details and constraints

Modules for miniaturization, computerization and molecularization of medicine are proposed and should be integrated into Virtual Hospitals. Classically in medicine only disease symptoms could be diagnosed and treated. In future molecular diagnosis, molecular imaging and molecular therapy could enable preventive and personalized medicine.

Molecular imaging combines modern methods of molecular and cell biology with recent technologies for non-invasive imaging. For this endogenous and exogenous molecules and drugs are used as contrasting agent. Imaging of processes in live environment on cellular and molecular level is an important step in understanding of the relevant physiological and patho-physiological processes and for the improvement of tumour diagnosis and therapy. Examples of molecular imaging are the development of instruments for multimodal imaging, detection of multi-photon fluorescence and imaging of nanoparticles in live biological environments.

Induced by advances in biology, medicine and engineering an increasing number of patient-related vital data are available for the medical doctor. This constantly increasing supply of data and information make the use of innovative information technology necessary.

Telemedicine in Chronic Diseases and Diabetes

Steinar Pederson, MD
Norwegian Centre for Telemedicine, University Hospital of Northern Norway, Tromsø, Norway

Structural changes in the healthcare system have resulted in hospitalized patients being transferred to out-patient clinics, general practitioners and home-based services at the same time as hospital beds have been changed into patient's hotel, district medical centers, and even into "My home as a hospital". To support these changes several new telemedicine services have been developed, especially in the area of chronic diseases.

Examples are diabetes, or the type 1 and type 2 diabetes. The project presented here show a combination of personal sensors measure parameters relevant for the chronic conditions. The measurements are monitored and integrated over time, and are used to monitor the lifestyle status and compare the status to the targets for the individual.

Telemedicine in private homes is the use of computer systems to monitor and control clients in the home-based caring-service. Through monitoring equipment, alarm functions, medical equipment, etc., it is possible to prolong the period a patient can safely stay at home, and thus both reduce the costs for the municipality and increase the patient's quality of life. Reduced costs may also imply that more people can receive help from home-based caring service. One application of this technology is the home-based caring-service.

Patient self-testing or self-management may provide the greatest degree of decentralization. Adding computerized decision support system (CDSS) will be useful and helpful. Patient analyses himself with his own blood using self-testing equipment. The measured INR-value will be sent directly to the thrombosis service at the hospital or primary healthcare. At the hospital or primary care, a physician at the thrombosis service with the help of CDSS can respond with a new dose.

Telemedicine in Extreme Conditions – From the Deserts of Arizona, to the Depths of Space, to the Vast Amazon Jungle

Rifat Latifi, MD, FACS[1,2,3], Mateja de Leonni Stanonik, MD, PhD[3,4], George Hadeed, MPH[1], Charles R. Doarn, MBA[3,5], and Ronald S. Weinstein, MD[2]

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The application of telemedicine in extreme, remote, and isolated conditions has become more common. There have been applications in post war countries (Kosova), extreme heat (Arizona), extreme cold (Alaska), human exploration of space, and even adventure expeditions such as the Amazon Swim Expedition (ASE). Extreme conditions can also be found in places outside of the perceived definition of the term, such as utilizing telemedicine in ambulances in most critical situations, including stroke or heart attack. Innovative programs are setting new frontiers in telemedicine pushing the envelope by conceiving testing and developing new technologies that make such lifesaving applications possible. In order to provide telemedicine in extreme conditions one needs a team of specialists, different and redundant technologies as well as the sense of adventure and ability to adapt to the new and ever changing conditions. One such example is the ASE led by Martin Strel, Guinness world record holder in ultra marathon swimming. Over 66 day, he successfully swam the entire length of the Amazon River, starting at Atalaya, Peru and ending in Belem, Brazil, at the mouth of Atlantic Ocean. Providing telemedicine support during the expedition was logical but difficult, as the expedition would have to pass through some of the most remote, dangerous, and yet beautiful yet mostly unknown territory. Telemedicine had never been reported to support such an expedition in such extreme conditions. The Amazon Virtual Medical Team (AVMT) was created to accomplish this task as well as to support the ASE. The AVMT consisted of trauma and general surgeons, infectious and tropical disease specialists, a dermatologist, vascular surgeon, ophthalmologist, exercise physiologist, psychiatrists, pathologists, and technical personnel that established satellite connectivity 24/7 for the duration of the expedition. The AVMT was led by the director, Rifat Latifi, MD, and by the team physician, Mateja de Leonni Stanonik, MD, who was on board the boat for the duration of the mission. The medical team was contacted through e-mail and telephone, live video consultation using Skype™, and store-and-forward techniques via portable satellite link. The objectives of the AVMT were to ensure safety of Martin Strel and his team, including the executive team, film makers, journalists, crew, and others guests at any given time as well as to promote telemedicine and e-health in the region. This and others examples clearly demonstrate that the application of telemedicine is possible with careful planning and organization, even in the most extreme and difficult of conditions.

Telemedicine for Home Health

Andrew R. Watson, MD, MLitt
Department of Surgery, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania

Changes in medicine are being driven by financial pressure. Payers are looking for ways to reduce the cost of providing healthcare. Healthcare providers are developing new ways to facilitate the transition to home and to reduce readmissions that will not be reimbursed. Chronic diseases represent 75% of healthcare dollar expenditure and 70% of deaths. Chronic diseases result in costly and frequent readmissions. Telemedicine is enabling monitoring of patients at home. A medical device library is being created by industry that includes technology to monitor patient information such as vital signs, pills taken, and blood glucose levels. A wireless aggregating device transmits this data to a healthcare facility which both monitors and processes this data. Providers react to and store the data as part of the patient's healthcare record. This process enables healthcare decision-making at home that may prevent readmissions and unrecognized progression of chronic diseases.

Major technical limitations to telemedicine in home care remain. Broadband communication and a coherent medical device library pose significant problems for industry. Likewise, rules-based algorithms are necessary to prioritize and filter information to prevent inundation of raw data to the physician.

Well designed, robust home care monitoring via telemedicine coupled with tertiary care center support leads to significant changes in the pattern of a chronic disease such as congestive heart failure. Such successes need to be translated to other chronic diseases and discharged patients. Financial modeling showing less readmissions will be necessary to justify up-front capital costs to establish homecare networks.

Teleradiology and Telepathology

Elizabeth A. Krupinski, PhD
Department of Radiology, Arizona Health Sciences Center, Tucson, Arizona

Teleradiology and telepathology are the most mature clinical applications in telemedicine today. In many ways these applications guided the development and technology used in many telemedicine applications being used today. These applications have been particularly successful in telemedicine not only because of the technology but because they have been readily reimbursable – creating the foundation for many telemedicine programs to build upon. This talk will review some of the basic technological aspects being used in both of these applications as well as the more clinical aspects using the Arizona Telemedicine Program's activities as an example. To date this program has completed over 850,000 teleradiology consultations and over 4,000 telepathology consultations. In particular, the application area will focus on a unique bundling of telemedicine applications to provide breast care to patients, starting with telemammography for detection and diagnosis, telepathology for biopsy confirmation of disease, and finally teleoncology for initiating the treatment and care process. The goal of this advanced use of technologies for breast care is to reduce significantly the time it takes to treat women with breast cancer, as well as those without, in order to improve outcomes and reduce the psychological and emotional trauma often incurred with long waiting times for appointments and results.

The Business Aspects of Telemedicine and e-Health

Gail Barker, PhD
Administration and Finance, Arizona Telemedicine Program, Phoenix, Arizona

In developing a sustainable telemedicine program, basic business principles must be considered. Understanding why a telemedicine program is being initiated and how it fits into the mission of an organization are the first steps in analyzing the business aspects of any new program or initiative, including telemedicine. Potential revenue sources must be reviewed; these include contracts and grants, organizational support, philanthropy, patient collections and user fees. Each of these funding sources has their own set of challenges so expense reductions, improved access to services, user convenience, expanded network use and/or a perceived added value are also reasons to initiate a telemedicine program. Reviewing the types of expenses both fixed and variable, one time and recurring, direct and indirect, at all sites, help organizations determine how the program will sustain itself over time. Finally, reviewing some of the strategies used and lessons learned from successful telemedicine programs can help a new program avoid costly mistakes.

Strategies for the Institutionalizing and for the Achievement of Sustainability of Telemedicine Programs

Ronald S. Weinstein, MD, FCAP[1,2], Rifat Latifi, MD, FACS[1,2], Elizabeth A. Krupinski, PhD[1,2], Ana Maria Lopez, MD, MPH[1,2], and Gail Barker, PhD[1,2]
[1]Arizona Telemedicine Program and [2]University of Arizona College of Medicine, Tucson and Phoenix, Arizona

Telehealth programs are complex and challenging to manage. Relatively few organizations have developed sustainable, multi-organization, multi-specialty telemedicine programs although many organizations have contemplated creating such entities. There are a number of barriers to the development of sustainable telemedicine and telehealth programs. First, relatively few organizations have the employees with the full set of skills needed to create and manage a multi-specialty telemedicine program. Telemedicine programs housed within a single healthcare delivery system have advantages over multi-organization telemedicine programs. Developing a shared vision among multiple organizations is a daunting task, especially when some of the organizations are otherwise competitors in the market place. Developing shared visions is complex process but is essential for long term success. Staffing requirements of telemedicine and telehealth programs may be met by sharing existent resources, hiring additional personnel, and or outsourcing activities. Business models, such as the Application Service Provider (ASP) model created by the Arizona Telemedicine Program, are designed to provide staffing flexibility by offering a combination of in-house and out-sourced services, depending on the needs of the individual participating healthcare organizations. The planning process should include goal setting and the periodic updating of the program's vision and mission statements. There can be additional special issues for multi-organization telemedicine and telehealth programs. For example, authority management within a multi-organization system will generally require the use of innovative approaches customized to the needs of the consortium. Inter-institutional relations, external to the telemedicine program, may introduce additional issues when competing healthcare organizations are utilizing shared resources. Branding issues are preferably addressed during the initial planning of a multi-organization telemedicine and telehealth program. Ideally, public policy regarding telemedicine and telehealth will be consistent with the promotion and implementation of a new telemedicine program. A cornerstone for building a new telemedicine program is careful planning and then ongoing assessment of the program on a regular basis.

Development of Telemedicine Network and Activities in the Region: The Do's and Don'ts When Establishing Telemedicine Programs

Rifat Latifi, MD, FACS[1,2,3], Ismet Lecaj, MD[2,3], Flamur Bekteshi[2,3], Kadri Haxhihamza, MD[2,4], Mateja de Leonni Stanonik, MD, PhD[3,5], Erion Dasho, MD, MPH[6], Svetlana Stojanovic, Ing. Dipl[7], Charles R. Doarn, MBA[3,8]
[1]University of Arizona, Tucson, Arizona; [2]Telemedicine Program of Kosova, Prishtina, Kosova; [3]International Virtual e-Hospital, Anchorage, Alaska; [4]Psychiatry Clinic, University of Skopje, Macedonia; [5]George Washington University, Washington DC; [6]University Clinical Center "Mother Teresa", Tirana, Albania; [7]Ministry of Health of Montenegro; and [8]Center for Surgical Innovation, Department of Surgery, University of Cincinnati, Cincinnati, Ohio

Serious telemedicine and e-health activities in the Balkans started with the creation of the Telemedicine Program of Kosova in 2002. Since then, this program has become a model for many developing countries around the word, and a catalyst for modernization of medical systems, particularly in countries coming out of war and other disasters. Experience in Kosova and other countries has demonstrated that investment in good telecommunications and electronic information technology between regional hospitals and the hub hospital which can ultimately improve the quality of care offered at regional hospitals significantly without high levels of continuous investment and without highly specialized medical staff in the regions. In addition to telemedicine for clinical services, e-health can improve the exchange of information, improving the administration of medical records. Finally electronic libraries can improve continuing medical education by providing access to the latest publications in medicine. The new initiative of International Virtual e-Hospital (IVeH) Foundation in collaborations with political and medical leadership of the region is to create a region-wide telemedicine and e-health network that will bring together healthcare providers and medical educators of countries in the region in order to establish standards of care and maintain scientific knowledge in the region. This network will, without doubt, bring people and countries in the region closer to each other as they develop a true partnership in caring for sick and injured and share medical knowledge. Lessons learned during the establishment of telemedicine in the Balkans have become tools in establishing telemedicine and e-health programs in other developing countries. What we have learned is not only what to do, but what not to do. Using techniques of initiate, build,

operate, and transfer, the IVEH continues to establish telemedicine and e-health programs in the region and beyond that comprise of four important elements: 1) Establishment of telemedicine and e-health infrastructure, network and communications; 2) Education programs and creation of human capacities to ensure sustainability; 3) Electronic library network and contents; and 4) Policies and procedures on regional and international collaborations and exchange. Each of these phases is an integral element of the overall process of establishing telemedicine and e-health programs.

Appendix D

Presentations

Telemedicine and E-health in Modern Medical Practice: Arizona Telemedicine Program As a Model

Rifat Latifi, MD, FACS
Professor of Clinical Surgery
Vice Chairman, International Relations
Department of Surgery, University of Arizona, Tucson, AZ
Associate Director of Arizona Telemedicine Program,
Telesurgery and International Affairs
President, International Virtual e-Hospital Foundation
Director, Telemedicine Program of Kosova

Telemedicine and E-health in Modern Medical Practice: Arizona Telemedicine Program As a Model

Ronald Weinstein, MD[1,2], Ana Maria Lopez, MD[1,2], Gail Barker, PhD[1,2], and Charles R. Doarn, MBA[3,4]

[1]University of Arizona, [2]Arizona Telemedicine Program, Tucson, Arizona; [3]Center for Surgical Innovation, Department of Surgery, University of Cincinnati, Cincinnati, Ohio; and [4]International Virtual e-Hospital Foundation, Anchorage, Alaska

Third Balkan Telemedicine Seminar

- To develop champions amongst health care workers that will carry this process and will make telemedicine and technologies an integral part of our practice, dreams and goals serving the injured and sick patients and improving the education process

The IVEH Mission

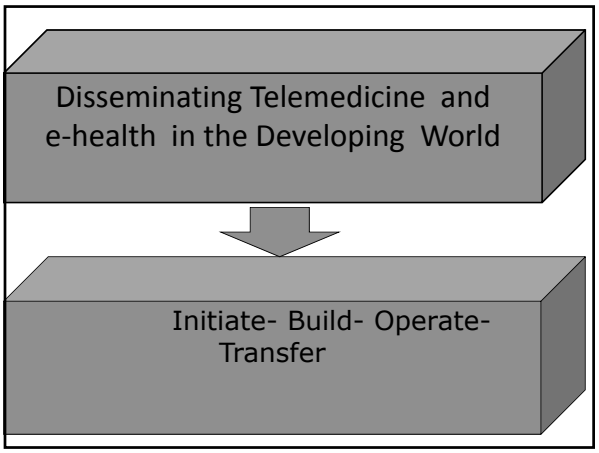
Creation and establishment of self-sustainable telemedicine and e-health programs around the world and to rebuild medical systems in the developing world, using telemedicine, advanced technologies, and cultural exchanges and collaboration as a platform.

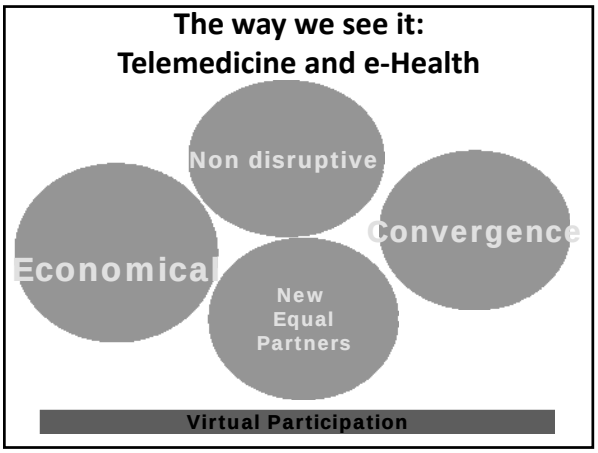
Our Goal

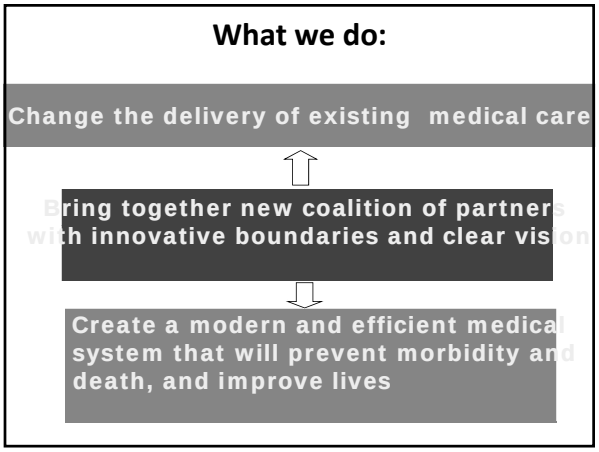
Training and education of healthcare providers of developing countries in the use, adoption, practice, and implementation of telemedicine, e-health and electronic libraries in order to narrow the gap created by the digital divide and healthcare imbalance.

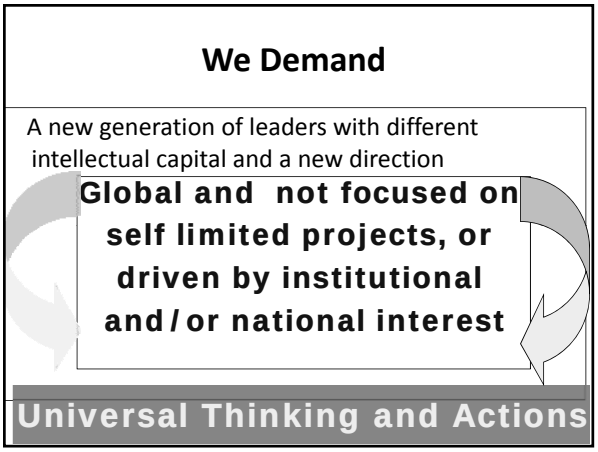
How we are doing it?: (Building Blocks)

- Establishment of Telemedicine and e-health infrastructure, network and communications
- Education programs and creation of human capacities to ensure sustainability
- Electronic library network and contents
- Regional and International collaborations and cultural exchange









We Create
New Healthcare Leadership

- Multi-dimensional
- Have a passion to change the world
- Not afraid to disturb the status quo
- Willing to share the knowledge among nations and the world
- View technology as the enabler of change, but not a sole answer itself

What strive to:

- Promote integration of inter-disciplinary health care strategies
- Address the inequalities and digital divide of health care world wide
- Encourage cooperation between nations
- Create higher standards and demands better care for all
- Encourage and demand evidence based medical practice

Telemedicine: Historical notes

Telemedicine: Historical notes

- **1900 - telephone was introduced**
- 1914 – WWI radio communications
- 1920 – Haukeland Hospital in Norway uses radio links with ships
- 1924 – Radio News prediction
- 1929 – Television introduced

Historical notes

- 1900 - telephone was introduced
- **1914 – WWI radio communications**
- 1920 – Haukeland Hospital in Norway uses radio links with ships
- 1924 – Radio News prediction
- 1929 – Television introduced

Historical notes

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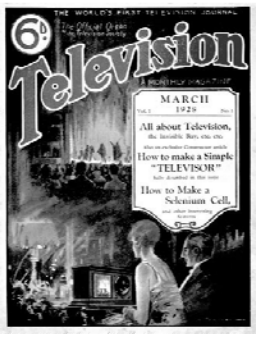
- 1924 – Radio News prediction
- 1929 – Television introduced

Historical notes

- 1900 - telephone was introduced
- 1914 – WWI radio communications
- 1920 – Haukeland Hospital in Norway uses radio links with ships
- **1924 – Radio News prediction**
- 1929 – Television introduced

Historical notes

- 1900 - telephone was introduced
- 1914 – WWI radio communications
- 1920 – Haukeland Hospital in Norway uses radio links with ships
- 1924 – Radio News prediction
- **1929 – Television introduced**



Telemedicine Notes

- 1955 - Nebraska Psychiatric Institute began using closed circuit television
- 1964 - Institute connected with another hospital and Telemedicine was born

Historical Notes

- In 1967 the Massachusetts General Hospital established a microwave connection with Logan Airport and began medical consultation for travelers

Historical Notes

- Monitoring the status of cosmonauts and astronauts required telemetry
- The first traveler was Yuri Gagarin in 1961 and his vital signs reported by the new technology of telemetry

Historical Notes

- From 1972 to 1975 NASA supported a demonstration project in Arizona called Space Technology Applied to Rural Papago Advanced Health Care (STARPAHC) using microwave transmission connecting a mobile health unit to a public health hospital for consultations

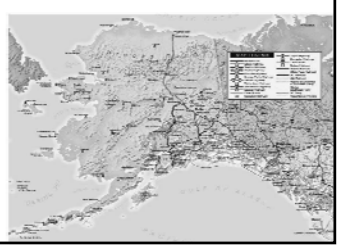
Telemedicine Notes

- In 1974 NASA established the basic requirements for video quality declaring acceptable 200 lines or a rate of 10 frames per second the minimal configuration
- Today: **1 M frames per second High-speed Video Camera and its application**

  (Journal of Imaging Society of Japan 2005)

Historical Notes

- The ALASKA ATS-6 program in 1971 linked 26 sites in Alaska by satellite for the purpose of medical support.



Telemedicine Notes

Earthquakes and other disasters...

Telemedicine for trauma…

Friendship Airport Disaster Exercise 1978

Purpose- Dr. R. Adams Cowley

- Implement Regional Disaster Plan
- Test Actual EMS Response
- Enact Coordinated Triage to Multiple Facilities
- Determine Feasibility of On-Scene Image Transmission and its Role in Triage and Transport

Friendship Airport Disaster Exercise

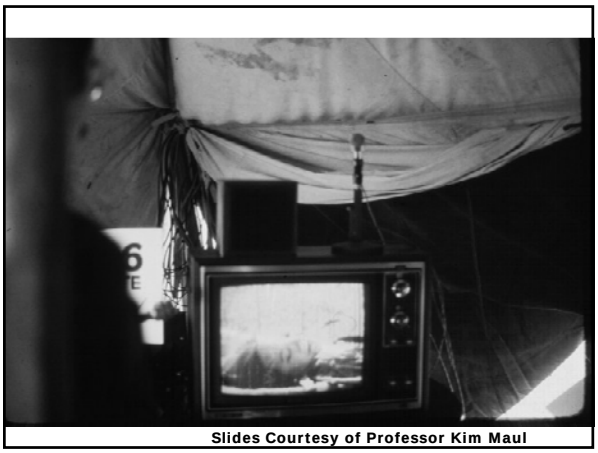
Exercise Conditions

- Simulated Airplane Crash
- 72 Casualties
- Activation of Regional Disaster Plan
- On-Scene Command Station
- Triage/Transport

Slides Courtesy of Professor Kim Maul

DC-6 DISASTER...

Slides Courtesy of Professor Kim Maul



Slides Courtesy of Professor Kim Maul

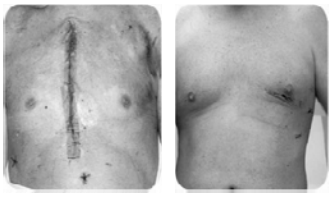
Transoceanic cholecystectomy: operation Lindbergh

- A laparoscopic cholecystectomy performed from New York in Strasbourg, France Sep 9, 2001
- Conclusion: Distance is meaningless

Prof. Marescau at work

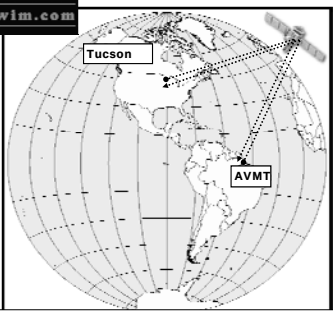
Robotic Surgery

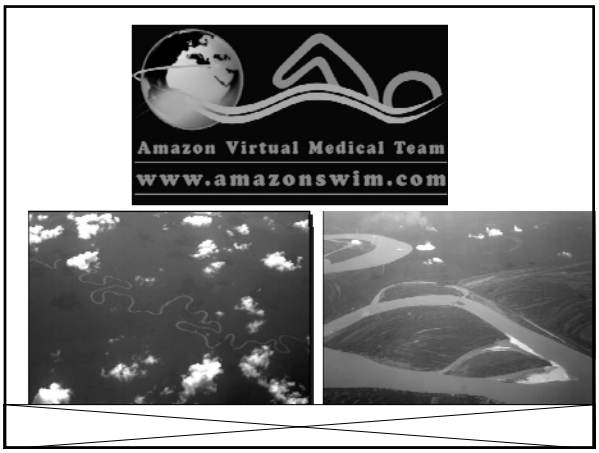
- Accomplishment- there were not possible before
- Dexterity enhanced
- Computer assisted
- Image guided



Amazon Virtual Medical Team
www.amazonswim.com

Amazonswim Telemedicine Expedition 2007





With all these results…

Medicine did not follow other industries

- Other industries have harnessed advanced information technologies, to the benefit of consumers
- Air travel system
- Banking system

New Medicine With Old Tools

- Medicine still operates primarily with paper based records.
- We doctors and nurses have to manage 21st century medical technology and complex medical information with 19th century tools.
- Medical professionals are the best and brightest in the world, and we need to set the standard for the world.
- It is a testament to our skills that we are able to achieve high-quality care in this antiquated system.

The Solution:

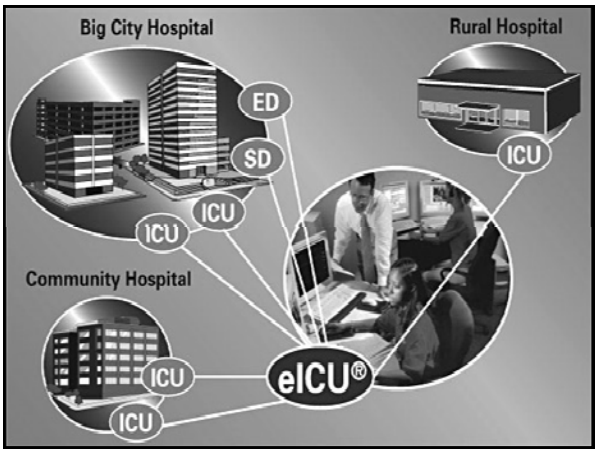
Health Information Technology

Health information technologies

- Electronic medical records, computerized ordering of prescriptions and other medical tests, clinical decision support tools, and secure exchange of authorized information – improve quality, reduce medical errors, and prevent deaths.

One Dramatic Example:

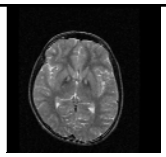
- **Virtual Intensive Care Unit (VISICU)**
- *One Intensivist Cares For Many Intensive Care Units*
- *Reduced Mortality*
- *Increased Productivity*
- *Evidence Based Medicine Practice*



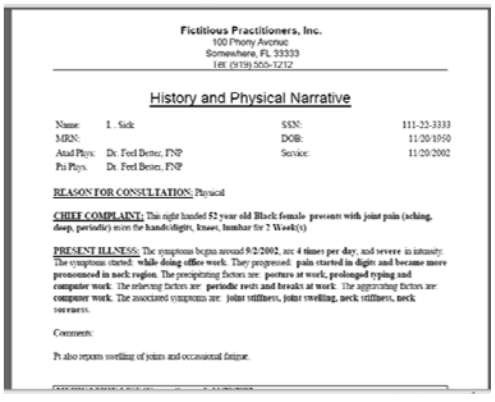
Other Examples

- New patient do not have to enter their personal information, allergies, medications, or medical history, since it is already available.
- A parent, who previously had to carry the child's medical records and x-rays in a large box when seeing a new physician, can now keep the most important medical history on a keychain, or simply authorize the new physician to retrieve the information electronically from previous health care providers.

Great examples



- Teleradiology
- Laboratory
- Telepharmacy



Fictitious Practitioners, Inc.
100 Phony Avenue
Somewhere, FL 33333
tel: (919) 500-1212

History and Physical Narrative

Name:	I. Sick	SSN:	111-22-3333
MRN:		DOB:	11/20/1950
Attnd Phys:	Dr. Feel Better, FNP	Service:	11/20/2002
Pri Phys:	Dr. Feel Better, FNP		

REASON FOR CONSULTATION: Physical

CHIEF COMPLAINT: This right handed 52 year old Black female presents with joint pain (aching, deep, periodic) in/on the hands/digits, knees, lumbar for 2 Week(s)

PRESENT ILLNESS: The symptoms began around 9/2/2002, are 4 times per day, and severe in intensity. The symptoms started while doing office work. They progressed. pain started in digits and became more pronounced in neck region. The precipitating factors are: posture at work, prolonged typing and computer work. The relieving factors are: periodic rests and breaks at work. The aggravating factors are: computer work. The associated symptoms are: joint stiffness, joint swelling, neck stiffness, neck soreness.

Comments:

Pt also reports swelling of joints and occasional fatigue.

Other Examples

- Arriving at an emergency room, a senior with a chronic illness and memory difficulties authorizes her physicians to access her medical information from a recent hospitalization at another hospital - thus avoiding a potentially fatal drug interaction between the planned treatment and the patient's current medications.
- Three patients with unusual sudden-onset fever and cough that would not individually be reported, show up at separate emergency rooms, and the trend is instantly reported to public health officials, who alert authorities of a possible disease outbreak or bioterror attack.

But There Is a Requirement

Broadband With
High-speed Internet

Broadband Internet for Every One

- Promoting Innovation and Economic Security through Broadband Technology
- Making broadband access tax-free will lower the cost to consumers
- Working to enable the rollout of new broadband technologies.
- The Federal Government must do its part to remove hurdles that slow the deployment of broadband.

Broadband with high-speed Internet

- Improve the Nation's economic productivity and offer life-enhancing applications, such as distance learning, remote medical diagnostics, and the ability to work from home more effectively
- Broadband technology will enhance our Nation's economic competitiveness and will help improve education and health care for all Americans

Important Facts about Broadband:

- Broadband is high-speed Internet access.
- Broadband in the United States is "always-on," allowing a computer to remain connected to the Internet 24 hours a day.
- Distance learning, remote medical procedures, interactive web teleconferencing, and real-time video and audio all require Internet speeds beyond what traditional dial-up service can offer

Telemedicine…

the practice of health care delivery, diagnosis, consultation and treatment and the transfer of medical data through interactive audio, video or data communications that occur in the physical presence of the patient, including audio or video communications sent to a health care provider for diagnostic or treatment consultation.

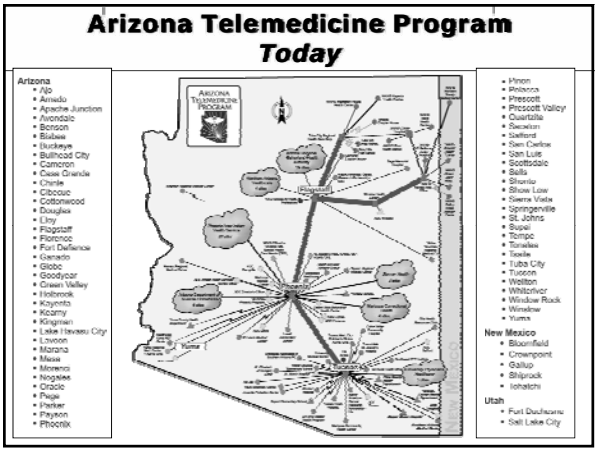
ARS 36-3601

Western Governors' Association
Telemedicine Action Report - 1995

"Western Governors are committed to improving access to and quality of health care for people living in the rural west."

Western Governors' Association
Telemedicine Action Report - 1995
Barriers

- Infrastructure Planning & Development
- Telecommunications Regulation
- Reimbursement for Telemedicine Services
- Licensure & Credentialing
- Medical Malpractice Liability
- Confidentiality



170+ Sites

- Urban & rural hospitals
- Native American healthcare
- Prisons & jails
- Community health centers
- Schools
- Distance learning affiliates
- International Sites

ARIZONA TELEMEDICINE PROGRAM

Clinical Telemedicine

Teleradiology

Over 650,000 Cases

Telepsychiatry

Teledermatology

Multi-specialty

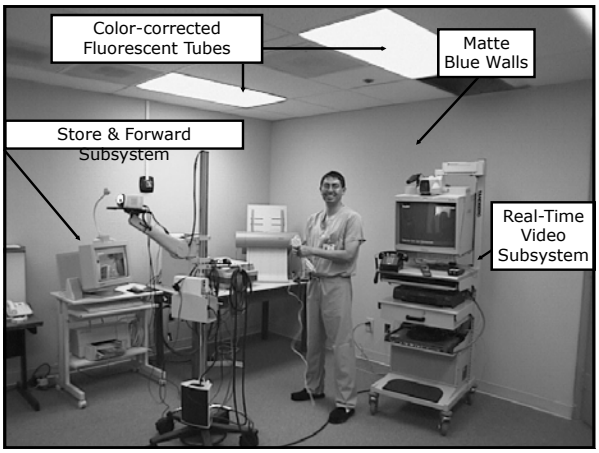
Multimedia

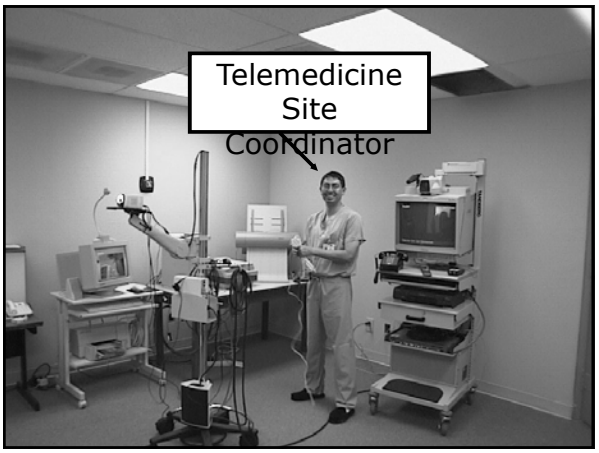
Store & Forward

Digital Cameras

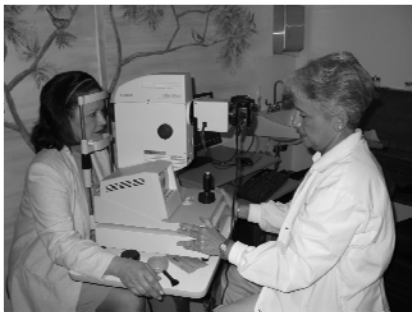
Canon PowerShot 600

Canon PowerShot S3 IS

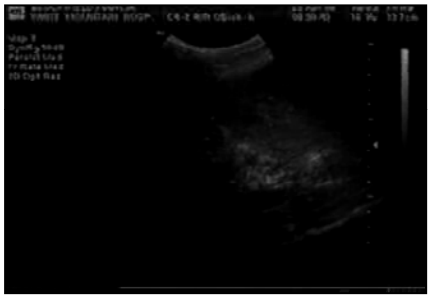


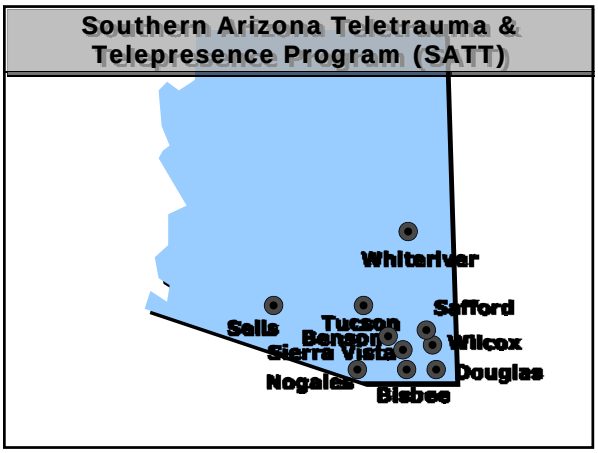


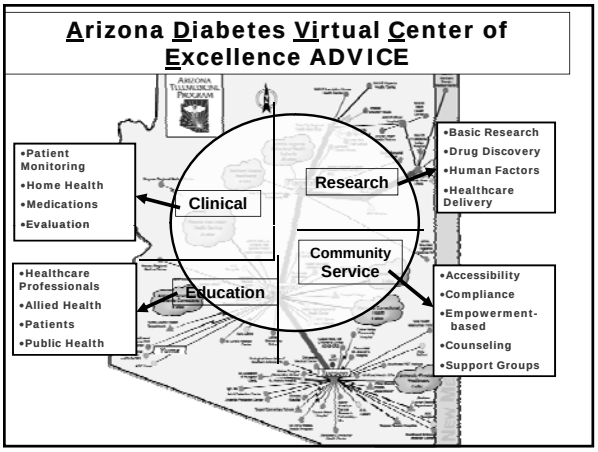
Teleophthalmology



Real-Time Fetal Ultrasound

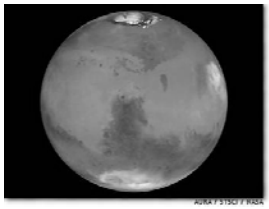




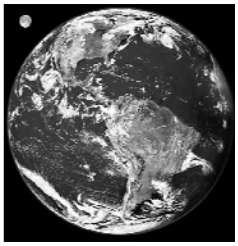


Telepodiatry

The Gap..



…between imagination and accomplishment



…has never been <u>smaller.</u>

Current Challenges…

1. Dream
2. Ambition
3. Creativity
4. Determination
5. Passion
6. Serendipity

SO WHAT WE NEED:

- A plan
- A business plan
- A team
- Funding
- Make part of the practice
- Do not do it by yourself only
- Justify it to every one that asks
- Make it all inclusive but
- You are the champion

Conclusions

- Analyze your situation
- Be critical but fair
- Find a solution
- Be visionary
- Strive to be the best in the world
- Technology is the solution
- Adopt it, spread it, help develop it

Lets Get To Work

"Never give up on a dream just because the time it will take to accomplish it. The time will pass anyway."

Summary

- E-health education has a real potential in all aspect of health education
- Establishes higher standards for medical education, CME
- Preferred choice dissemination of existing knowledge

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Third Balkan Telemedicine and e-Health Seminar

Current Principles and Practices of Telemedicine and e-Health
Clinical Applications and Evidence-Based Outcomes

February 6-7, 2009

Skopje, Republic of Macedonia

1

International Virtual e-Hospital Foundation
www.iveh.org

Requirements for Successful Telemedicine Consultation and Telemedicine Program

Charles R. Doarn, MBA
Executive Director, IVeH
Executive Director
Center for Surgical Innovation
Deputy Director
Advanced Center for Telemedicine and Surgical Innovation (US Army - Funded)
Associate Professor of Surgery and Biomedical Engineering
Department of Surgery
University of Cincinnati College of Medicine
Special Assistant to the Chief Health and Medical Officer, NASA Headquarters, Washington, DC (NASA – Funded)
Executive Director, Telehealth Video Resources Center (Ohio Board of Regents - Funded)
Administrative Director, Minimally Invasive Medical Technologies Center (NSF – Funded)
Editor-in-Chief, Telemedicine and e-Health Journal

2

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

- Unmet Need
- Leadership
- Ability
- Capability
- Financial
- Societal
- Technical
  - Devices
  - Robust/reliable Comm
- Legal
- Cultural
- PROCESS!

3

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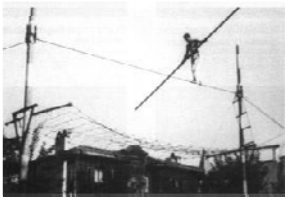
Requirements for Successful Telemedicine Consultation and Telemedicine Program

Challenges and Opportunities



4

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Stakeholders and Policy Makers

- Various branches of government
  - Executive Branch
  - Congress / Parliament
  - Agencies
  - Councils
- Departments / Ministries
- State / Provincial / Community
- Based on their need(s) and responsibilities

5

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Stakeholders and Policy Makers

- Educators
- Payors
- Patients
- Providers (all levels)
- Administrators
- You and Me

6

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Barriers

- Distance/Geography
- Financial
- Technical capabilities/ availability
- Technology
- Culture
- Language
- Policy

7

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Barriers

- Legislative
- Access
- Socioeconomic/political
- Willingness to Change
- Acceptance
- Education / Training

8

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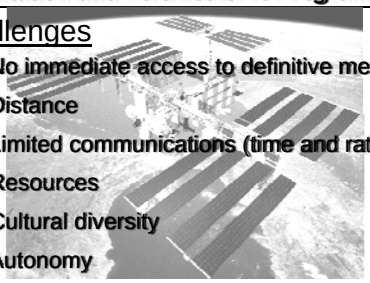
Requirements for Successful Telemedicine Consultation and Telemedicine Program

Challenges

- No immediate access to definitive medical care
- Distance
- Limited communications (time and rate)
- Resources
- Cultural diversity
- Autonomy



9

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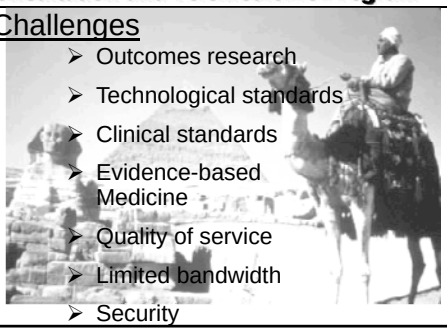
Requirements for Successful Telemedicine Consultation and Telemedicine Program

Challenges

- Outcomes research
- Technological standards
- Clinical standards
- Evidence-based Medicine
- Quality of service
- Limited bandwidth
- Security



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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Issues

- Privacy
- Confidentiality of information
- Reimbursement
- Sustainability
- Credentialing
- Liability
- Return on investment (ROI)
- Acceptance

11

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Privacy, Confidentiality, and Security

- Impact of technology
- Protection under the law
- Hippocratic Oath??

12

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Payment Policies

- Government (CMS – Socialized models)
- Fee-for-service
- Bundled payment methods
- Capitation payment
- Fears and concerns – rising costs across the board
- Teleradiology and telepathology are reimbursed

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Legal

- Legislative
- Licensing
  - Who, Where
- Reimbursement
- Clinical responsibility apportioned

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Systems Approach

- Needs and Requirements Assessment
  - Interact with leadership
  - Interact with care providers (all levels)
  - Interact with vendors – determine what is available
  - Identify your funding source

15

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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Systems Approach

- Identify a champion
- Identify and document a process
- Get everyone involved
- Keep it simple
- Identify your market
- Collect date – outcomes - is it really working and is it beneficial?

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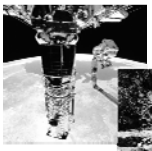
Requirements for Successful Telemedicine Consultation and Telemedicine Program

Unique Environments

- Remote
- Extreme
- Multilingual
- Multicultural
- International



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Requirements for Successful Telemedicine Consultation and Telemedicine Program

Charles R. Doarn, MBA

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18

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Current Technologies

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Current Technologies

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Current Technologies

Change!

Where is my IPOD?

Where is my cell phone?

What do you mean I need HDTV!

I only have dial up!

Everything that needs to be invented has already been invented!

Fetch the doctor!

3

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Current Technologies

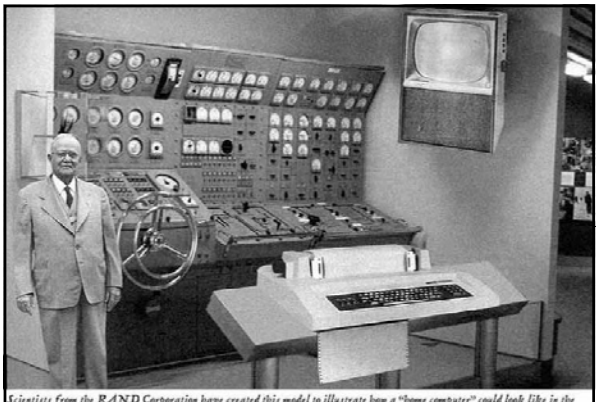
Change!

We don't believe there is a market for computers for individuals!

Internet – what is that for?

Don't forget to buy some film! – Polaroid no longer sell film!

4



Scientists from the RAND Corporation have created this model to illustrate how a "home computer" could look like in the year 2004. However the needed technology will not be economically feasible for the average home. Also the scientists readily admit that the computer will require not yet invented technology to actually work, but 50 years from now scientific progress is expected to solve these problems. With teletype interface and the Fortran language, the computer will be easy to use.

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Current Technologies

Major Change!

Monaural Stethoscope (Rene Theophile Hyacinthe Laennec – 1816)

X-ray (1895, Wilhelm Conrad Röntgen)

6

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Current Technologies

Electricity!

7

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Current Technologies

Standard Teaching Practices!

8

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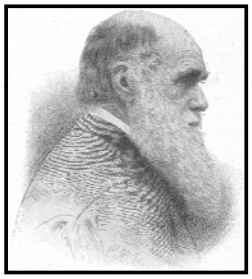
Current Technologies

"It is not the strongest who survive, nor the most intelligent, but those most responsive to change"
– Charles Darwin



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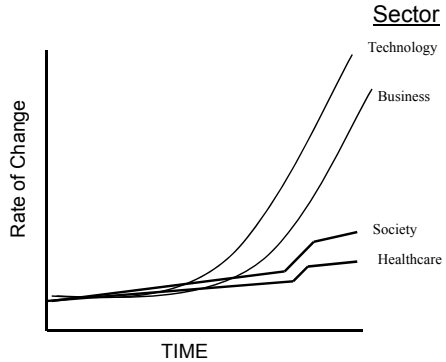
Current Technologies

Sometimes change is hard to overcome, accept, …..

11



Differing responses to scientific discovery by various sectors

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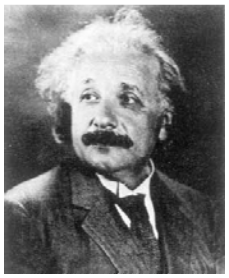
Current Technologies

"Imagination is more important than knowledge"



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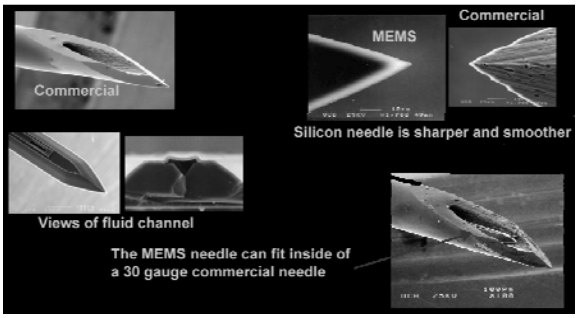
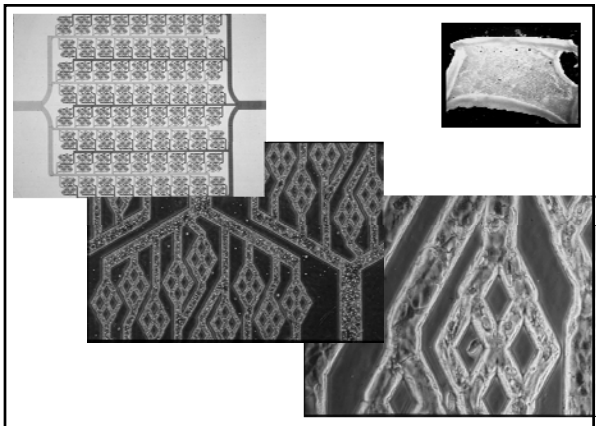
Microelectrical mechanical systems (MEMS) Needles





Courtesy of J. Vacanti, MD MGH March, 2000

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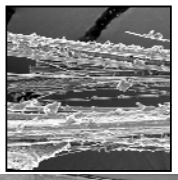
Current Technologies

Technology helps us understand more!

- Asbestos related disease
  - "Asbestos is a group of naturally occurring, heat-resistant fibrous silicates"
- Dust
  - Coal
  - Talc
  - Cigarette Smoke



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Current Technologies

Technology provides more!

- Better diagnosis (Dx)
- Better treatment (Tx)
- Better pharmaceutical (Rx)
- Better life
- Better access /distribution
- Are there issues that make this not look so good??
  - Cost
  - Privacy

17

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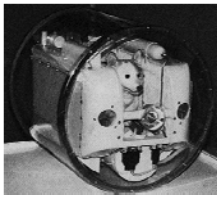
Current Technologies

Fully integrated systems – components!



Sputnik 2 – 1957
Second satellite sent into orbit

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Current Technologies

Magnetic anastamosis

20

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Current Technologies

Virtual Reality and Simulation

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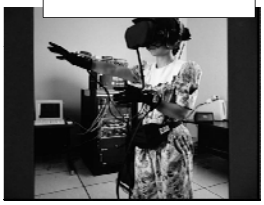
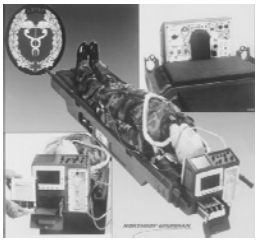
Current Technologies

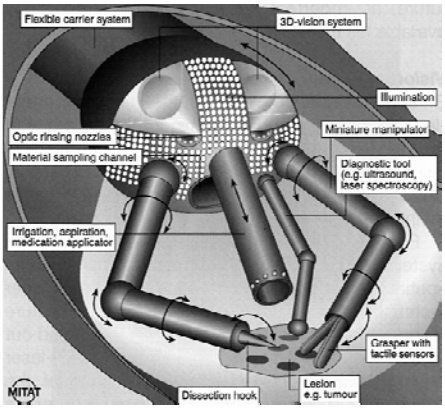
Virtual Reality





Trauma Pod

22



International

The Operating Room of the Future

Projected presence and robotic assistance

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Current Technologies

VTC

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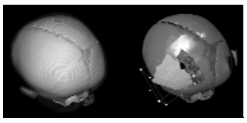
Sensors and Interfaces

Virtual Reality

Miniature Monitors



Biocomputation

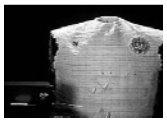
Wireless Monitoring

Sensors and Interfaces

Portable Devices

Noninvasive Monitoring

Displays



Smart Materials – Wearable Computers

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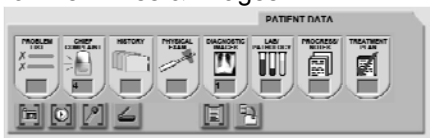
Current Technologies

Add or View Files & Images



- Pick and File Images & Data Files
- Categorize Files
- Capture Screen Images
- Capture / Play Image Clips
- Capture / Play Audio Files
- Scan and File Documents

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Current Technologies

ViTel Net's Image Tools

- Leveling
- Measure Line
- Measure Angle
- Measure Area
- Annotate Text
- Annotate Voice
- Magnification
- Mouse Zoom
- Rectangle Zoom
- Rotate – Flip
- Print & Save Image

32

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Current Technologies

ViTel Net's Video Conferencing

- Initiate Video Conference
- Capture Video Images
- Control Local Camera
- Control Remote Camera
- Real-Time Vital Signs
- Capture Vital Signs
- Picture-in-Picture

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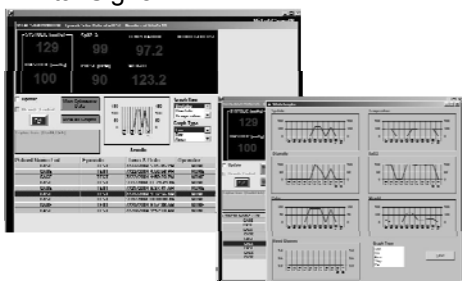
Current Technologies

Review Vital Signs



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Current Technologies

The success of e-Health depends on teamwork between all actors involved, between all of us!

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Current Technologies

Charles R. Doarn, MBA

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36

UPMC

Telementoring in Surgery

Andrew R. Watson, MD, MLitt
Skopje, Macedonia
Department of Surgery
Center for Telehealth
February 6-7, 2009
UNIVERSITY OF PITTSBURGH MEDICAL CENTER

Telementoring

- Mentoring other surgeons remotely
- Using real-time data, 2-way video communication
  - real-time assistance with patient-care
- Example: MVA 100 miles away, in a storm, transport is 2 hours by ground, helicopters grounded - GCS 8, hypotensive, being transfused
- Physician recruitment / retention

Telementoring

- Process not established in surgery
- Not widely accepted nor published (nor supported)
- POC exists: Maritime industry, airline industry, legal industry
  - assistance with complicated, challenging, or potentially life-threatening situations
- And surgeons don't do this because?

Why do this in surgery?

- Field of surgery is challenged
  - work hour restrictions - training limited
  - increased specialization (less comfort outside your area)
  - rural / under-served areas - physician shortage
- Physician recruitment becoming a challenge
- Legal implications of errors
- Outcomes studies / public awareness
- ED coverage for sub-specialties an expense for hospitals

Why do this in trauma?

- Acuity of decision making
  - ATLS - protocol driven, rapid progression of decision making, certification
- Traumas are not concentrated in an area
- Transfer of trauma - time of highest risk, if possible at all
- Expense of transfer / effect of transfer on local hospital
- Complexity of decision-making with multi-system

Why do this in trauma?

- An avoidable adverse outcome in a trauma bay or trauma OR
  - higher cost of care
  - increased length of stay
  - medical-legal exposure
  - post-surgical complications
  - patient, physician, hospital all "suffer"
- How much will physician ratings be a factor??

Telementoring Examples

- Urology
- Neurosurgery - endo-nasal surgery (UPMC)
- Remote robotic surgery
- Laparoscopic rooms are limited versions of this

UPMC 7

Supporting Technology

- Trauma bay
- Operating room
- Clinic
- ICU





UPMC 8

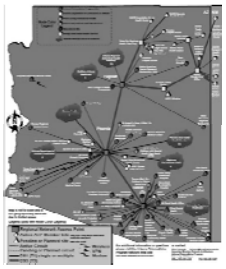
Telestration

- draw on one screen - seen on other remote screens
- instantaneous (low latency)
- low bandwidth
- must be easy to use
- critical for telementoring - especially in OR

UPMC 9

Internet Connectivity

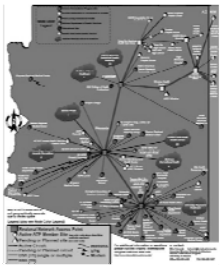
- Internal backbone
  - UPMC ALU
  - video transport
  - QoS
  - firewall / NAT
- WAN / "internet"
- Remote site bandwidth
- HIPAA


Arizona Telemedicine Network

UPMC 10

Technical Outcome Metrics

- Jitter
- Pixelation
- Ease of connection
- Loss of connection
- Latency
  - 250 milliseconds


Arizona Telemedicine Network

UPMC 11

Data Sent to Mentor - Real Time

- medical device library
  - vital signs
  - stethoscope
- real time data
  - CT / US (FAST) / PACS
  - EMR
  - medication
  - labs
- decision support / real-time

UPMC 12

Example

- GSW, rural hospital, patient unstable
- transport by EMS
  - local ED contacts tertiary center hospital
  - video-teleconference to trauma bay started
  - remote surgeon (mentor) starts discussion with local surgeon
- patient arrives
  - remote surgeon watched vital signs, x-rays, communicates with local surgeon - guides resuscitation

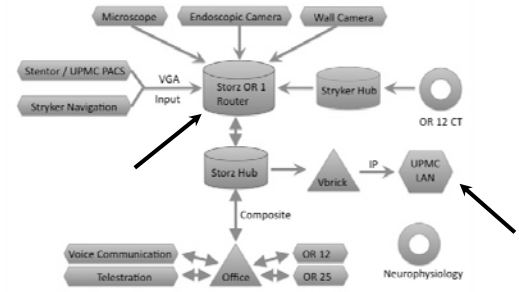
Example

- patient goes to operating room
  - remote surgeon then connects to operating room
  - has 2-way live teleconferencing
  - can see view of overhead light camera
  - guides local surgeon through damage control operation
- patient in ICU
  - 2 surgeons communicate via teleconferencing
  - remote surgeon re-examines patient
  - patient is transferred to tertiary hospital

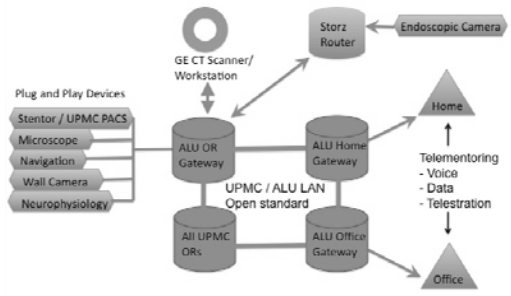
Operating Rooms - laparoscopy

- laparoscopic vendors are trending to a “closed” OR solution
  - not scalable, not integrated
  - expensive to maintain
  - little real integration beyond their own ORs
  - limited feature set
- good for limited use, not adequate for telementoring

UPMC OR Example



Data Sent to Mentor - Real Time



Benefits from Telementoring

- Length of stay
- Quality and cost of healthcare
- Comfort of rural physicians in stabilizing and managing complex care
- Patient preference is to stay local
- Cost of transferring patients (especially sick)
- Medical legal ramifications
- Benefit to local hospital to keep patients

Implications of Telementoring

- Right for the patients -- right for the doctors
- Augment / bridge surgical eduction
- You can rely upon help when you need it
- Physician recruitment / retention
- Up-front investment / enterprise business case

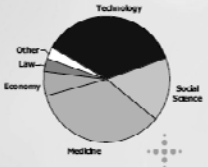
NST | Nasjonalt senter for telemedisin
UNIVERSITETSSYKEHUSET NORD-NORGE
WHO Collaborating Centre for Telemedicine

Telemedicine and Research Aspect: Need for Continuous Improvement

Steinar Pedersen

Norwegian Centre for Telemedicine

- Established i 1992
- Centre of expertise in telemedicine
- Research & Development
- WHO collaborating centre
- Centre for research-based innovation



My allegation I

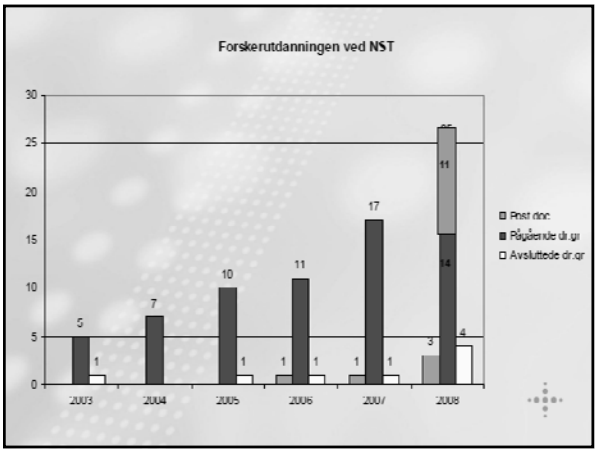
- Telemedicine is not a new way of treating diseases
- Telemedicine is new way of sharing medical information

My allegation II

- The traditional, well-known scientifically methodology in medicine are not always transferable to telemedicine
  - Evidenced based
  - Randomized controlled trials
  - Double blind/cross over
  - Significance

My allegation III

- Most of the improvements in our everyday life based upon ICT would not have taken place if scientific methodology should have been applied
  - Internet
  - E-mail
  - SMS

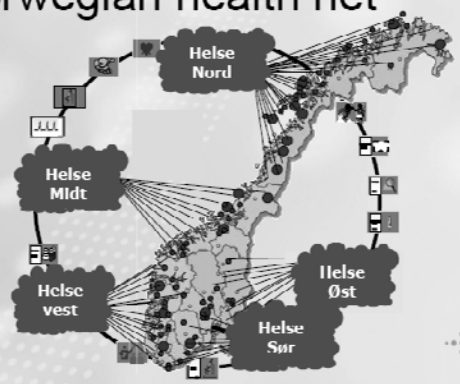


EU-projects

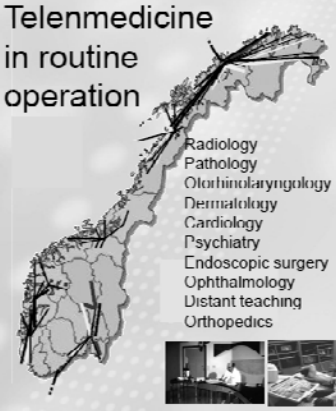
Prosjektnavn	Koordinator	Prosjekttype	NST s rolle	Budsjett(totalt/NST
eHealth Trends	NST	FP5	Koordinator	EUR 205 161 (125 096 finansiert)
Cogknow	Telefonica , Spania	STREP/FP6	FoU (evaluering)	EUR 1,9 mill/ 89 000 (100% finansiering)
Baltic eHealth	MedCom, DK	Interreg IIID	FoU/jus, økonomi	EUR 125 333
Sustainable Health	Utviklingssenteret Finnsnes	Interreg IIID	utredning	EUR 99 880
Medical Peace Work	SIH, Ute/Unn	Leonardo daVinci	fjernundervisning	EUR 33 456 (16 607 finansiert)
Better Breathing	MedCom, DK	eTen	Field trial (Min helsestasjon)	EUR 1.899.000/267.000 (50%/ 120.574 finans.)
Persona	Vodafone Omnitel	IP	FoU	EUR 11.629.000/ ??(50% finansiering)
R-Bay	MedCom, DK	eTen	Utredning jus	EUR 1.899.000/146.000 (50% finansiering)

- Today
- Trends
- The future

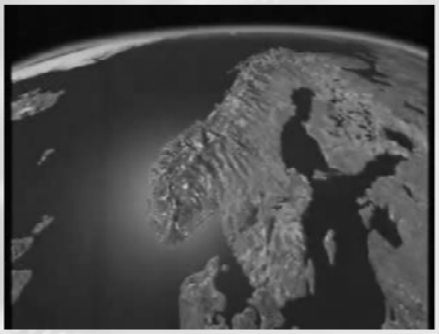
Norwegian health net



Telenmedicine in routine operation



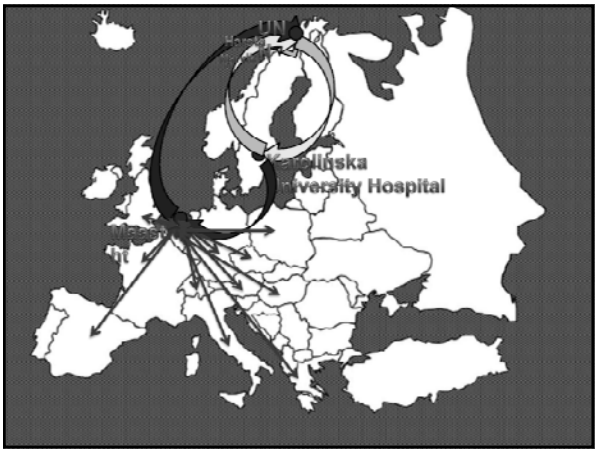
Radiology
Pathology
Otorhinolaryngology
Dermatology
Cardiology
Psychiatry
Endoscopic surgery
Ophthalmology
Distant teaching
Orthopedics



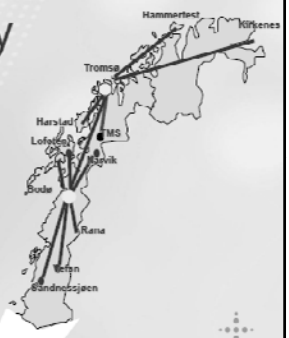
Born with broadband

Patient and midwife


Videokonferanseskjerm
Laparoskopiskjerm



Teleradiology

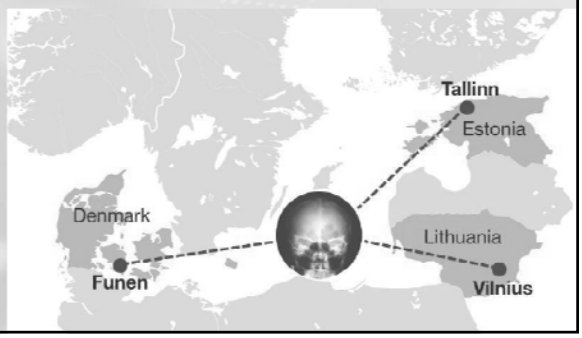


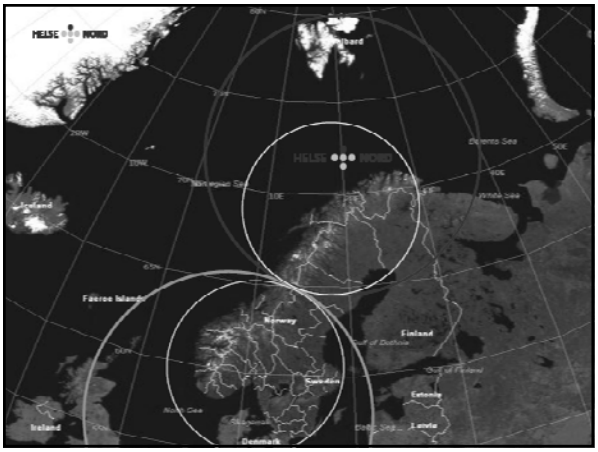
xRay results

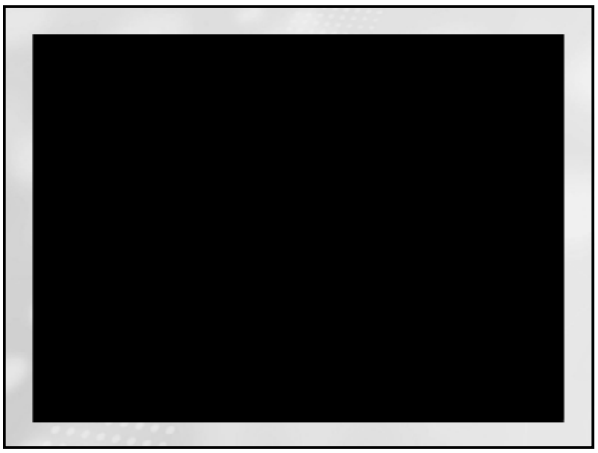
- 1999, 99 neurosurgical patients
  - 93 % of the patients improved their treatment because of teleradiology
    - 34 % avoided transportation
    - 42 % had major changes in their treatment locally
    - 13 % had transportation initiated
- Since 1999 the numbers of consultations have increased by 10

eRadiology - Rbay

Baltic eHealth







www.helsekompetanse.no
A learning gateway

•Compiles all information and offers within net based health education in Norway

http://www.helsekompetanse.no

Educating norwegian medical students abroad

- 100 medical students in:
  UK
- Ireland
- Germany
- Malta
- Australia
- Poland
- Hungary, Denmark
- Netherland, Brasil and Balticum

Nasjonalt tilbud

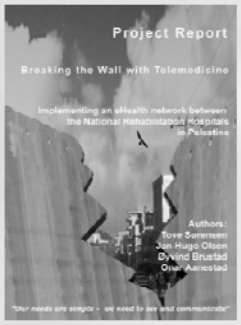
120 temaforelesninger - vår 2006

- Eldreomsorg
- Ergoterapi
- Ernæringsfysiologi
- Fysioterapi
- Psykiatri
- Spiseforstyrrelser
- Sykepleie
- Læring og mestring
- Dialyse
- Psykososialt team for flyktninger etc.

Koordinering, opplæring, teknisk og pedagogisk tilrettelegging

Palestine project

- Establish a Palestinian health network between hospitals in
  - Jerusalem
  - Ramallah
  - Bethlehem
  - Gaza City
- Rehabilitation



- Radiology, EPJ and communication, Distant teaching
- Teledialysis, Prehospital thrombolytic treatment, telepsychiatry, teledermatology
- Pediatric, ophthalmology, ENT

Has Norway been successful in the use of ICT in the health care system?

- **YES** - If we are talking of digitizing the past
- **No** - If we are talking about:
  - Integration between EPR system
  - Electronic communications between the EPR
  - Organizational improvement basted upon the implementation of ICT in health care environment

Some trends

- Open source
  - The fight against the existing systems
  - The voluntary work going on in the global village
- The world of the media
  - Entertainment
  - Newspapers
- The education world
  - Access to teaching
  - Access to professional journals

Will professional knowledge be designed exclusively for the professionals?

Will professional knowledge also be designed for the ordinary people?

Why produce knowledge for ordinary people?

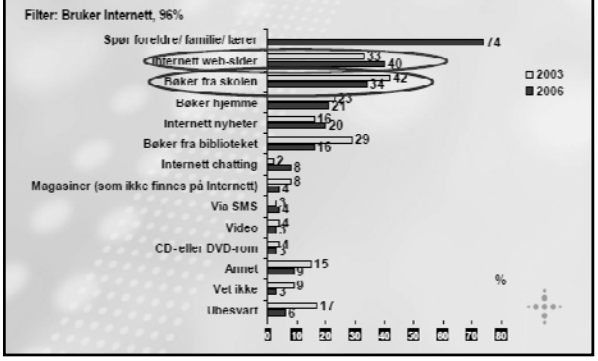
- Is the people a challenge or a resource?
  - 94 % correct
  - Or 6 % wrong

Open source

The world of the media

- Will Web-TV outstrip ordinary TV?
- Explosion of internet-only program will make the conventional TV brd sweat)
  - 42 % (10-29) have Google News as the primary news source
  - YouTube 60 mill (30 % - 18-20 once a day)
  - Joost.com 400+ canals and 20 000 shows on demand
  - advertisement money follow the viewers
- The sale of CD has decreased with 19 % last year
- Paper based newspapers vs net newspapers

Q29: The most natural method of finding information when doing homework



"Free" access to journals

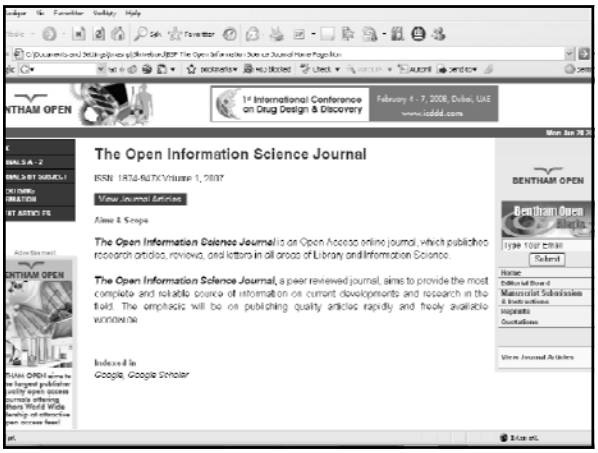
PRESS RELEASE

HINARI ACCESS TO RESEARCH

2500th Member Joins Developing Country Institutes with Low-Cost Access to World's Medical Literature

HINARI program hits major access milestone

Geneva, May 18, 2007 - HINARI Access to Research Initiative from the World Health Organization, today announced the registration of the 2500th institution to access free or low cost online medical journals and databases. These publicly funded and non-profit institutions include universities, medical schools, hospitals and research institutes drawn from 100 developing countries. Through HINARI, they are able to access 2,750 journals online from 100 diverse publishers covering medicine, nursing and related health and social sciences.



1st International Conference on Drug Design & Discovery

February 4 - 7, 2008, Dubai, UAE

The Open Information Science Journal

ISSN: 1874-9674, Volume 1, 2007

View Journal Articles

Aims & Scope

The Open Information Science Journal is an Open Access online journal, which publishes research articles, reviews, and letters in all areas of Library and Information Science.

The Open Information Science Journal, a peer reviewed journal, aims to provide the most complete and reliable source of information on current developments and research in the field. The emphasis will be on publishing quality articles rapidly and freely available worldwide.

Indexed in: Google, Google Scholar

Real free access to knowledge

Amedeo Challenge

The Book

New: "The Amedeo Challenge"

Poding, Gaming, Buying, Blogging, Wikiing,, YouTubing, Facebooking …

bloggblogg

myspace.com

Hovedside

Patient writing own health record

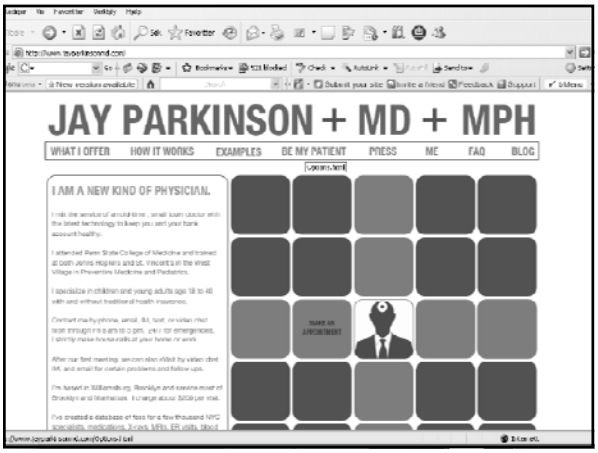
Shared decision making

Transparency

Blogging and emailing

Den Norske Kreftforening

- Who is most important?

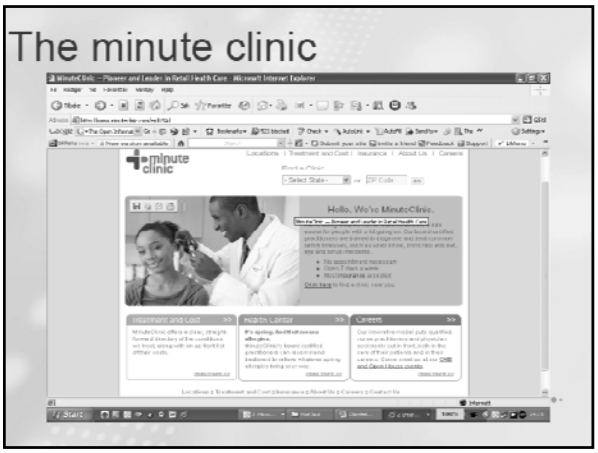


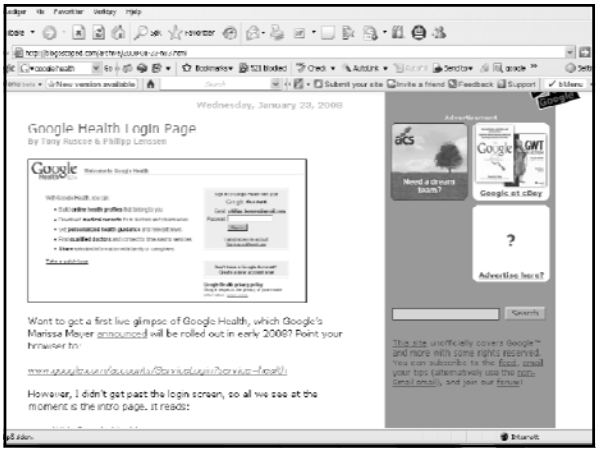
JAY PARKINSON + MD + MPH

WHAT I OFFER | HOW IT WORKS | EXAMPLES | BE MY PATIENT | PRESS | ME | FAQ | BLOG

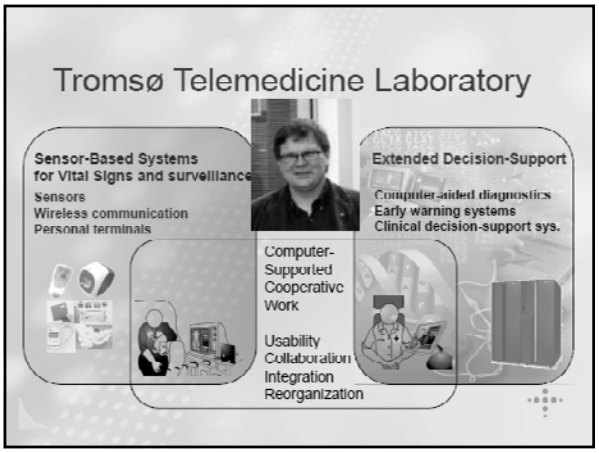
I AM A NEW KIND OF PHYSICIAN.


nrk
Østafjells
Buskerud
Kriser på nettet
Stadig flere ungdommer bruker nettet når de skal kontakte Kirkens SOS.
120 min
+90 sms
hver måned


The minute clinic
minute clinic
Hello. We're MinuteClinic.


Google Health Login Page
By Tony Ruscoe & Philipp Lenssen
Wednesday, January 23, 2008
Want to get a first live glimpse of Google Health, which Google's Marissa Mayer announced will be rolled out in early 2008? Point your browser to:
However, I didn't get past the login screen, so all we see at the moment is the intro page. It reads:

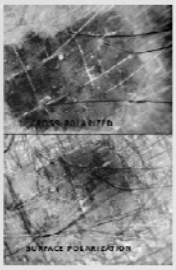

HealthVault
Welcome to HealthVault
Be well. Protected.
Web Health Search
Search Health
Our Health Privacy Commitment


Tromsø Telemedicine Laboratory
Sensor-Based Systems
for Vital Signs and surveillance
Sensors
Wireless communication
Personal terminals
Extended Decision-Support
Computer-aided diagnostics
Early warning systems
Clinical decision-support sys.
Computer-
Supported
Cooperative
Work
Usability
Collaboration
Integration
Reorganization

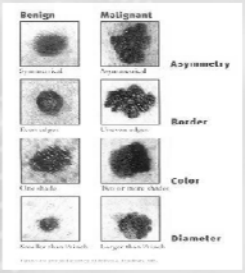

Melanor

Pocket dermatoscopes

Practical and accurate



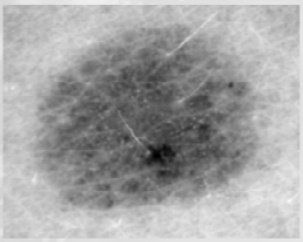
ABCD



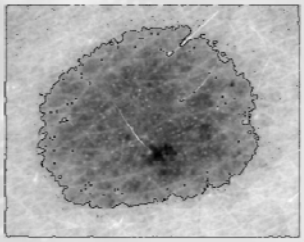
Computer aided diagnostics

- Mathematical and statistical quantification of the diagnostic process
- Detection and differentiation systems

Example



Results

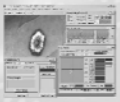


Future

Picture fm cellphone camera are sent to

...

Computer aided diagnostics for picture segmentation (asymmetry, color, bounder and diameter)



Feedback to patient

Tele-Warf

- Patients with a risk of blood clot
- Warfarin decrease the prothrombin time
- Risk of blood clot and haemorrhage

home laboratory data

...

are sent automatically and wireless to a cell phone and through the Health Net

...

to decision support system based upon a pharmakinetic model

.....

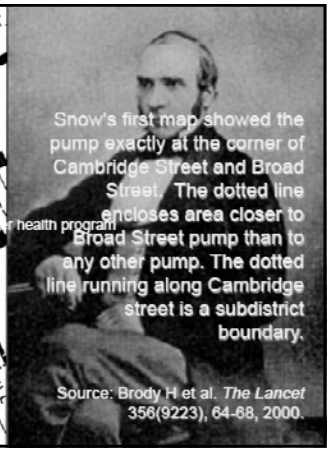
assist doctors in dosage planning

...

and ensure the patient against wrong medication

TROMSØ TELEMEDICINE LABORATORY

The SNOW project

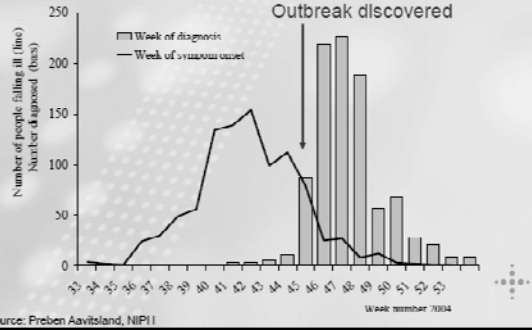


Snow's first map showed the pump exactly at the corner of Cambridge Street and Broad Street. The dotted line encloses area closer to Broad Street pump than to any other pump. The dotted line running along Cambridge street is a subdistrict boundary.

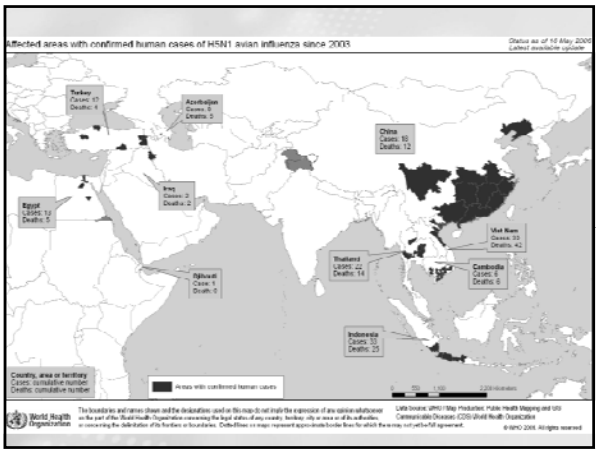
Source: Brody H et al. *The Lancet* 356(9223), 64-68, 2000.

John Snow's solution in 1854: Remove the pump handle!

The outbreak of giardiasis in Bergen



Source: Preben Aavitsland, NIPH


Affected areas with confirmed human cases of H5N1 avian influenza since 2003
Status as of 10 May 2006
Latest available update
Turkey
Cases: 12
Deaths: 4
Azerbaijan
Cases: 8
Deaths: 5
China
Cases: 50
Deaths: 12
Iraq
Cases: 2
Deaths: 2
Egypt
Cases: 12
Deaths: 5
Viet Nam
Cases: 93
Deaths: 42
Thailand
Cases: 22
Deaths: 14
Cambodia
Cases: 6
Deaths: 6
Djibouti
Cases: 1
Death: 0
Indonesia
Cases: 53
Deaths: 25
Country, area or territory
Cases: cumulative number
Deaths: cumulative number
Areas with confirmed human cases
World Health Organization
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.
Data Source: WHO / May Production: Public Health Mapping and GIS
Communicable Diseases (CDS) World Health Organization
© WHO 2006. All rights reserved.


Thank you for your attention!
www.telemed.no

Telemedicine and Telepresence for Trauma and Emergency Management: Arizona Experience

Rifat Latifi, MD, FACS

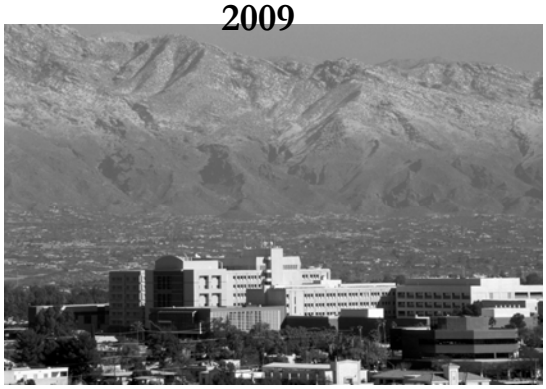
Professor of Surgery, Vice Chairman, International Relations
Department of Surgery, University of Arizona, Tucson, AZ
Associate Director of Arizona Telemedicine Program,
Telesurgery and International Affairs
President, International Virtual e-Hospital Foundation
Director, Telemedicine Program of Kosova

Telemedicine and Telepresence for Trauma and Emergency Management: Arizona Experience

George Hadeed, MPH[1], Charles R. Doarn, MBA[2,3]

[1]University of Arizona, Tucson, Arizona , [2]International Virtual e-Hospital, Anchorage, Alaska; and [3]Center for Surgical Innovation, Department of Surgery, University of Cincinnati, Cincinnati, Ohio

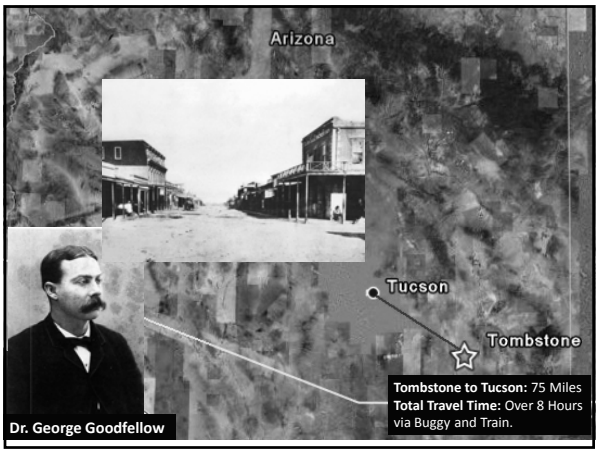
2009

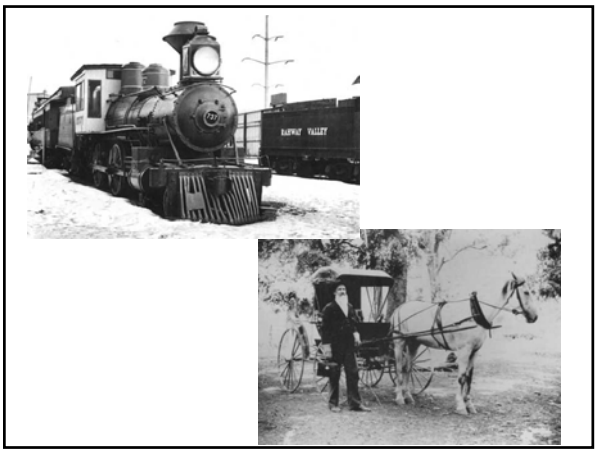


UMC, Tucson, Arizona

Tucson, Arizona,1881- The Wild West

- The President of the University of Arizona shot in the abdomen in Tucson
- Surgeon, Dr. Goodfellow called from Tombstone, 75 miles south east Arizona
- Using train and Buggy - Eight hours later he came to Tucson, a bit late, one may say
- The president of the University of Arizona died on the operating table





THE SOUTHERN CALIFORNIA PRACTITIONER.

VOL. IV. LOS ANGELES, CAL., MAY, 1889. No. 5.

ORIGINAL.

CASES OF GUNSHOT WOUND OF THE ABDOMEN TREATED BY OPERATION.

BY GEORGE E. GOODFELLOW, M. D., TOMBSTONE, A. T.

On the night of January 14, 1889, I was called to see Mr. E. A. Clark of Bisbee, A. T., who had been shot in a fight a few minutes before. I reached him about half an hour after the reception of the injury, and found him with a gunshot wound of the abdomen, evidently bleeding to death. The ball—from a 44 or 45 Colt revolver—had entered the epigastric region, exactly in the median line, at the apex of the ensiform cartilage, nicking it, and had emerged from the left side about nine inches from the linea alba, and about three and one-half inches above the crest of the ilium. Recognizing the fatal character of his wound, and the need for immediate operation (after informing his family and friends of my opinion), I proceeded to operate.

It was midnight in a little mountain mining town. I was alone entirely, having no skilled assistance of any sort, therefore was compelled to depend for aid upon the willing friends who were present — these consisting mostly of hard-handed miners just from their work on account of the fight.

Without delay he was put upon a table in the large dining-room of a restaurant; the anesthetic administered by a barber; lamps held, hot water brought, and other assistance rendered by others. There being no time to lose, the abdomen was opened in the mesial line, from the sternum to the umbilicus, by a single sweeping cut. An immense quantity of blood poured out through the incision, the cavity being full. This was flushed out at once with a gallon or two of hot water, and in a short time the principal sources of hemorrhage were found, which were the liver, and the gastro epiploica sinistra of the great curve of the stomach, the ball having passed

VOL. IV. 8—1.

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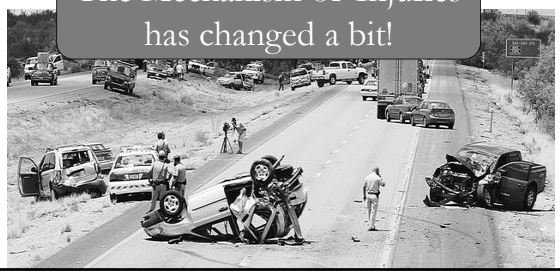
VOL. IV. 8—1.

■That was then. …

This is today!

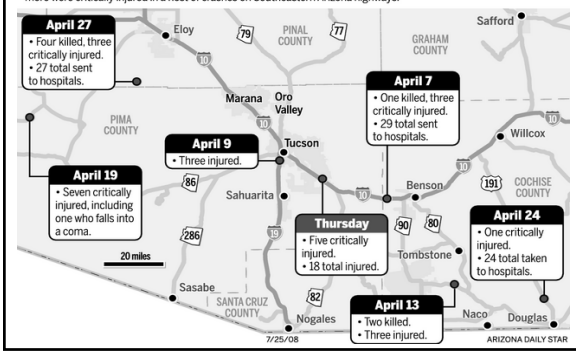
I-10 rollover, series of collisions injure 18 illegal immigrants in minivan Tucson, Arizona 07.25.2008

The Mechanism of Injuries has changed a bit!



Another rollover involving illegal immigrants

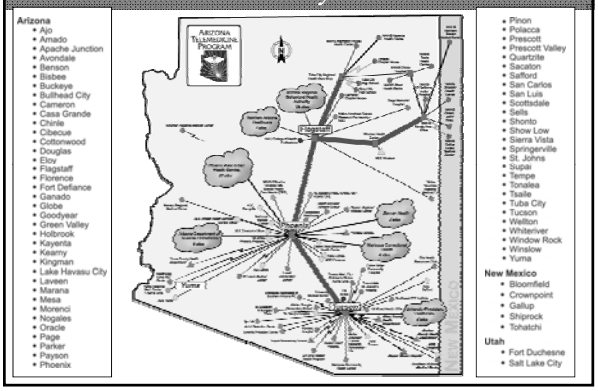
Eighteen people were injured Thursday morning — and five remain in critical condition — in a series of crashes on Interstate 10 near Houghton Road that began when a minivan carrying illegal immigrants rolled. It's the first multiple-injury rollover involving illegal immigrants since April, when seven were killed and several more were critically injured in a host of crashes on Southeastern Arizona highways.



2008

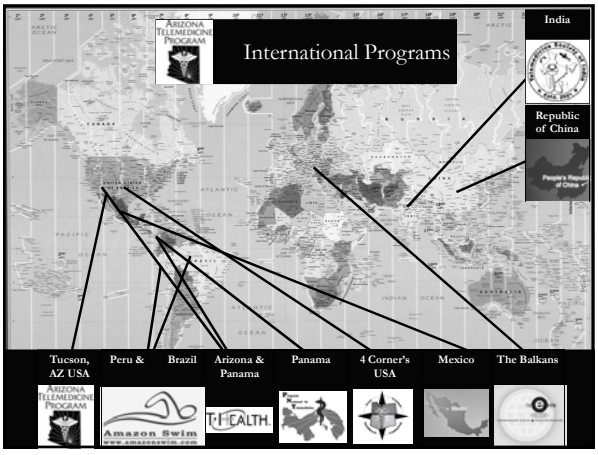
- Injured patients in any Southern Arizona town with a hospital, can be seen within minutes by a trauma surgeon from Tucson

Arizona Telemedicine Program
Today



170+ Sites

- Urban & rural hospitals
- Native American healthcare
- Prisons & jails
- Community health centers
- Schools
- Distance learning affiliates
- International Sites



Arizona Telemedicine Programs

- Elective Telemedicine Program
- Inter-hospital telemedicine and telepresence and network- SATT
- Digital ambulances and monitored patient transport- ER-Tucson link
- Deployable mobile telemedicine systems- Disasters, medical missions (www.amazonswim.com)

COMMAND AND CONTROL CENTER

Already established :

Intervene in the first "Golden Hour"…

- Desperation hour!

How can we change the desperation hour?

Answer

1. Personal involvement

- Get out of current comfort zone
- Technological advances
- Distance education

2.Community involvement

Have expertise of trauma centers available and accessible to small hospital ERs in rural regions 24 hours, a day seven days a week through Virtual Trauma Presence...

Rural Trauma Care

- Low volume "centers"
- Limited experience
- Staff: "revolving door"
- Lack of trauma, emergency care CME
- Lack of specialist (trauma surgeon, neurosurgeon, vascular surgeon, orthopedic surgeon…critical care)

Results:

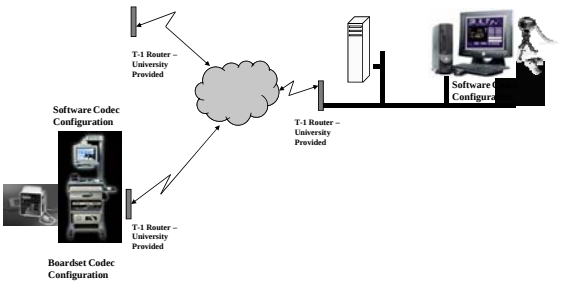
"Patients involved in MVC in rural America have twice the rate of mortality with those in an urban settings with the same ISS"

JAMA 2000;284

Intervene in the "Golden" minutes?

SATT PRESENTATION

Southern Arizona Telepresence and Teletrauma Program

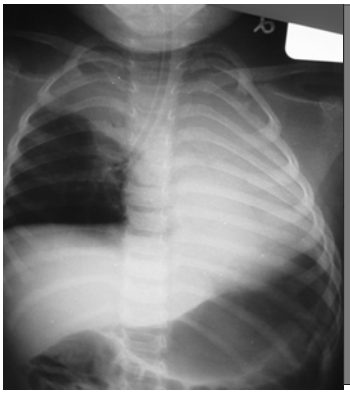


13 months Pilot Project of Southern Arizona Telepresence and Teletrauma Program 11/04-01/06

Case Presentation

- 18 months old female brought to SAMC ER in Douglas, AZ, three hours after motor vehicle crash with three fatalities
- In coma with severe head injury
- Right tib-fib fracture, left femur fracture
- Hypoxic (saturation in the 70s) , hypotensive (SBP in the 50s), severe acidosis (Base deficit 9.0, anemic (hemoglobin 5.8)
- No IV access

Once Intubated…



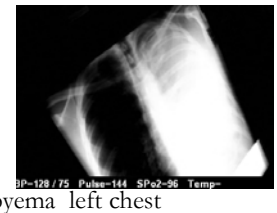
Advise:
Pull the ET tube back, decompress the stomach…
Results:
Clinical Improvement
Better SBP
Improvement of Saturation

Initial Chest x-ray of the patient managed by telemedicine 11/21/2004

Interventions

- Intubate the patient
- Able to evaluate chest raising after intubation
- Reposition the ET tube from the right main bronchus
- Assessed the CXR
- Sedate, paralyze the patient
- Obtain femoral vein/arterial access
- Aggressively resuscitate with lactated ringer
- Obtain a blood gas, CBC
- Blood transfusion, antibiotics
- Suction the ET tube
- Place the orogastric tube to decompress stomach

Patient at the UMC Trauma center being attended by trauma team



Patient with empyema left chest

Patient in Coma GCS 5

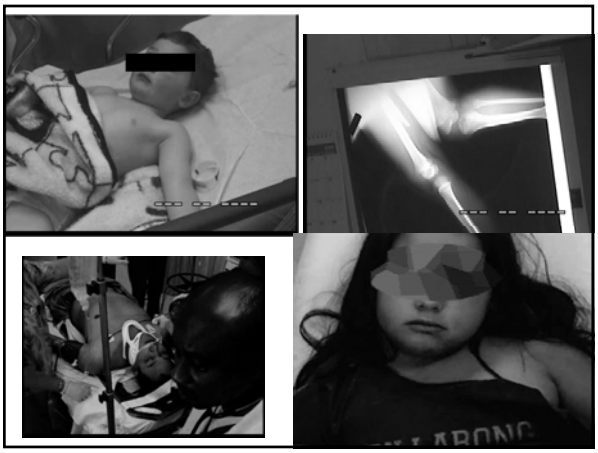
Status post fall

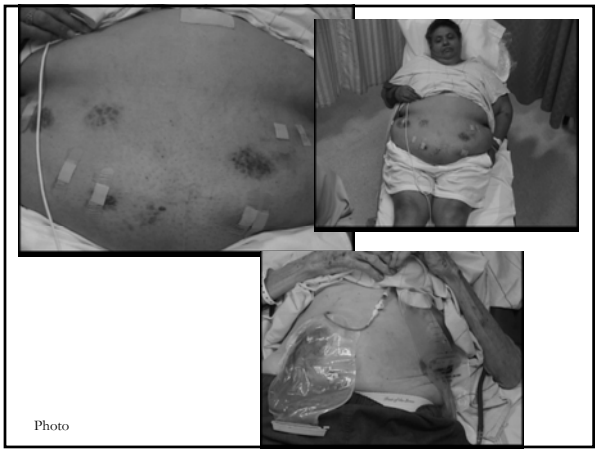
GSW to left neck with expanding hematoma

Necrotizing Soft Tissue Infection

"I WILL BE THERE …"

Video





SATT Pilot Project 11/04-1/06

- 21 patients
- 5 life savings interventions
- 14 accepted for transfer
- 1 unable to accept
- 5 unnecessary transfers prevented:
  3 Treated in Douglas
  2 discharged home

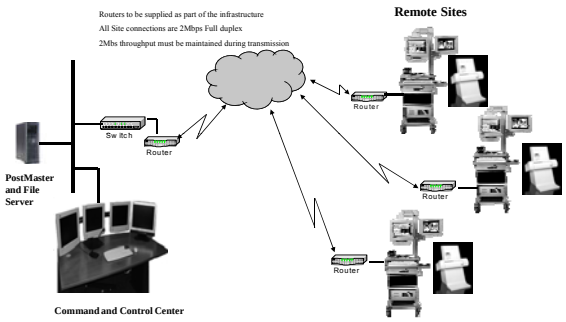
Early Resuscitation

- Can be done via telemedicine and will save lives!
- Creativity and commitment by Trauma Centers to render care to its population!
- Telemedicine network and expertise

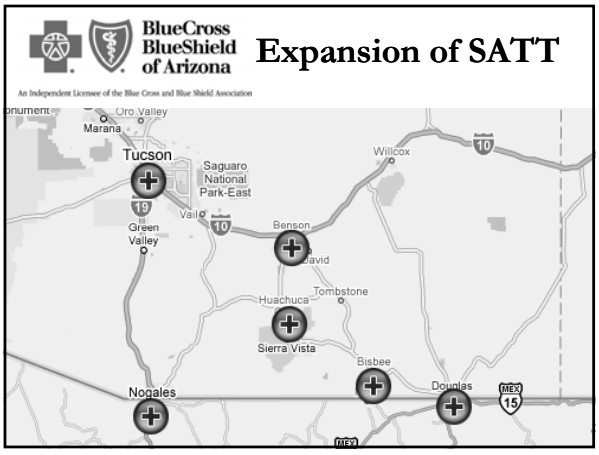
Questions that we resolved:

- It acceptable by referring hospitals?
- It acceptable by trauma and emergency docs?
- "The big brother is watching concept"

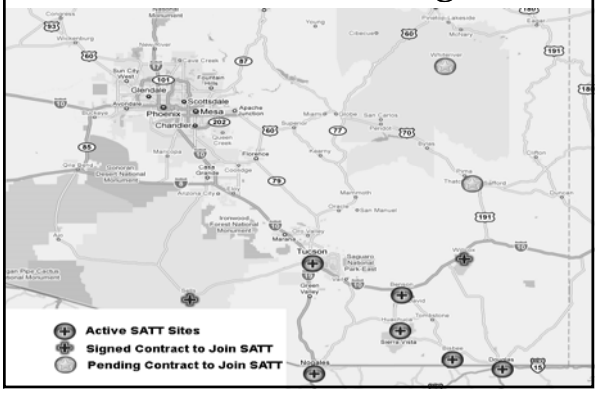
Teletrauma Network



Expansion of SATT



Current Status of SATT August 08



Teletrauma Program: Real Effects

- *Able to intervene early*
- *Reduce morbidity*
- *Reduce mortality*
- *Potential for significant savings*
- *Preventing unnecessary transfers*
- *Patient satisfaction*
- *Healthcare workers satisfaction*

ARIZONA AIR AMBULANCE SERVICE RATE SCHEDULE

ARIZONA DEPARTMENT OF HEALTH SERVICES, Bureau of Emergency Medical Services & Trauma System
150 North 18th Avenue, Suite 540, Phoenix, AZ 85007-3248
Phone: (602) 364-3150; Fax (602) 364-3568
In accordance with Federal Regulations, the State is not allowed to regulate air ambulance provider routes or rates

Updated: July 10, 2008

Entity dba	RATES: Fixed Wing *Base Rate	Fixed Wing **Mileage Rate	Rotor-Wing *Base Rate	Rotor-Wing **Mileage Rate	As Submitted On
Aerocare Medical Transport, Inc.	$11,200.00	$118.00	N/A	N/A	07/06/07
Aerocare Medical Transport Systems, Inc.	$12,500.00	$125.00	N/A	N/A	06/13/08
Air Evac	$9,934.00	$123 (First 70 miles) $52 (71st mile on)	$9,934.00	$123 (First 70 miles) $52 (71st mile on)	03/21/08
AirCARE1 International	$7,000.00	$50.00	N/A	N/A	07/31/07
Arizona Lifeline	N/A	N/A	$7,950.00	$75.00	[illegible]
Classic Lifeguard Air Ambulance	$8,000.00	$75.00	$8,000.00	$75.00	04/15/08
Eagle Air Medical	$12,500.00	$125.00	N/A	N/A	05/30/06
Guardian Air	$9,248.09	$101.11	$11,041.65	$111.00	02/18/08
Neonatal Transport	$10,237.19	$101.11	$12,030.75	$111.00	
Pediatric Transport	$9,743.73	$101.11	$11,537.30	$111.00	
Stable Baby	$5,965.00	$101.11	N/A	N/A	
LifeNet (LifeNet Multi-Load Miles)	N/A	N/A	$11,035.00	$99.02 $49.51	07/01/08

ARIZONA GROUND AMBULANCE SERVICE RATE SCHEDULE

ARIZONA DEPARTMENT OF HEALTH SERVICES, Bureau of Emergency Medical Services and Trauma System
150 North 18th Avenue, Suite 540, Phoenix, AZ, 85007-3248
Phone: (602) - 364 - 3150; Fax: (602) - 364 - 3567
Download this schedule at: http://www.azdhs.gov/bems/ambul-pdf/ratesch.pdf

Prepared: July 1, 2008

CON No.	Type Entity	Entity dba	RATES: ALS	BLS	Mileage	Standby Waiting	Subscription Service	EMS Control No.	Rates Effective Date	Separate Charges For Disposable Medical Supplies
90	fp	**Action Medical Service Inc. - Ganado**	970.50	970.50	12.00	242.63		3126	02/21/08	No
104	fp	**Action Medical Service Inc. - Winslow**	650.27	605.47	9.09	72.65		3052	05/08/07	No
101	np	**Ajo Ambulance, Inc.**	786.22	786.22	12.41	196.56	54.47	3149	12/19/07	No
75	fp	**American Ambulance**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3057	05/08/07	Yes
46	[illegible]	**American Comtrans**	595.89	530.51	13.41	132.63		3146	12/19/07	[illegible]
120	fp	**Arizona Ambulance Transport**	767.34	767.34	13.50	191.84		3050	06/01/07	No
[illegible]	fp	**Arrowhead Mobile HealthCare, Inc. (Show Low EMS)**	1,101.63	1,101.63	11.69	56.49	50.69	3050	06/01/07	No
5	sd	**Avra Valley Fire District**	750.22	750.22	11.04	187.55		[illegible]	[illegible]	No
124	sd	**Beaver Dam / Littlefield Fire District**	NONE	533.80	8.01	NONE		3151	12/24/07	No
100	muni	**Bisbee Fire Department**	850.00	850.00	15.00	212.50		2974	08/14/06	Yes
121	sd	**Black Canyon Fire Department**	956.91	956.91	12.41	231.25		3050	06/01/07	Yes
28	sd	**Blue Ridge Fire District**	796.78	796.78	9.00	NONE		2928	12/01/05	No
8	sd	**Buckeye Valley Volunteer Rescue Unit**	621.08	553.24	12.88	NONE		3023	05/09/07	No
39	sd	**Bullhead City Fire Department Ambulance Service**	687.31	687.31	11.45	59.02		3204	06/24/08	No
25	sd	**Camp Verde Fire and EMS**	724.15	724.15	10.35	181.04		3145	12/19/07	Yes
58	fp	**Canyon State Ambulance**	1,111.28	1,111.28	16.54	85.48	79.18	3051	04/20/07	Yes
22	sd	**Colorado City Fire Department**	NONE	865.80	16.14	NONE		3198	06/24/08	only Oxygen
105	sd	**Daisy Mountain Fire District**	697.44	697.44	11.81	NONE		3173	04/21/08	[illegible]
32	muni	**Douglas Ambulance Service, City of**	512.00	512.00	8.21	40.88		2614	09/05/02	Yes
11	sd	**Drexel Heights Fire Department**	1,165.50	1,165.50	16.65	291.37		3173	04/21/08	[illegible]
17	sd	**Elfrida Ambulance Service**	800.00	800.00	15.00	200.00		3046	11/05/07	Yes
13	sd	**Eloy Fire District Ambulance Service**	1,165.50	1,165.50	16.65	291.37		3173	04/21/08	No
29	sd	**Forest Lakes Fire District**	917.54	917.54	12.27	58.71		3152	12/31/07	Yes
82	sd	**Fort Mojave Mesa Fire Department**	774.23	774.23	11.06	53.38		3150	12/31/07	No
18	sd	**Fry Fire District**	900.00	900.00	12.50	225.00		3047	11/28/07	Yes

Potential Savings per Patient

Air Transports	Douglas	Nogales
Air Evac	$20,104	$17,929
LifeLine	$15,450	$12,825
LifeNet	$20,935	$17,470

Ground Transports	Douglas	Nogales
Arizona Ambulance	$2,360.41	$1,644.91
Douglas Ambulance	$1,480.78	
LifeLine Ambulance	$3,137.04	$2,237.63
Nogales Ambulance		$1,137.5

Source:

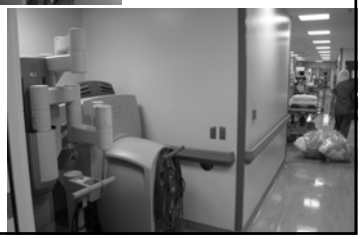
Bureau of EMS & Trauma System
Arizona Department of Health Services

"There are no more excuses for any trauma or critically ill patient to die in any emergency room just because there was no trauma surgeon or critical care specialist available on site to help with the resuscitation. There is no longer excuse for that. Telemedicine will significantly reduce trauma and critical illness related preventable deaths"

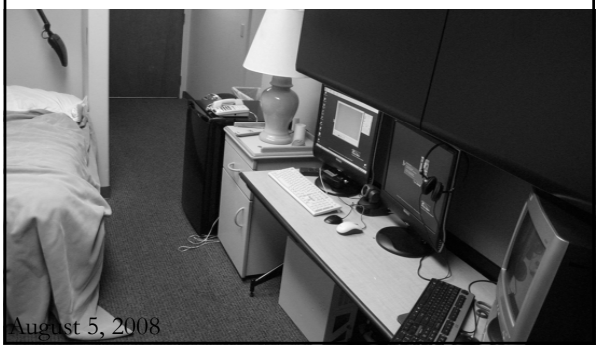
R Latifi, MD, 2006

Da Vinci Robotic Surgery

Waiting and collecting dust



NEW DEVELOPMENT
Trauma Physician's Call Room, UMC
Equipped with Telemedicine Unit



August 5, 2008

Two lives, one story

Then and Now

"Military Telemedicine & e-Health from the Battlefield : Lessons for Civilians"

Third Intensive Balkan Telemedicine & e-Health Seminar

COL Ron Poropatich, MD
&
Dr. David Lam, MD
Telemedicine & Advanced Technology Research Center (TATRC)

US Army Medical Research & Materiel Command (USAMRMC)
Fort Detrick, MD

6 February 2009

Topics

- E-mail Tele-consultation
- Dedicated bandwidth for deployed medical units
- Tele-medical maintenance
- Tele-surgical mentoring

The views and opinions expressed in this presentation are those of the authors and do not reflect official policy or position of the U.S. Government

AKO Tele-Consultation

Background

U.S. Army E-mail Teleconsultation program (initiated April 2004)

- ❑Email based system with JPEG image attachments – no patient identifying information; no patient privacy violations
- ❑Utilizes theater providers' personal digital camera & routine Internet email access
- ❑U.S. based medical specialists answer tele-consults 24x7
- ❑Response time: ~ 5 hours (average for more than 4900 consults)
- ❑Strong favorable response from deployed providers

19 Current U.S. Army Tele-Consultation Clinical Specialties

Burns-Trauma
Dermatology
Internal Medicine
Neurology
Ophthalmology
Preventive Medicine
Toxicology
Orthopedics
Laboratory Medciine
Dental
Cardiology
Infectious Diseases
Nephrology
Occupational Medicine
Pediatrics
Rheumatology
Urology
Traumatic Brain Injury (TBI)
Infection Control

AKO Tele-consultation Program Summary

- **19 specialties with contact groups**
- **4,922 teleconsultations (Apr 04 to 31 Dec 08 – 58 months)**
- **68 known evacuations prevented**
- **183 known evacuations facilitated following consultant's recommendation**
- **1,349 different referring health care professionals**
- **669 teleconsultations on non - US patients**
- **Average Reply Time 5 hr 7 min**

Year	Reply Time
2004	5 hr 9 min
2005	5 hr 16 min
2006	5 hr 12 min
2007	5 hr 27 min
2008	4 hr 58 min
Dec 08	4 hr 19 min
Program	5 hr 7 min

Non U.S. Patients			
Country	Consults	Country	Consults
Afghanistan Army	34	Iraqi Civilian	345
Afghanistan Battalion	3	Iraqi Air Force	1
Afghanistan Non Combatant	125	Iraqi Army	39
Australian Army	1	Iraqi Detainee	72
Australian Navy	2	Italian Navy	1
Bangladesh Contractor	1	Jordanian Soldier	1
Bosnian Child	1	Jordanian Contractor	1
Bosnian Officer	1	Kenya Child	2
Bosnian Contractor	1	Korean Army	7
Botswana Child	1	Kyrgyzstan Contractor	1
British Contractor	1	Macedonian Soldier	2
British Soldier	2	Mauritania National	1
British Air Force	1	Nepalese Contractor	1
Bulgarian Army	7	New Zealand Contractor	1
Canadian Soldier	1	Pakistan	20
Colombian Army	7	Philippine Contractor	1
Congo Child	1	Poland Army	1
Djibouti National	3	Romanian Contractor	1
Dutch Army	2	Romanian Soldier	1
Ethiopian Contractor	3	Russian Al Hilla Contractor	1
German Child (in Turkey)	1	Saudi Detainee	1
Georgia Contractor	1	Scottish Civilian	1
Ghana Child	2	SE Asian (not specified)	1
Guatemala Child	1	Somalia Child	1
Hungarian Contractor	1	South Africa Contractor	2
Hungarian Army / Medics	12	Sri Lankan Contractor	1
Indian Army / Police	7	Turkey Contractor	1
India Contractor	14	Ugandan Army	10
Total			669

U.S. Army Tele-Consultation
Program Summary for Deployed Forces

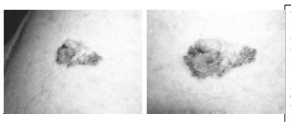
April 2004 to 31 December 2008

By Specialty	**52% Dermatology** **9% Infectious Diseases** **5% Ophthalmology** **34% Other Specialties**
By Location	**68% Iraq** **11% Afghanistan** **4% Kuwait** **3% US Navy afloat**
By Patient Branch	**53% Army** **12% Marine Corps** **10% Non-Combatant** **9% Air Force**

N = 4922 consults

Dermatology

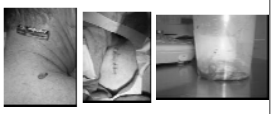
Images



Referring Physician's Narration

50 y/o male with new growth over last 6 months. Found on nape of neck. Varigated and fleshy. Looks like it ought to be cut off just for cosmetic purposes alone.

Outcome



Surgery 5 days after receiving recommendation. Pathology confirmed malignant melanoma. Pt completed chemo therapy & returned to duty.

Dermatologist's Recommendation / Dx

This one looks UGLY ! I'll put money on this one being a Malignant Melanoma, probably arising out of a mole. This one has all the criteria: Asymmetry, irregular Borders, varied Color, large Diameter, and uneven Elevation. It looks like it has been there a lot longer than 6 months.

At any rate, he needs to see a Surgeon ASAP, in the next week or two....sooner, if possible.
To be complete, include in your referral note to the Surgeon, Patient's history of blistering sunburns, any past hx of skin cancers, family hx of melanoma, his exposure to sun (grew up in Florida, lived at beach, etc...) . Do a complete skin exam (including scalp, genitalia, bottoms of feet, etc) looking for other suspicious lesions that you can alert the Surgeon to. Also, do a lymph node exam. If the patient has palpable lymph nodes in the cervical chain or axillae, it is more worrisome.

Try not to alarm the patient too much at this point. The prognosis is dependent on the thickness of the Melanoma, and we don't know that at this point. I would just tell the patient that you think the lesion may be a Melanoma, and that the prudent thing is to get him to a Surgeon who can remove it and send it to the lab for testing.

As for his unit commander, I would tell him that the soldier could be lost to the unit for weeks or could be med-evaced back to the states, depending on several factors, yet to be determined.

Dx/DDx: Malignant Melanoma

Offer to NATO Forces in Afghanistan

- Aim: As a proof of concept, USA is offering this clinical capability at no charge to NATO/PfP forces deployed in Afghanistan on an interim basis. Currently, consultants in 19 clinical specialties are available (does not include radiology support)
- Objective: An approved MOU/MOA & Technical Arrangement has been developed and staffed nationally and within NATO. It is felt to be legally satisfactory.
- Status: Deployment of this capability is occurring 1-17 Feb 2009 in Afghanistan to 20 NATO sites

Joint Urgent Operational Need (JUON) for a Joint Medical Telemedicine Network (JMTN)

Problem Statement: The insufficient availability of high-speed and on demand Theater network services to transport medical images across the theater in a timely manner jeopardizes life saving medical care

Scope: Level III MTFs and select Level IIs

End State Objective: A joint medical network:
- Providing on demand transmission of medical images
- Enabling remote medical consultation for Level III facilities

Background: The need was identified in Aug 2007; the solution was approved in Feb 08. Partial implementation of the solution includes increased bandwidth; an upgrade to the Landstuhl hub; and 9 new terminals each with a 2.4 meter dish, a 24W block up converter (BUC), DSN VoIP, a web accelerator, and a video teleconferencing suite

Current Status: Installation of the new terminals and upgrade to select legacy VSATs is underway with an expected completion date of 23 Feb 09

As of 15 Jan 09

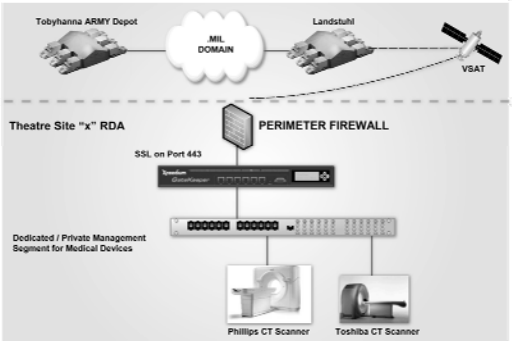
Medical Telemaintenance Initiative: Remote Diagnostic Access (RDA)

National Maintenance Program (NMP)
US Army Medical Materiel Agency, Fort Detrick
CW5 Kim Pham-Cieliesz
Elizabeth Poole, GDIT

Remote Diagnostic Access (RDA) Overview

- Physician's capability to utilize *real time* telemedicine for patient diagnosis is now supported with *real time* medical maintenance, repair and sustainment
- The RDA medical maintenance concept will:
  - Use Information Technology (IT) resources already established in theater
  - Enable Biomedical Equipment Specialist (BES) operations to deliver greater independence, management, support and oversight
- Provide "Operational Status" reports to Commanders and Decision Makers
- RDA maximizes report automation and use of "virtual engineers"

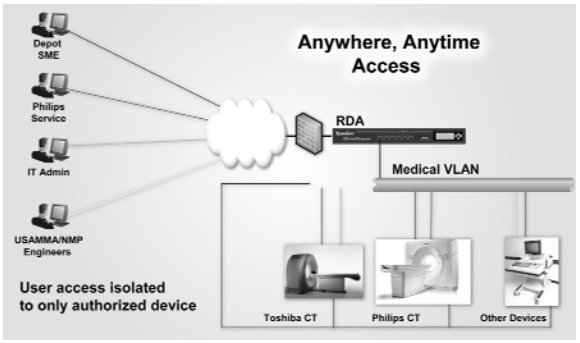
Current RDA Network Topology - VSAT



RDA Status

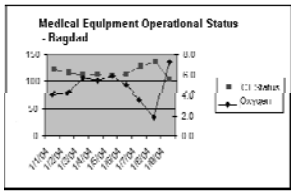
- Connection to all 6 Army Combat Support Hospitals in Iraq established with RDA
- Total of 10 Computed Tomography (CT) scanners have access to remote support
- Remote users are Army personnel Subject Matter Experts (SMEs) and Philips Medical Technical Staff
- Future equipment planned to include Computed Radiography (CR) Deployable Teleradiology and laboratory devices (blood gas analyzers)

Real-Time Secure Access for Remote Users



For the Commander

- Real – time status reports and analysis
- Ability to make decisions based on accurate data within minutes
- Medical Maintenance Dashboard
- Statistical data for financial decisions and resource support analysis

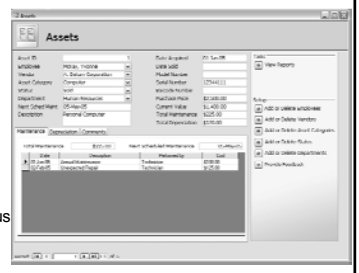


For the Depot

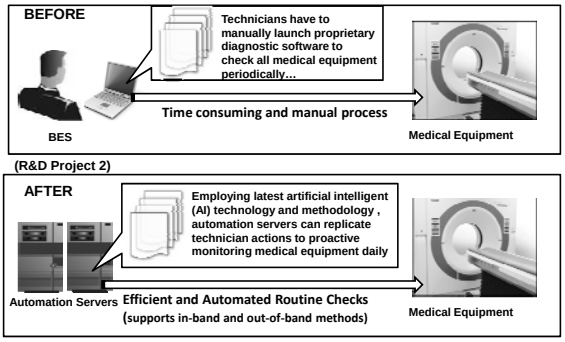
- Real-time reports of system status
- Proactive monitoring to "act" not "react"
- Ability to access equipment remotely for repair
- Accurate inventory and identification of equipment
- Easy part and system shipment
- Software upgrades and system notifications to maintain configuration management

For Bio-maintenance

- Immediate technical support for equipment repair:
  - Asset Visibility and Tracking
  - Online training
  - Operational support
  - Technical troubleshooting guides
  - Immediate access to the Original Equipment Manufacturer (OEM)
  - Repair part tracking/status
  - Real time software updates
    - Notifications
    - Downloads



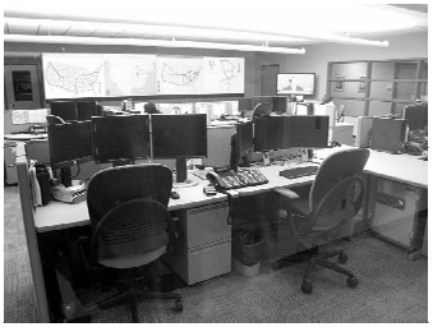
Proactive Monitoring of Medical Equipment



Medical Operations Center (MOC)

- Centralize operational readiness to enhance medical treatment
- Provide instant crisis response time for medical equipment and operations
- Reduce complexity to support medical equipment:
  - Remote Diagnostic Access (RDA)
- Deliver real-time situational understanding and support for medical systems and operations:
  - Pro-Active Monitoring and Reports
  - Medical Maintenance "Dashboard"
- Provide "Army Total Asset Visibility" for medical equipment elements to include:
  - Complete inventory of all equipment, location and owner
  - Medical Maintenance Knowledge Management Database
  - Medical Operations Center to provide single command, control and expert support for the Biomedical Equipment Specialist (BES)

MOC Illustration



MOC Functions

- Responsible for monitoring the medical systems and network for alarms or certain conditions that may require special attention to avoid impact on the medical network and/or system performance
- The MOC will monitor power failures, network communication line alarms (such as bit errors, framing errors, line coding errors, and circuits down) and other performance issues that may affect the network.
- The MOC can analyze problems, perform troubleshooting, communicate with site technicians, other MOCs, and track problems through resolution
- As necessary, the MOC will escalate problems to the appropriate personnel
- The MOC will have procedures in place to immediately contact technicians to remedy problems

Tele-mentoring for the Operating Room

- **R&D project funded by Army Medical Department**
- **Consortium of DOD/VA/Academia/Industry partners**
- **LTC Sloane Guy, MD is the clinical lead (CT Surgeon)**
  - **deploying to Iraq in February 2009 as Chief of Surgery, 47th CSH**
  - **plans to leverage increased bandwidth from JUON**
  - **R&D protocol pending approval**
  - **Surgical specialists in USA will be referring providers**
- **Goal - bringing Level I trauma care to the forward environment while reflecting the logistical reality that the military cannot have every specialty at every location**

The Need

- **General Surgeons in theater have to perform subpecialty procedures (craniotomies, bladder repairs, etc)**
- **Current telementoring systems are corporate teleconferencing systems which are not adequate for the operating room (i.e. large and proprietary)**
- **Current systems do no allow manipulating the image before transmission, or directly pointing to anatomical structures**

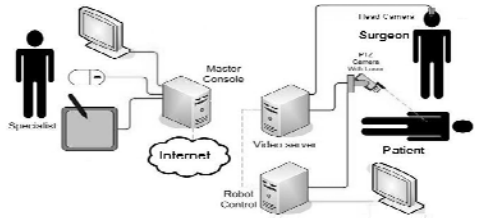
The Approach

- Design a stream-lined and light weight system that allows remote manipulation of camera and laser pointer on remote site
- Develop open web-based interface which is platform independent
- Design system to meet needs of the surgeon

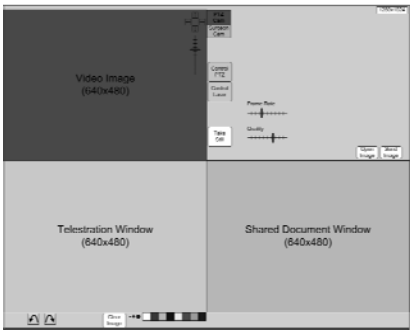
Project Objective

Develop proof-of-concept prototype and validate value through testing in animal models

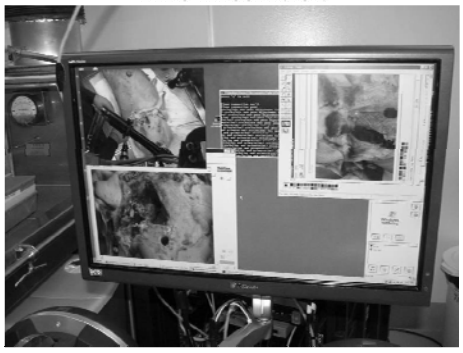
The System



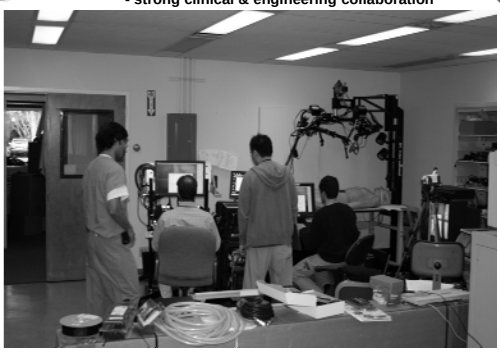
The Interface



The Interface



Laboratory Development of Tele-Surgical Mentoring Device
- strong clinical & engineering collaboration



Usability of Robotic Systems for Remote Surgical Telementoring

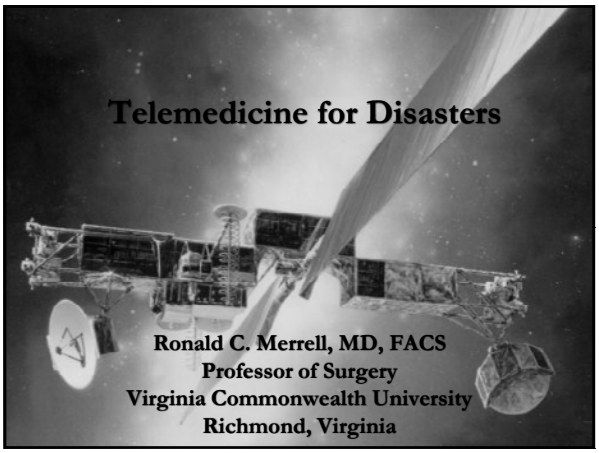
Alexander Q. Ereso, MD1, Pablo Garcia2, Elaine Tseng, MD3, Gregory P. Victorino1, MD FACS, LTC. T. Sloane Guy, MD3, 4

1East Bay Program - UCSF, 2SRI International, 3SFVA Medical Center - UCSF, 4US Army Medical Command

- **Conclusion**
  - **Study demonstrates the feasibility of a mouse or pen/tablet interface controlling a robotic camera with attached laser pointer for surgical tele-mentoring.**
  - **Interface may allow surgical subspecialists to provide emergency peri-operative guidance to remotely located general surgeons.**

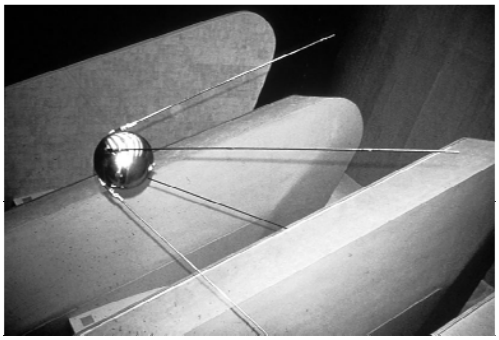
Summary

- Remote consultation is actively providing mission & cost benefits for deployed U.S. forces
- Simple and inexpensive tele-consultation solutions exist that can easily be incorporated into civilian systems
- Bandwidth is the rate limiting resource for operational telehealth and an approved solution is being implemented in Iraq & Afghanistan
- Future application in Medical Equipment Repair hold great promise in improving remote health care
- A military Tele-Surgical network is being developed that will further support & advance remote care capabilities



Disaster

- Sudden disruption of services due to natural or human action
- Sudden expansion of demand for services by casualties
- Sudden loss of infrastructure even with services intact
- In all instances an abrupt imbalance between services and demand

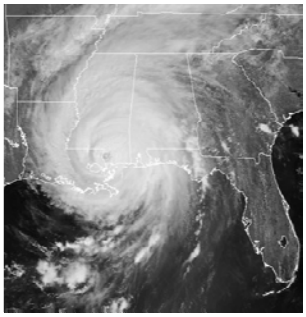


BEEP, BEEP, BEEP

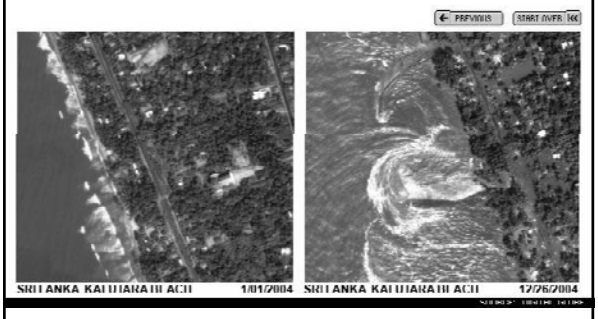
Behold, the Earth

- Weather, acute
- Weather, chronic & trends
- Seismic
- War preparations
- Disaster prediction
- Disaster assessment
- Disaster decision supportlogistics, coordination

Prediction
Hurricane Katrina



Marginally Predictable



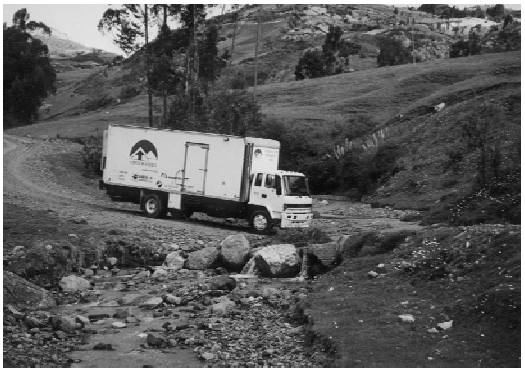
Assessment

- Intensity
- Scope
- Resources
- Liabilities
- Telecom, just-in-time alerts

Decision Support

Decision Support

- Logistics
- Information management
- Command and control
- Telecommunications, information continuum
- Resource assignment



First Responder

- Power
- Sensors
- Telecommunications
- Information Management
- Assisted Autonomy

Kenya

Armenia

SPECIAL REPORT

Telemedicine and International Disaster Response

Medical Consultation to Armenia and Russia Via a Telemedicine Spacebridge

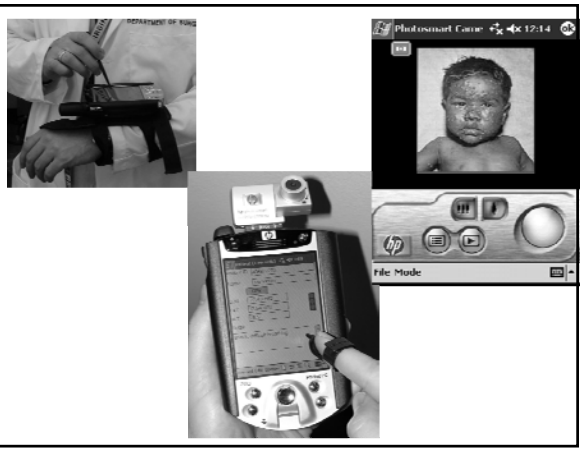
Bruce A. Houtchens, MD,[1] Terry P. Clemmer, MD,[2] Harry C. Holloway,[3] MD, Alexander A. Kiselev, MD,[4] James S. Logan, MD,[5] Ronald C. Merrell, MD,[6] Arnauld E. Nicogossian MD,[7] Haik A. Nikogossian, MD,[8] Russell B. Rayman, MD,[9] Ashot E. Sarkisian, MD,[10] John H. Siegel, MD[11]

Abstract

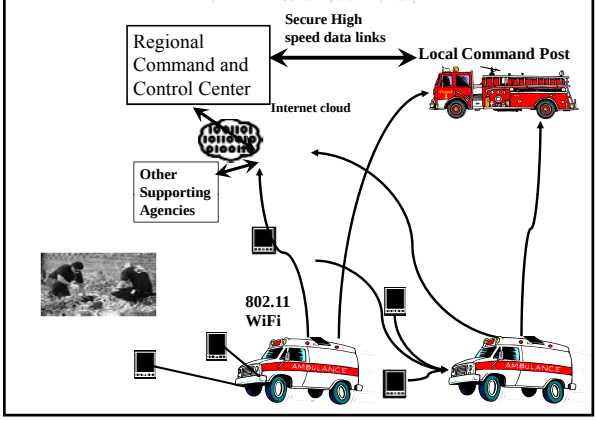
Introduction: The Telemedicine Spacebridge, a satellite-mediated, audio-video link between four United States and two Armenian and Iluntian medical centers, permitted remote American consultants to assist American and Russian physicians in the management of medical problems following the December 1988 earthquake in Armenia and the June 1989 gas explosion near Ufa. Methods: During 12 weeks of operations, 247 Armenian and Ilunian and 175 American medical professionals participated in 34 half-day clinical conferences. A total of 200 patients were discussed, requiring expertise in 20 specialty areas. Results: Telemedicine consultations resulted in altered diagnoses for 34, new diagnostic studies for 70, altered diagnostic processes for 47, and modified treatment plans for 93 of 185 Armenian patients presented. Simultaneous participation of several US medical centers was helpful. Quality of data transmission was judged excellent. Conclusions: These results suggest that interactive consultation by remote specialists can provide valuable assistance to ensure pregnancy and traumatic outcome clinical decisions in the aftermath of major disasters.

Prehospital and Disaster Medicine 8(1):57-65, 1993

Information Portal and Manager



Communications



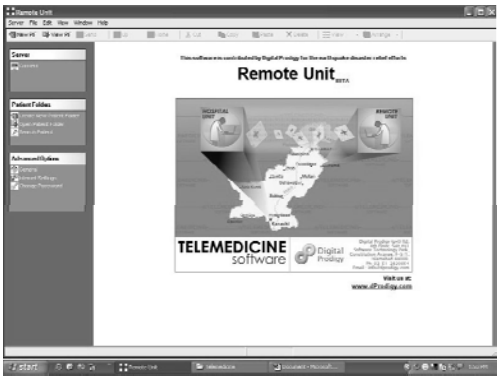
Telemedicine after Hurricane Katrina

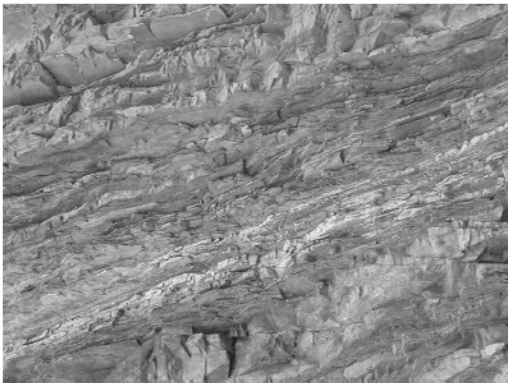
Pakistan

Training

Telemedicine/e-health Training Center Rawalpindi

- USAID grant
- Curriculum web based, interactive and developed with MITAC
- Two week course trained 30 people
- Wide arrange or specialties and each trainee prepared a project in their area of interest
- Based upon a tentative network with two rural sites



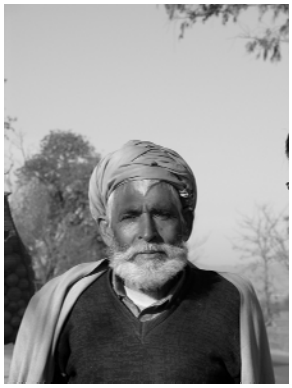


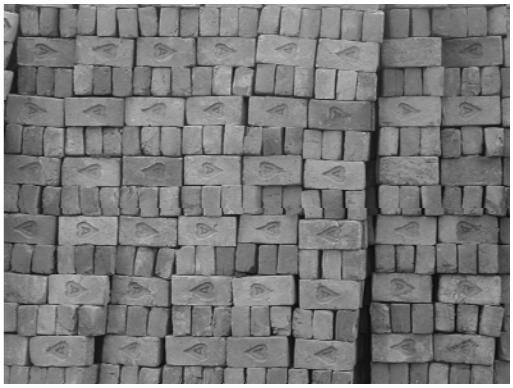
Telemedicine in Earthquake Response

- Rapidly train 10 medical students
- Send them out to the relief clinic at ground zero with laptop, EHR, satellite phone and camera
- Start screening patients and interact with the relief groups.
- Directed patients down to the Rawalpindi medical College. Overall 6000 patients were transferred
- Conduct telemedicine consults at one clinic with faculty at Holy Family Hospital, Rawalpindi

Overall damages by Telemedicine team in Tehsil Balakot

Area	Deaths		Injuries		Damaged Houses	
	M	F	M	F	Kacha	Pakka
Balakot	4539	4303	2730	2170	13944	8928





Technology	Frequency	Bandwidth	Power	Population	Cost	Issues
HF (Ham) Radio	1-30 MHz	100-400 bps	+	+	+	Antenna ~9 m
VHF> Police + UHF>Ambulance	30-200 MHz 200 MHz-1Ghz	2400-9600bps	++	++++	+	<5 Km to node
Cellular (Analog) (1st generation)	800-900 MHz	2400-9600bps	+	++++	+	<5 Km to node
Cellular (Digital) (2nd generation)	1.7-1.8 GHz	14.4-60Kbps	++	++++	++	<5 Km to node
LEOS Satellite	1.5-1.7 GHz	2400 – 9600 bps	++	0	+++	Outside access
Geosynchronous Satellite (Inmarsat)	1.5-1.7 GHz	64 Kbps	+++	0	+++ +	Outside antenna dish
Wireless Ethernet (3rd generation)	2.5 GHz	11-100+ Mbps	+	0	++	<30 m to node

Table 2. Telemedicine package configurations for various disastrous cases

Disastrous cases	Functions of medical equipment and medicines	Transportation	Communication devices	U interfaces
Typhoon/hurricane Floods/Tsunami	Relief from drown Prevention for infectious diseases	Boats, helicopters	Telephone, telemedicine equipment	Wireless, satellite
Earthquakes/fire	Relief from burn Relief from crash syndrome	Vehicles, helicopters	Telephone, telemedicine equipment	PSTN, mobile Wireless, satellite
Volcano eruptions	Relief from poisonous gas Relief from burn	Vehicles, helicopters	Telephone, telemedicine equipment	PSTN, mobile Wireless, satellite
Air crash/traffic accidents	Relief from crash syndrome Relief from fracture of bones and burn	Helicopters, vehicles	Telephone, telemedicine equipment	Wireless, satellite mobile
Nucleus power station trouble	On site sampling of HLA type for bone marrow transplant	Vehicles, helicopters	Telephone, telemedicine equipment	PSTN, mobile Wireless, satellite
Terrorism by bombing	Burn, Barotrauma, Pulmonary injury	Vehicles, helicopters	Telephone, telemedicine equipment	PSTN, mobile Wireless, satellite
Terrorism by poisonous gas	Secured aspiration	Vehicles, helicopters	Telephone, telemedicine equipment	PSTN, mobile Wireless, satellite

Source: http://www.itu.int/osg/itusetting/doc.asp?type=items&lang=e&parent=D03-RGQ14.1.2-C-0045

Conclusions

- Telemedicine is routinely supported by terrestrial telephony and Internet in areas that are developed and intact.
- With disruption of services in disaster routine telecommunications are typically an early casualty. Cellular systems are especially vulnerable..
- Disaster can reduce any community to the dependent and vulnerable state otherwise associated with the developing world.
- Disaster communications based upon radio are reliable and have worked for 50 years.
- The amount of information needed to support medicine cannot be transmitted by HF radio.
- A robust, well practiced satellite system can replace the information void otherwise associated with disaster.
- Prior training and prepositioning of telecommunications can make telemedicine an immediate and reliable adjunct to disaster management

Telemedicine In Disaster Mangement-- The Military Viewpoint

David M. Lam, M.D., M.P.H.
U.S. Army Telemedicine & Advanced Technology Research Center

Thanks for data and slides to: Colonel Angel L. Lugo, Commander & Colonel Kenneth E. Hawk, Deputy Commander for Clinical Services 212th MASH

"This presentation represents The opinions of the author, and Not necessarily those of TATRC, MRMC, or the United States Army"

3rd INTENSIVE BALKANS TELEMEDICINE AND E-HEALTH SEMINAR

Skopje, Macedonia
February 2009

TMED in Disasters-- the Literature

- First impression: GREAT! TMED changes the way we do business and saves lives. (Especially in reports from the early TMED use in the 1980s, 1990s)
- But: Mostly anecdotal individual case reports, with limited analysis on a systemic basis-- limited number of cases in which it altered care
- Most reports emphasise simple utilisation, not beneficial utilisation
- Not useful in all phases of a disaster
- Some have said, "If you need TMED in the acute phases of a disaster, you have deployed the wrong physicians"

Telemedicine Definition

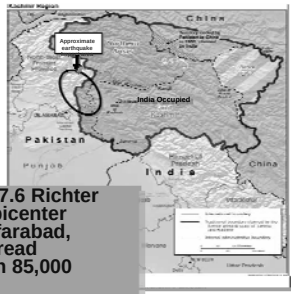
"The use of advanced telecommunication technologies to exchange health information and provide health care services across geographic, time, social, and cultural barriers."

NATO STANAG 2517

Note: Does not necessarily include medical administrative data, as in patient tracking.

The Experience of One U.S. Army Hospital in an Earthquake Zone-- Pakistan 2005

Earthquake



- 8 Oct 2005 -- A devastating 7.6 Richter scale earthquake with an epicenter located 30 km NW of Muzaffarabad, Pakistan; Resulting widespread destruction led to more than 85,000 deaths
- The MASH and SMART Team were deployed on 18 October 2005 to Muzaffarabad to provide humanitarian assistance to the people of this region following this event.

212th Mission

TF 212th MASH provided **far forward resuscitative and surgical care, hospitalization, out-patient services, preventive medicine services, and medical outreach missions** for humanitarian assistance operations in support of Operation Lifeline, Disaster Assistance Center, Pakistan. In addition, served as Area Commander for all military forces in Muzaffarabad area focusing on administrative, logistical, and force protection matters.

SMART Team (Telemedicine)

(Medical Command, Control, Communication & Telemedicine Special Medical Augmentation Team)

The SMART TEAM is a U. S. Army special unit that was designed to provide short duration augmentation to local, State, Federal and defense agencies or medical teams responding to disasters, civil-military cooperative actions, humanitarian assistance, weapons of mass destruction incidents, Chemical, Biological, Radiological, Nuclear, or Explosive (CBRNE) events or emergencies. **It is not used for traditional combat scenarios but is intended for deployment for humanitarian (including disaster relief), peacekeeping, and other stability and support operations. As its name implies, it provides communications capabilities which can be used for telemedicine as well as other communications requirements.**

SMART Team Mission

1. Providing initial on-scene incident assessment.
2. Task organizing and calling forward additional tailored teams, supplies and equipment.
3. Providing basic man-portable communications equipment sufficient to communicate intra- and inter-team and to home base station.
4. **Providing technical expertise and man-portable telemedicine equipment sufficient to install, operate and maintain a rudimentary emergency teleconsultation capability from a remote field site.**

The Team's equipment includes a 56/64 kbps satellite terminal that is capable of making telephone calls or establishing a low speed Internet connection.

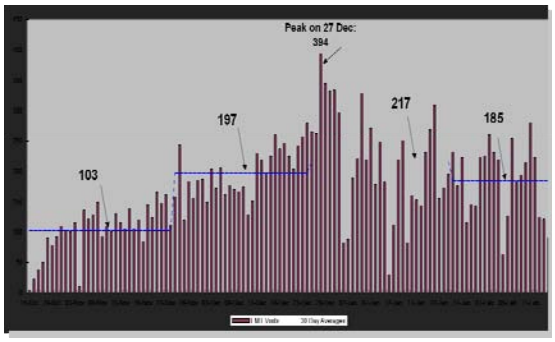
Medical Capabilities

- Emergency Medicine & Advanced Trauma Life Support
- 2 Surgical Tables with the following Specialties:
  - General
  - Orthopedic
  - OB/GYN
  - Anesthesia
- Internal Medicine
- Primary Care (Family Practice, Pediatrics)
- 84 Bed Facility
  - Preventive Medicine Services
- Command, Control, Communications, Computers & Information (C4I)

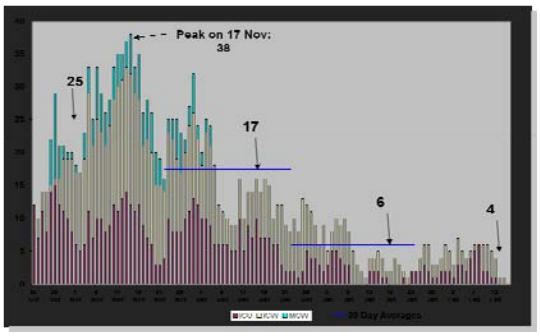
Operational

- Arrived Muzaffarabad Forward Operating Base (FOB) 24 Oct 05
- First patients seen within 6 hours
- Initial Operating Capability (IOC) established within 24 hours
  - First surgery performed 25 Oct 05
  - ICU beds filled on 25 Oct 05
- Immediately integrated into World Health Organization (WHO)
- & Pakistan Ministry of Health (MoH) relief management efforts

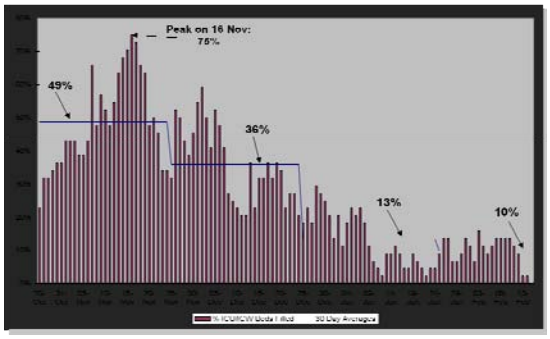
Patient Visits



Hospital Census



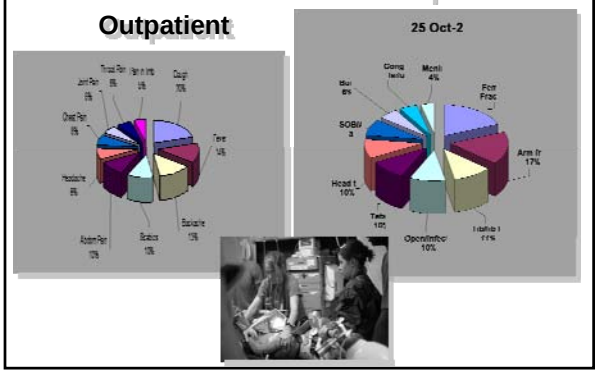
High Acuity Census



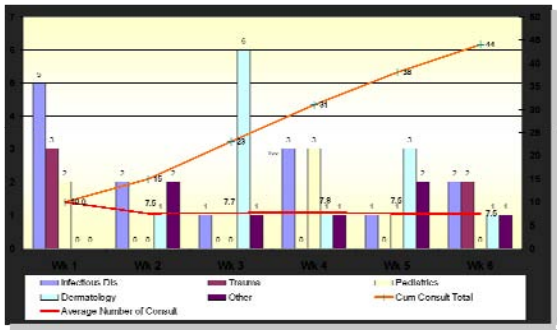
Complaint Categories

Inpatient

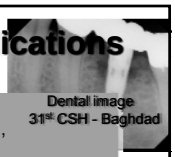
Outpatient



Telemedicine Consults

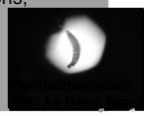


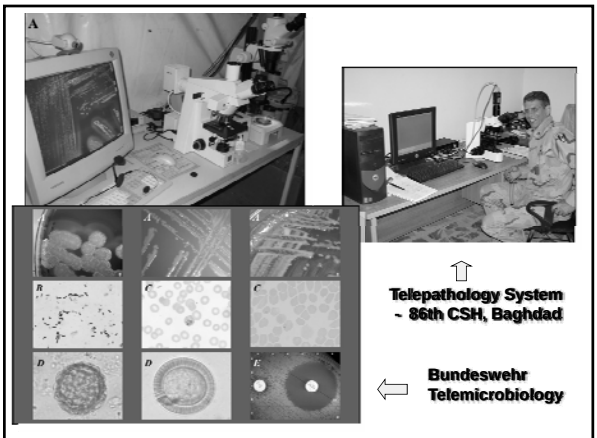
Current Telemedicine Applications



Dental image
31st CSH - Baghdad

- Initial Urgent Evaluation Of Patients,
  - Triage Decisions, And Transfer Arrangements;
- Management Of Acute Or Chronic Diseases
  - Requiring A Specialist Not Available Locally;
- Supervision And Consultation For Primary Care
  - Encounters Where A Physician Is Not Available;
- Extended Diagnostic Workup Or Short Term
- Management Of Self-limited Conditions;
- Routine Consultations;
- Transmission Of Diagnostic Images;
- Medical/surgical Follow-up;
- Transmission Of Medical Data

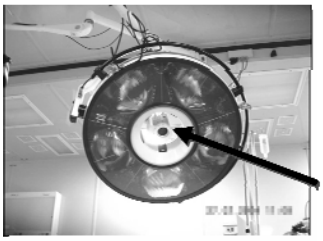




Telepathology System
- 86th CSH, Baghdad

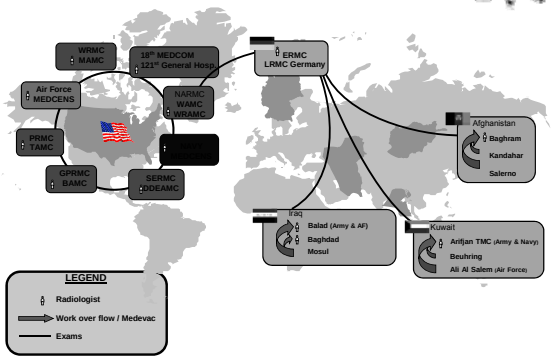
Bundeswehr
Telemicrobiology

Polish Telementoring



Embedded Camera

Theater Teleradiology



Phases of a Disaster

- Acute (24 hours to one week)-- Patients with acute trauma/ lifesaving requirements-- medical emphasis is on trauma and surgery.
- Recovery (after one week)-- Patients tend to be more chronic disease or “routine”. Medical emphasis is on primary care.

Utility of Telemedicine

- Acute Phase-- not much use, except in the rare instance of a fully qualified surgeon who needs support from sub-specialists. Our deployed personnel are qualified to deal with acute and sub-acute trauma. Same for most NGOs.
- Recovery Phase-- TMED was felt to be of primary use during the early phases of the deployment, when the medical staff was learning about diseases endemic to the disaster area, or when dealing with diseases new to the practitioners, rather than in dealing with acute or subacute trauma. Store and Foreward is more useful than VTC

Lessons Learned for the Recovery Phase of a Disaster

- Most patients seen are relatively well, with acute minor illnesses and chronic diseases
- Goal: work through/with local healthcare system, rather than create a western-style non-sustainable system
- Primary care is critical-- Combat surgical hospitals may not be the best things to send

Lessons Learned in Pakistan

- Telemedicine integrated into a deployed military hospital works well in a disaster setting, but is of limited utility.
- However, the disaster stage at which it is deployed will to a large extent determine usage.
- We gained no experience in the acute phase, due to arrival in the recovery phase of the disaster, though it appears that there will be little real use for TMED in the acute (surgical) phase, based on surgical patients seen immediately after arrival.
- Although Teleradiology was available late in the deployment, it was little used, as the Medical staff felt qualified to read the films they ordered.
- If well-trained and experienced medical personnel are deployed, the use of teleconsultation will be of immediate use in the recovery phase as clinicians encounter diseases or problems they are unfamiliar with, but this usage rapidly falls off as they gain experience with local conditions.
- General communications support provided by a TMED capability is probably at least as important as actual clinical support.

Conclusions

- TMED may help with efficient utilisation of resources, especially in the recovery phase
  - Volunteer
  - Military
- TMED is a "nice to have" item, but there are few patients for whom it has proven a vital necessity, assuming you deploy well-trained and well-equipped facilities.
- If you deploy lower-capability facilities or personnel, it may prove able to compensate for the lacks.
- Real-time video teleconferencing (VTC) has not always been required nor useful

Reference

Lam D, Meade K. "A Deployable Telemedicine Capability in Support of Humanitarian Operations". Telemedicine and E-Health, 13 (3): 331-340, 2007.

International Virtual e-Hospital Foundation
www.iveh.org

Clinical Telemedicine

Third Balkan Telemedicine and e-Health Seminar

Current Principles and Practices of Telemedicine and e-Health
Clinical Applications and Evidence-Based Outcomes

February 6-7, 2009

Skopje, Republic of Macedonia

International Virtual e-Hospital Foundation
www.iveh.org

Clinical Telemedicine

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Center for Surgical Innovation
Deputy Director
Advanced Center for Telemedicine and Surgical Innovation (US Army - Funded)
Associate Professor of Surgery and Biomedical Engineering
Department of Surgery
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Special Assistant to the Chief Health and Medical Officer, NASA Headquarters, Washington, DC (NASA – Funded)
Executive Director, Telehealth Video Resources Center (Ohio Board of Regents - Funded)
Administrative Director, Minimally Invasive Medical Technologies Center (NSF – Funded)
Editor-in-Chief, Telemedicine and e-Health Journal

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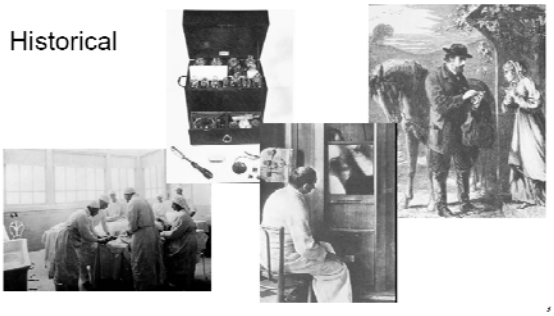
Clinical Telemedicine

Historical



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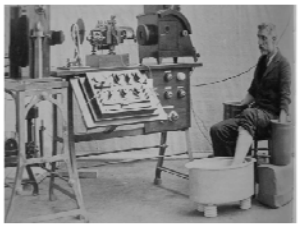
Clinical Telemedicine

Early Technology– Early Challenges



Einthoven EKG 1912

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Clinical Telemedicine

Communications

Computer/Information technologies

— multimedia computers

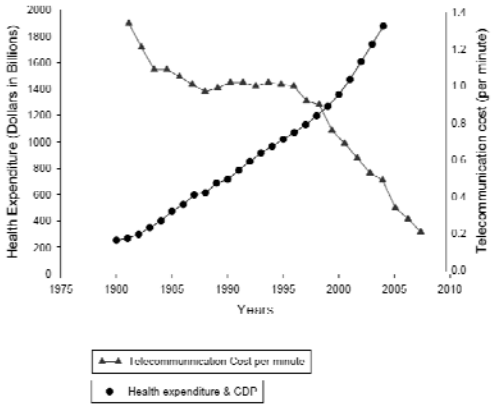
— Internet

— World Wide Web

— virtual presence/environments

— artificial intelligence/decision support systems

— smart materials



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Clinical Telemedicine

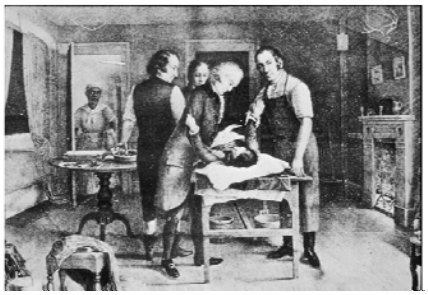
Telemedicine Technologies

Store-and-Forward

Real-Time Video

9

Clinical Applications of Telemedicine



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Clinical Telemedicine

- Radiology
- Pathology
- Primary Care
- Dermatology
- Psychiatry
- Disaster Response
- Extreme environs
- Medical tourism
- Home healthcare
- Patient Centric
- Surgical Care
- Medical Education
- Correctional Medicine
- Military
- Space

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Clinical Telemedicine

Radiology

- Picture Archiving System – PACS
- Standards
- Digital Image Communications in Medicine (DICOM)
- Image Acquisition
- Compression
- Storage

X-ray size 4K x 4K, 12 bits, 4 images per exam, Avg. Storage Requirement 128MB

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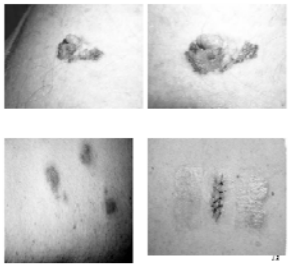
Clinical Telemedicine

Pathology / Dermatology

- Imaging systems
- Standards
- Image Acquisition
- Compression
- Storage
- Transmission



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Clinical Telemedicine

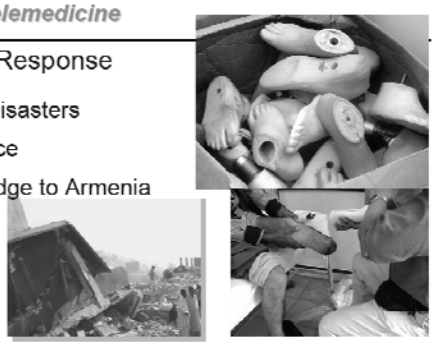
Trauma / Ambulance

International Virtual E-Hospital Foundation
www.ivch.org

Clinical Telemedicine

Disaster Response

- Natural Disasters
- Experience
- Spacebridge to Armenia



International Virtual E-Hospital Foundation
www.ivch.org

Clinical Telemedicine

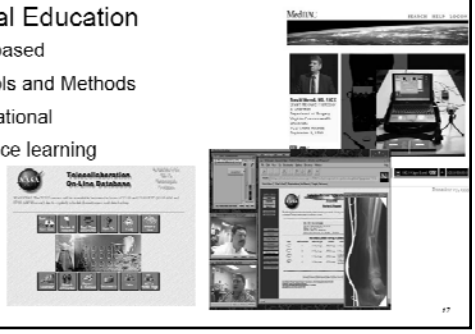
Surgery

International Virtual E-Hospital Foundation
www.ivch.org

Clinical Telemedicine

Medical Education

- Web-based
- IP Tools and Methods
- International
- Distance learning

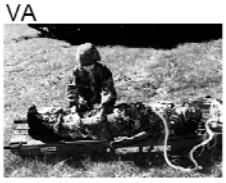


International Virtual E-Hospital Foundation
www.ivch.org

Clinical Telemedicine

Military

- Ships at sea
- Battlefield
- CONUS
- VA



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Clinical Telemedicine

SPACE FLIGHT ACTIVITIES

- Medical Monitoring
- Health Maintenance
- Countermeasures

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Clinical Telemedicine

Extreme Environments

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Clinical Telemedicine

War

Telemedicine in humanitarian efforts - post war

- Changing needs
- Population base

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Clinical Telemedicine

Kosovo

- Limited Resources
- Surgical Education
- Integration of information technology to benefit health care recovery

International Virtual E-Hospital Foundation
www.ivch.org

Clinical Telemedicine

Ecuador

- Remote Environments
- Mobile capabilities
- Pre-op / post-op screening
- Low Bandwidth
- EMR
- Validation

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Clinical Telemedicine

Home or Where ever you are

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Clinical Telemedicine

Mobility in Healthcare

- Mobile patient
- Mobile disease manager
- Mobile technology
- Mobile First Responder
- Mobile learner and consultant

Operation Lindbergh

- Trans Atlantic – dedicated com network
- Surgical removal of gall bladder
- Surgeon in New York – Patient in France
- Most missed story of 2001

Canadian Telesurgery

- 45 Mbps 144msec MPLS IP VPN + Zeus TS
- Hamilton - North Bay
- Laparoscopic Nissen Fundoplications

NASA Extreme Environment Mission Operations

Great analog for space

NEEMO 12

- Evaluation of University of Washington's RAVEN robot
- Evaluation of SRI's M7 enhanced robot
- Autonomous task operation – ultrasound
- TATRC funded
- NASA, NOAA, Army, Navy, Air Force – academia and industry

High Altitude Platforms for Mobile Robotic Telesurgery

International Virtual e-Hospital Foundation
www.iveh.org

Clinical Telemedicine

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Globalization of Telemedicine: The Grass Root Approach

F. Lievens [1,2,3], M. Jordanova [4,5]

[1] Board Member and Secretary, International Society for Telemedicine & eHealth (ISfTeH), Switzerland
[2] Board Member, World Academy of Biomedical Science and Technology (WABT), France
[3] International Coordinator Med-e-Tel, Belgium, lievensf@skynet.be
[4] Coordinator Educational Program Med-e-Tel, Bulgaria
[5] Solar-Terrestrial Influences Institute, Bulgarian Academy of Sciences, Bulgaria, mjordan@bas.bg

WHAT IS eHEALTH

eHealth

- eHealth refers to the use of modern information and communication technologies to meet the needs of citizens, patients, healthcare professionals, healthcare providers, as well as policy makers

  (EU Ministerial Declaration, Brussels 22 May 2003)

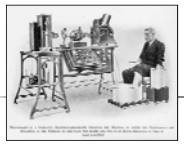
- In a broader sense, **eHealth** is not only an application of technical achievements in healthcare, but it is also a state-of-mind, a way of thinking, an attitude, and a commitment for networking at all possible levels. eHealth is a global thinking plus the ambition to contribute to the improvement of health services at local, regional, continental and worldwide level by wide application of information and communication technology

Eysenbach G. J Med Internet Res 2001;3(2):e20) doi:10.2196/jmir.3.2.e20

HOW IT EMERGED

The Beginning

- 1905 –W. Einthoven – transmission of ECG signals via telephone
- 1906 – First publication: Einthoven W., Le telecardiogramme, "Archives Internationales. Physiologie" 4:132, 1906
- 1920 - Morse code applications for distant consultations
- 1924 - The first exposition of Telecare
- 1950s - radiology image transfer and videophone experiments
- 1955 – Telepsychiatry: Nebraska Psychiatric Institute - closed-circuit television
- 1957 – Space medicine on the pipeline
  - Knowledge gained from the space programs facilitates medicine: programmable heart pacemakers, implantable drug administration systems, magnetic resonance imaging, computerized axial tomography
- Mid-1990s –worldwide explosion of telemedicine programs in nearly every area of healthcare



Einthoven's original ECG

Telephone 1905

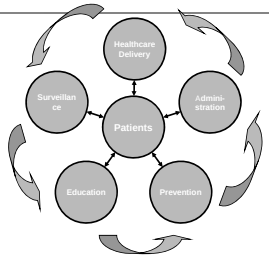
Morse Code Key 1920

The first exposition of Telecare

4.11.1957 Sputnik

WHAT eHEALTH OFFERS

Optimizing Healthcare System: Moving Towards Citizens Centered Healthcare



Traditional medicine - patients move upward, unchanged for 6000 years

eHealth - direct universal access to globally spread specialist s - www, IDTV

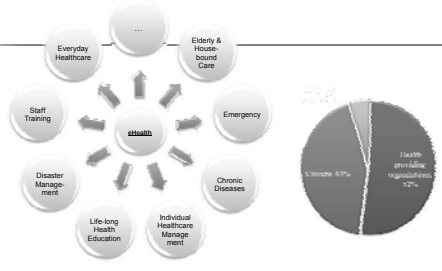
eHealth Promises

- Quick, timely high quality healthcare
- Affordable healthcare for all, everywhere, at any time
- Optimizing patient care
- Enhancing preventive care
- Protecting human rights
- Education – empowered citizens
- Reduction of healthcare budgets
- ….

- Despite of that, the humanity is still far away from the world of cyber healthcare, from extensive application of technology for the benefit of all

TODAY

eHealth Applications Are Everywhere



and its ultimate beneficiary are the citizens

Beneficiaries source "eHealth is Worth it: The economic benefits of implemented eHealth solutions at ten European sites www.ehealth-impact.org/


Mobile health


Telerehabilitation


Homecare

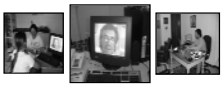

Tele-consultations


Chronic diseases

eHealth


ePrescription


Telenursing


Tele-psychiatry


Tele-psychology

Tele-surgery Munich [1]

Blood pressure meter and NFC enabled mobile phone

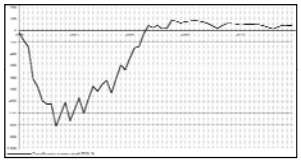
eHealth

VR Head-Mounted Device

[1] pegasus.me.jhu.edu/~rwebster/index_files/pub_files/chapter.pdf

eHealth

eHealth: Return of Investment



Return of investment: Stolyar V., Sel`kov A. et al. Economics and Marketing ... In Global Telemedicine / eHealth Updates: Knowledge Resources, Vol. 1, Luxexpo, Luxembourg, 2008, ISBN 1998-5509, pp.145-152

To Summarize

- The development of eHealth is a **"grass root"** one, i.e. in most cases the ideas, projects, technologies, products were developed and implemented from the bottom up rather than from the top down

ALWAYS BE AWARE ABOUT WHAT IS GLOBALLY GOING ON TROUGH INTERNATIONAL NETWORKING INITIATIVES!

International Organizations & Institutions

- **WHO**
  - The recipiendary
  - Major coordination role
  - Worldwide (193 member states)
  - eHealth Unit
  - eHealth Resolution
  - Global eHealth Observatory
- **ITU**
  - Telecommunication issues
  - Standardization role
  - Cooperation with WHO
- **EU**
  - European Commission Information Society and Media Directorate General Unit H-1 IST for Health - D.G. INFSO
  - European Commission Directorate General Health and Consumer Protection Unit C2 Health Information - D.G. SANCO
  - Major impact through its Framework Programs
  - Another DG is taking up eHealth in its program - DG Enterprise and Industry

International Organizations & Institutions

- **UNOOSA**
  - **Space issues**
  - **Peaceful applications of Outer Space**
  - **Action Team 6 Telehealth**
  - **Organization of workshops in all continents**
- **WABT/UNESCO**
  - **Educational, Scientific, Cultural and Communication issues**
- **NEPAD**
  - **New Economic Partnership for African Development**
  - **Important driving force for eHealth implementation on the African continent**
- **Etc.**

But

World Health Organization

Only WHO is fully dedicated to health issues

Other organizations deal with health issues amongst several other activities

Therefore WHO should have the ultimate coordinating responsibility

International Societies & Associations

- Telemedicine - Around Healthcare Professionals
- Informatics - Around IT Professionals
- Telecom - Around Telecommunication Professionals
- Management - Around Management Professionals
- Patients

More cooperation and coordination is vital!

The Role of International Organizations

- Mapping local, national & regional initiatives, capacities, impacts, outcomes
- Improved professional education and increasing awareness of professionals, decision makers and public
- Gap analyses
- Strengthening the capacity building and filling the gaps
- Healthcare liability across borders
- Facilitation of effective collaboration among different stakeholders
- Facilitating the implementation of eHealth worldwide
- Steps in solving reimbursement issues
- Solving standardization issues
- And many more ...

Interactivity and Networking Initiatives

Over the years, 2 main "Associative" structures were developed:

- Medical Informatics (Engineers and Computer specialists) in the '80s - IMIA (**www.imia.org**)
- Telemedicine (Health Care professionals) in the '90s - ISfTeH (**www.isft.net**)

Importance of improved and continuous cooperation and coordination

The International Society for Telemedicine & eHealth

http://www.isft.net

ISfTeH

NGO in Official Relation with WHO

ISfTeH

Mission Statement

The ISfTeH exists to facilitate the International dissemination of knowledge and experience in Telemedicine and eHealth and to provide access to recognized experts in the field worldwide!

Acting as

- Moderator in all aspects of healthcare
- Feeder for information and projects
- Coordinator between science, education and implementation
- Activator of networking and development

ISfTeH is the International representative body of National and other Associations, Institutions, Corporations, Individuals

In Partnership with WHO, ITU, UNOOSA, WABT/UNESCO

Liaising with other International Associations

ISfTeH

- **National members (as per October 2008)**

  Argentina, Australia, Austria, Bangladesh, Bosnia & Herzegovina, Brazil, Canada, D.R. Congo, Croatia, Denmark, Finland, France, Georgia, Germany, Hungary, India, Italy, Japan, Malaysia, Netherlands, New Zealand, Nigeria, Poland, Russia, Switzerland, Ukraine, UK, Venezuela

ISfTeH

- **Associative members -** Brazil, France, Germany

- **Institutional members**

  Australia, Belgium, China, Colombia, Denmark, France, Greenland, Lithuania, Mexico, Norway, Pakistan, Poland, Russia, South Africa, Turkey, USA

- **Corporative members –** Belgium, Germany, Russia, Switzerland, UK, USA

ISfTeH

- **Individual members**

  Algeria, Australia, Austria, Belgium, Egypt, France, Hungary, India, Italy, Japan, Moldova, Nigeria, South Africa, Spain, The Netherlands, Ukraine, United Kingdom, United States

- **Students members**

  Australia, Brazil, France, Germany, Hungary, Indonesia, Lithuania, Romania, Sweden, Switzerland, Turkey, U.K., U.S.A.

- A Working Committee "Students" has been started up within the ISfTeH to promote and follow-up specific eHealth activities amongst the student community worldwide

Students Membership Applications are most welcome!

ISfTeH

- A Working Committee "Education" is now functioning under the umbrella of ISfTeH (chaired by Prof. M. Mars, South Africa)
- The mission is
  - Establishing basic Telemedicine/eHealth templates for fundamental training programs
  - Coordinating Telemedicine/eHealth educational efforts around the Globe
  - Assisting the set up of new courses in eHealth / Telemedicine
  - Defining the needs of universities and specialists for basic and continuous education
- Enormous success of virtual students session at Med-e-Tel 2008
- Virtual students session planned for Med-e-Tel 2009!

ISfTeH

- Working Groups
  - Education
  - Students
  - Tele-nursing
  - Nomenclature and Best Practice
  - eHealth IT
  - Communication and Newsletters

Med-e-Tel

- **Med-e-Tel**

  The International eHealth, Telemedicine and Health ICT Forum For Education, Networking and Business

- **www.medetel.lu**

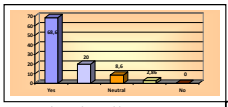
Med-e-Tel

- Truly international with more than 50 countries attending
- Broadly educational with CME accreditation by the EACCME
- Extensive program with sessions and meetings on a wide variety of topics
- Versatile exhibition of products and services
- Focusing on practical experiences and results
- Supported by major international organizations
- Important media partnerships to reach a global audience
- The ultimate networking event in telemedicine and eHealth

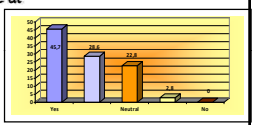
Med-e-Tel 2008

- >170 presentations from 50 countries
- 43 media partners
- Exhibitors and presentations available at **www.medetel.lu**
- Highly evaluated by attendees

Countries represented at Med-e-Tel 2008

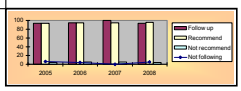


Have I learned something from this event? (%)



Will the event change my practice? (%)

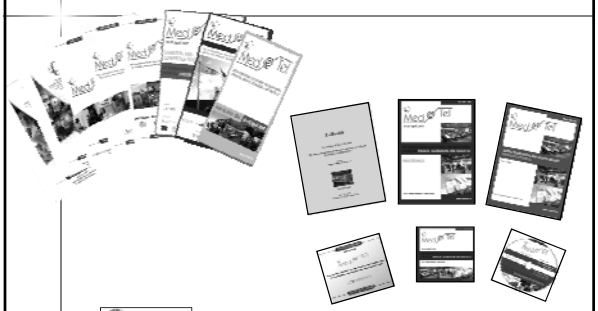
Follow-up

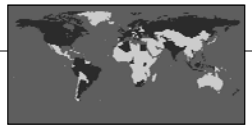


Accreditation

- Med-e-Tel provides many educational opportunities through its extensive program of presentations, panel discussions, workshops and satellite symposia
- **Med-e-Tel 2008 was accredited by the European Accreditation Council for Continuing Medical Education (EACCME) to provide maximum of 18 hours of European external CME credits for medical specialists**
- EACCME credits are also recognized by the American Medical Association towards the Physician's Recognition Award (PRA)
- **83 medical doctors have already received CME credits at Med-e-Tel**

Editions and Publications





Countries present in the preliminary program as per January 15, 2009

Next edition April 1-3, 2009!

Join us and do not forget to tell your friends!

Be open minded even if in the eyes of other this is unreasonable!

The reasonable man adapts himself to the world.

The unreasonable one persists in trying to adapt the world to himself.

Therefore, all progress depends on the unreasonable ones.

Bernard Shaw

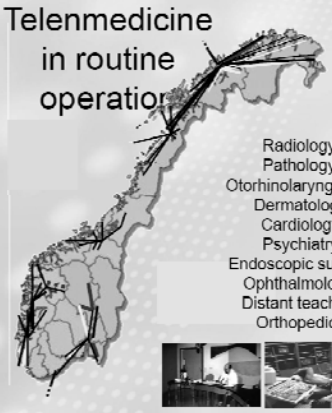
THANK YOU!

NST | Nasjonalt senter for telemedisin
UNIVERSITETSSYKEHUSET NORD-NORGE
WHO Collaborating Centre for Telemedicine

Telemedicine in Chronic Diseases and Diabetes

Steinar Pedersen

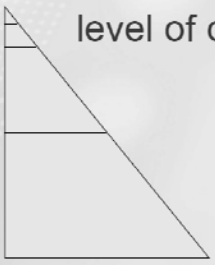
Telenmedicine in routine operation



Radiology
Pathology
Otorhinolaryngology
Dermatology
Cardiology
Psychiatry
Endoscopic surgery
Ophthalmology
Distant teaching
Orthopedics

Patients and level of care

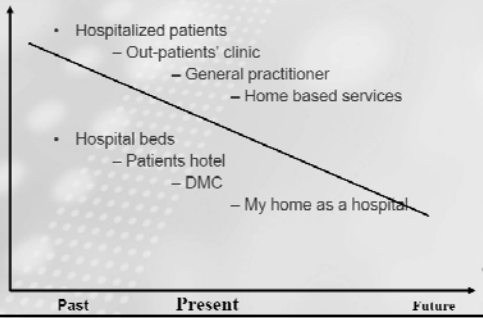
Persons per month	Care level
2 (1)	University hospital
3 13 (9)	Local hospital
150	General practitioners
500	Self-care
85	Symptoms, no treatment
250	No symptoms
1000	Risk population



Source: Anders Grimsmo

Structural changes

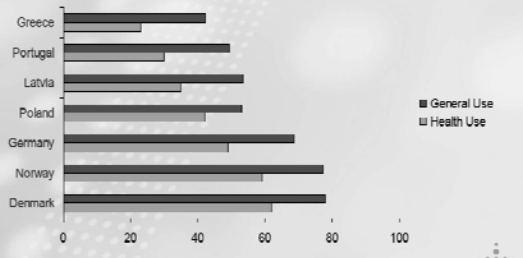
- Hospitalized patients
  - Out-patients' clinic
    - General practitioner
      - Home based services
- Hospital beds
  - Patients hotel
    - DMC
      - My home as a hospital

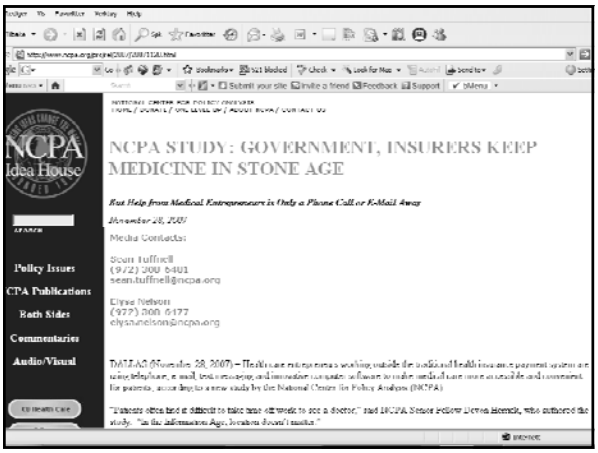


eHealth trends partners

- Norwegian Centre for Telemedicine, University Hospital of North Norway, Norway (NST)
- Fyns Amt, Danish Centre for Health Telematics, Danmark (Funen)
- Friedrich-Alexander-Universität Erlangen-Nürnberg, Lehrstuhl für Medizinische Informatik, Germany (IMI)
- Foundation for Research and Technology - Hellas, Greece (FORTH)
- Health Promotion State Agency, Latvia (HPSA)
- Wroclaw Medical University, Poland (Wroclaw)
- Universidade de Aveiro, Portugal (Aveiro)

Use of the Internet for health purposes




NCPA STUDY: GOVERNMENT, INSURERS KEEP MEDICINE IN STONE AGE

But Help from Medical Entrepreneurs is Only a Phone Call or E-Mail Away

November 28, 2007

Media Contacts:

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sean.tuffnell@ncpa.org

Elyse Nelson
(972) 380 8177
elysnelson@ncpa.org

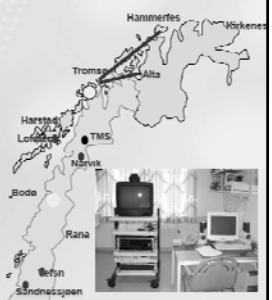
Policy Issues
CPA Publications
Both Sides
Commentaries
Audio/Visual

- The study notes that the biggest obstacle to Information Age medicine, commonly referred to as telemedicine, is government and traditional insurance, which only reimburses for face-to-face consultations. Therefore, the most interesting developments in telemedicine are occurring outside traditional insurance, both by new medical services and by individual practitioners

IBM: Healthcare 2015

- Healthcare delivery is overly focused on episodic acute care; it must shift and expand to include and embrace prevention and chronic condition management in order to respond to the merging environment.
- By 2015, we belive chronic patients will be empowered to take control of their diseases through IT-enabled management programs…..
- Patients and their families, assisted by health infomediaries, will replace doctors as the leaders in chronic care management……

Tele-Dialysis



- Control and follow-up of
- Remote visit, guiding and education

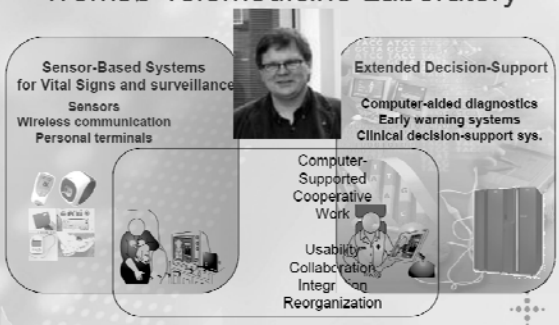
Arterial ulcers

Photography

Outpatient department at UNN

Teleorthopedy

Tromsø Telemedicine Laboratory



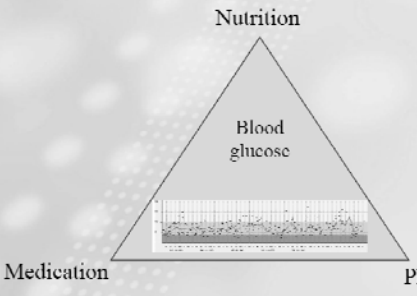
What it is all about

- To prevent healthy people to become sick
- To keep the sick people out of the health car institutions

Medical challenges

- 194 mill. with diabetes, increases to 330 mill. in 2025
- In Norway: 240 000. USA: 20.8 mill.
- Poorly regulated blood glucose increases the chance for diabetic complications.
- Diabetic complications, in Norway: NOK 7 bill. / year
- WHO: The wave of elderly, increase in weight due to food/physical activity → epidemic increase in Type 2 diabetes

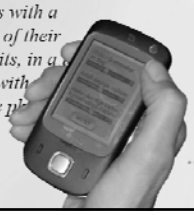
The diabetes patients' challenge



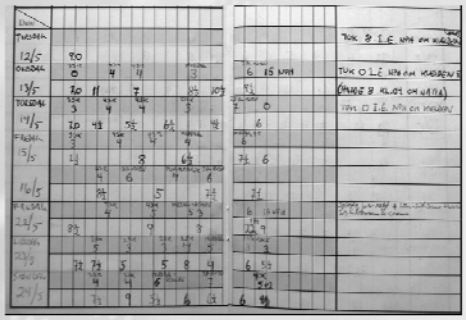
The concept

Include no more than three parameters
- in order to minimize the complexity
and
- to design an easy-to-use system

Providing users with a better overview of their disease-related habits, in a that is "always" with i.e. their mobile ph



I.e., Instead of paper diaries



The Self-Help Tool

Evolved by involving real users,
and combining ICT, computer science,
medical informatics, telemedicine and medicine

Utilizing mobile phones, wireless communication, and sensor systems

Basis: mobile phones with touch-sensitive screen

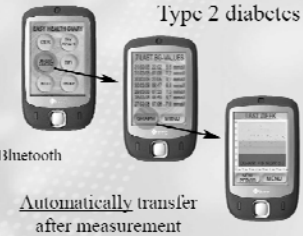
The Few Touch application

- Blood glucose level
- Physical activity
- Nutrition habits

Parameter 1: Blood glucose

Paper 3:
Blood glucose sensor systems

Type 2 diabetes (self-help)



Bluetooth

Automatically transfer after measurement

Type 1 diabetes (data to parents)

SMS

Parameter 2: Physical activity

and presented to the user in an informative way

automatically to the phone

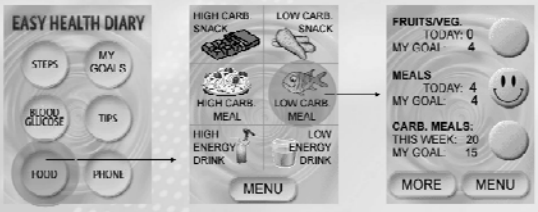
7 9 5 1

the physical activity is recorded

7 9 5 1

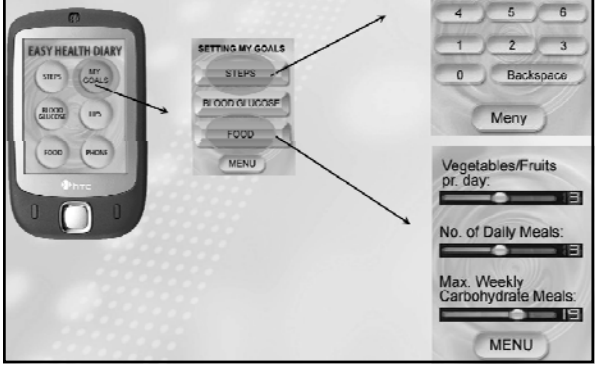
Parameter 3: Nutrition habits

Easy input forms - few touches

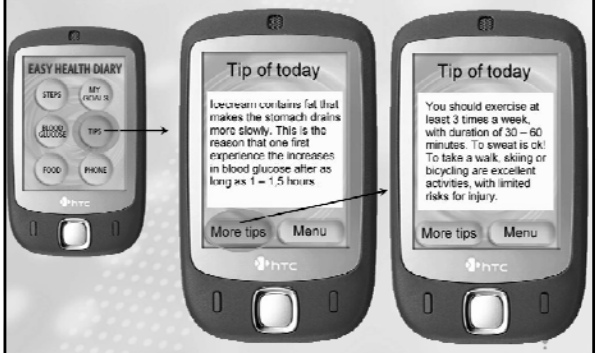


The tool will provide overviews and give feedback according to your aims

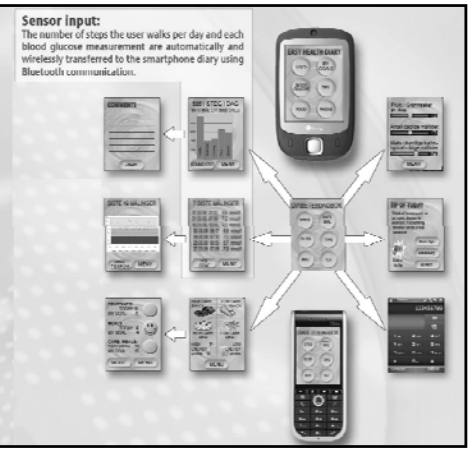
Goal setting



General information

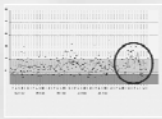


The self-help tool



Paper 7:

Epidemic Disease Indicator



Proposal of the concept:
Since BG increases due to infections

Can a repository of BG values be used for achieving indications of infectious disease outbreaks?

– Årsand E, Walseth OA, Andersson N, Fernando R, Granberg O, Bellika JG and Hartvigsen G. *Using blood glucose data as an indicator for epidemic disease outbreaks.* Studies in Health Technology and Informatics, October 2008; 116(X): pp. 217–222.

Possibly test set-up of the EDDG system

Possible outbreak

Abnormal situation, 8 additional long-lasting instances over 10 mmol/l a day.

Tele-Warf

- Patients with a risk of blood clot
- Warfarin decrease the prothrombin time
- Risk of blood clot and haemorrhage

home laboratory data
...
are sent automatically and wireless to a cell phone and through the Health Net
...
to decision support system based upon a pharmakinetic model
.....
assist doctors in dosage planning
...
and ensure the patient against wrong medication

Healthcare@home

- Elderly patients with COPD, diabetes or kidney failure
- 50% over 65 years don't use PC – need for a simple interface
- Better individual follow-up

Individual follow-up based on ex. Blood sugar measurements, oxygen saturation in the blood

Discussion with health care personnel and with other chronics

Legible education information
Group education/conversation
Lecture, attend exercise program

Group based training

- Started with an initial meeting at the hospital for the participants
- TV-meetings at home on a weekly basis

Individual following-up

- On a weekly basis (two part video conferencing)
- Personalized following-up

Thank you for your attention!

www.telemed.no

Telemedicine in Extreme Conditions

Rifat Latifi, MD, FACS

Professor of Surgery
Vice Chairman, International Relations
Department of Surgery, University of Arizona, Tucson, AZ
Associate Director of Arizona Telemedicine Program,
Telesurgery and International Affairs
President, International Virtual e-Hospital Foundation
Director, Telemedicine Program of Kosova

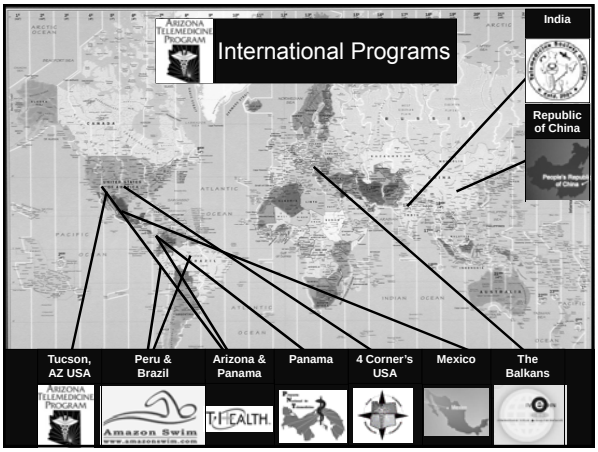
Telemedicine in Extreme Conditions

Mateja de Leonni Stanonik, MD, PhD[3,4], George Hadeed, MPH[1], Charles R. Doarn, MBA[3,5], and Ronald S. Weinstein, MD[2]

[1]Department of Surgery and [2]Arizona Telemedicine Program, Arizona Health Sciences Center, Tucson, Arizona; [3]International Virtual e Hospital, Anchorage, Alaska; [4]George Washington University, Department of Neurology, Washington DC; and [5]Center for Surgical Innovation, Department of Surgery, University of Cincinnati, Cincinnati, Ohio

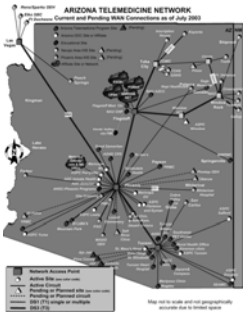
TELEMEDICINE IN EXTREME CONDITIONS: What does it mean?

- Rendering medical care and education to people in extreme conditions such as remote and mountainous sites, areas affected by natural or man made catastrophes, or simply in territories that do not have access to modern medical care
- One of the best applications of telemedicine, yet it represent one of the greatest challenges.



1,950 the cruelest border miles on earth…

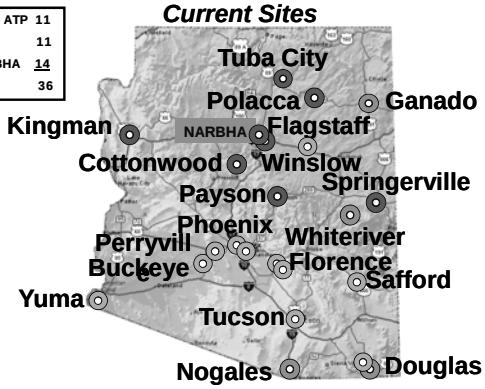
Project description: Arizona



Arizona Telemedicine Program

Current Sites

Rural ATP	11
ADC	11
NARBHA	14
Total	36

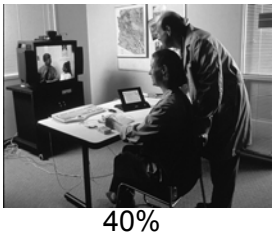


Telemedicine Technologies

Store-and-Forward

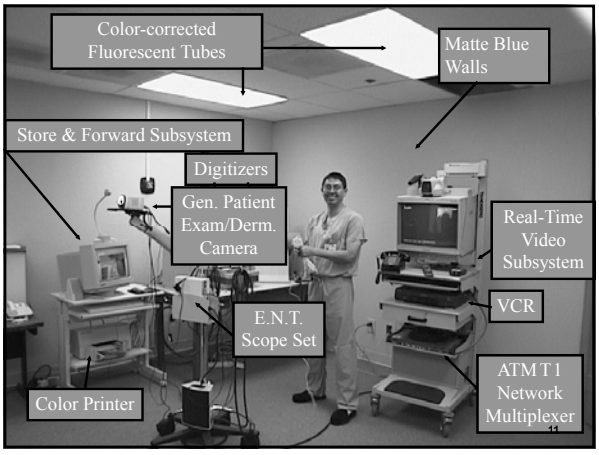
60%

Real-Time Video



40%

10



11

http://video.biocom.arizona.edu

12

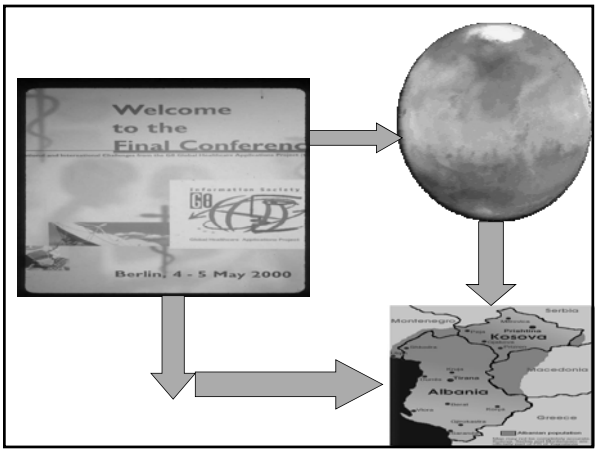
AZHIN Training

13

- The Balkans….

Telecommunication building in Prishtina

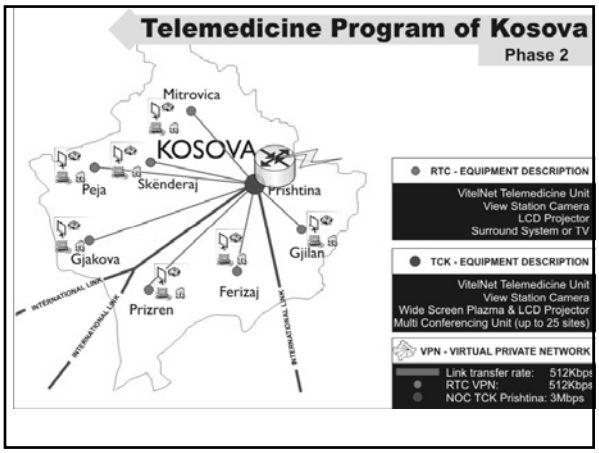
UNIVERSITY LIBRARY IN PRISHTINA: GHOST BUILDING!



Telemedicine Project of Kosova:

- Objective:
  To become
  a catalyst of hope and
  technology!
- Place:
  Devastated country by
  war, neglect and bad
  management!

First Intensive Balkan Telemedicine Seminar, October 25-27, 2002
Live transmission of an operation from VCU to Kosova



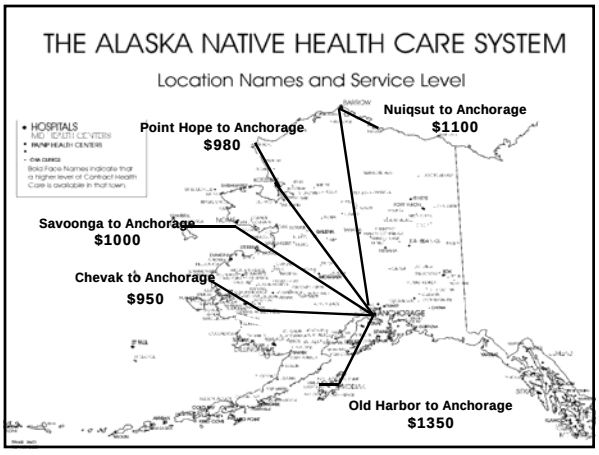
Project description: Alaska

Mission:
To provide the highest quality health services for all Alaska Natives.

Vision:
A unified Native Health System, working with our people, achieving the highest health status in the world.

Why Alaska needs telemedicine

- 1st in land mass
- 47th in road miles
  - 75% Alaskan communities unconnected by a road to a hospital. 25 of these have no airport.
- 48th in "doctors to residents" ratio
  - Vast majority located in Anchorage
  - Shortages in many specialties
  - 25% Alaskans (46% of Alaskan Natives) live in communities of less than 1000 people.
  - 579 Community Health Aides in 200 villages provide nearly ½ million encounters each year.

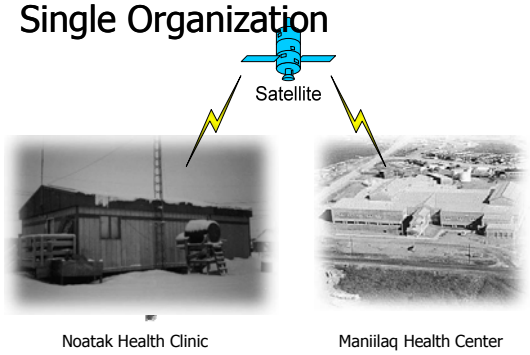


AFHAN Project

Kiana Community Clinic, Maniilaq

- 43 autonomous organizations:
  - U.S. Army
  - U.S. Air Force (3 bases)
  - Veterans Administration
  - U.S. Coast Guard
  - Public Health Nursing
  - Native Health Corporations (36)

Single Organization

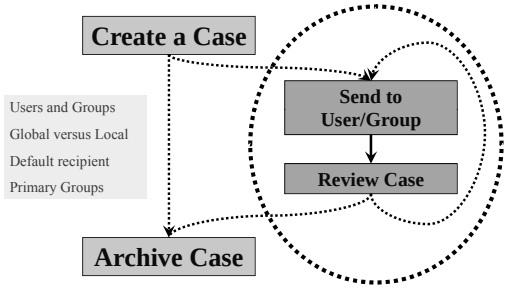


Multi-Organizational S&F

Key Concept: Multinode

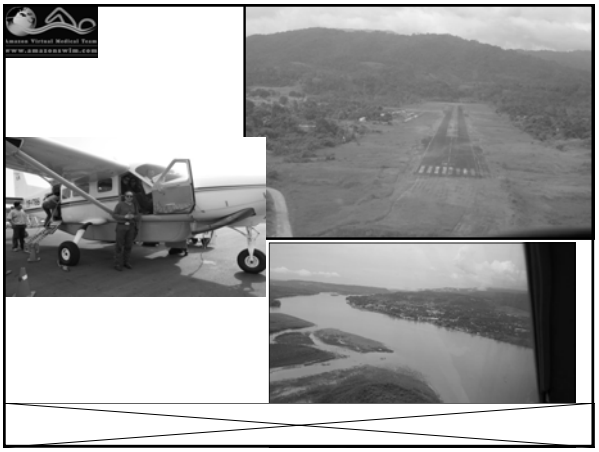
- **Any server that can browse out to the Internet can connect to all other servers that are part of the system – in a secure, robust, HIPAA compliant manner.**

Highly extensible workflow capabilities

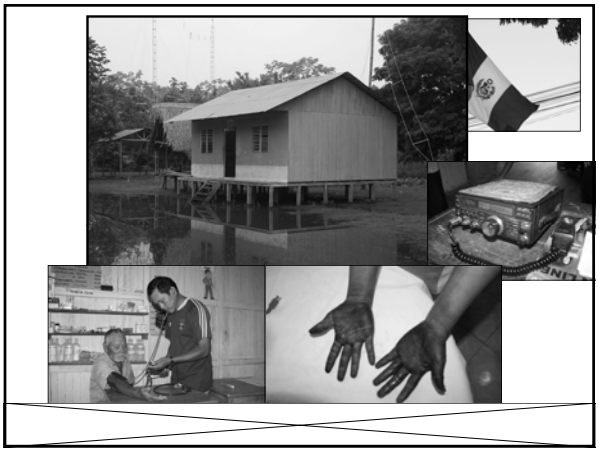


The Amazon Virtual Medical: Telemedicine to and from the Amazon Jungle

Peru

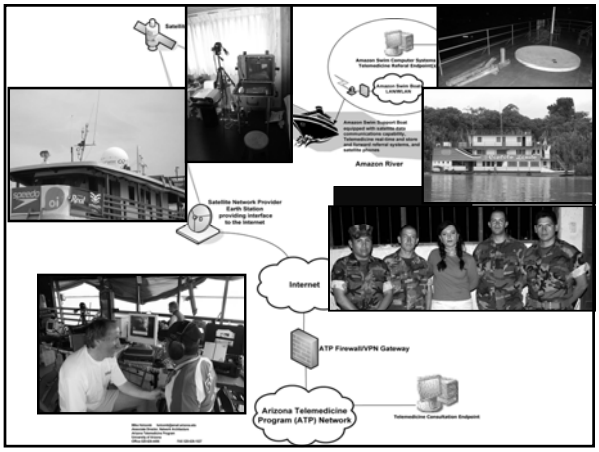


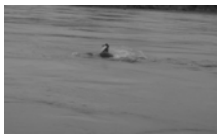
Amazon Jungle Telemedicine




STAR PERÚ
STAR PERÚ
1851-P

Atalaya, Peru 2008



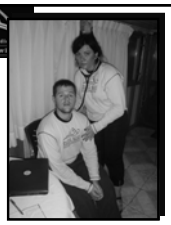


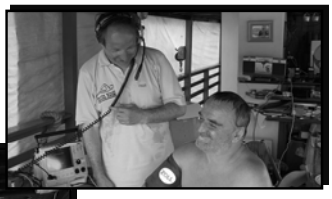
Setting Up Telemedicine Equipment on Board

The Amazon Swim Telemedicine

Setting Up Telemedicine Equipment on Cassiquirri

The Amazon Swim Telemedicine



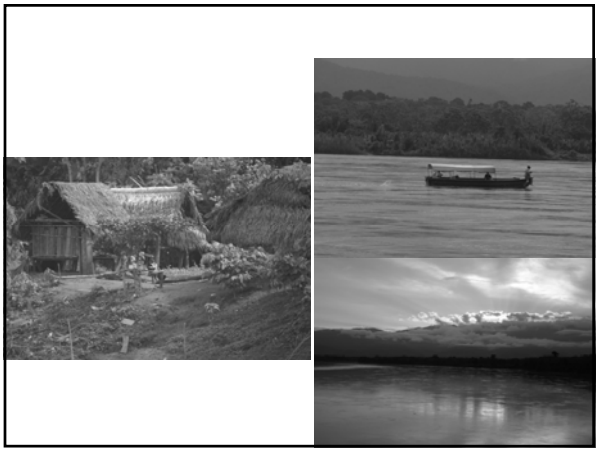


Hypertension and Dehydration

Manaus Telemedicine Conference

Manaus Telemedicine Conference

Manaus Telemedicine Conference



The Amazon Swim Telemedicine

Setting up Telemedicine in a Leper Colony, Casa San Jose, Peru

Connecting with Telemedicine In Parintins, Brazil

Telemedicine Education for Future Projects

Hypertension and Dehydration

Telemedicine in the Jungle

- The Amazon River region with its vast territories, underdevelopment of medical system, plagued by varies diseases and medical needs, yet mysterious and beautiful, is a perfect example where providing medical care and medical education using telemedicine and advanced technologies will prove to be beneficial not only for this region, but for the rest of developing world.

Telemedicine in Extreme Conditions

- IT POSSIBLE
- IT IS VERY BENEFICIAL
- CHANGES LIVES
- NEED COMMITMENT
- TEAM EFFORTS
- CREATIVITY

UPMC

Telemedicine: Homecare

Andrew R. Watson, MD, MLitt
Skopje, Macedonia
Department of Surgery
Center for Telehealth
February 6-7, 2009
UNIVERSITY OF PITTSBURGH MEDICAL CENTER

Perspective

- This is based on telemedicine in the United States
- Currently there is a tremendous focus on homecare
- We are seeing large corporations investigate this
- Home care will be a reality

Why now?

- Paradigm shift in technology
  - Portable devices
  - Bandwidth
  - Seeing this internationally (Voxiva)

Google

- New possibilities / cost effective
- Hospital pressure – cost / quality
- Physician pressure - outcomes

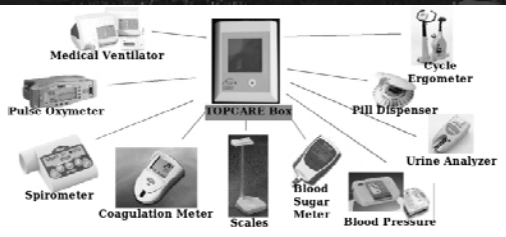
Why trauma?

- Patients
  - Unexpected change
  - Older patients
  - Remote patients
- Discharge to home or rehab – faster than before
- Frequently have wounds
- Medication changes / new medication

Congestive heart failure model

- Chronic diseases – financially significant for US
- 200% increase in medication compliance
- Reduce 1 year hospital costs $25,000 to 12,000
- Reduce hospitalizations by 60%

Supporting technology - home



UPMC Hospitals

Supporting technology - home

UPMC Hospitals

UPMC 7

Supporting technology – connectivity

- Home connectivity – capture / interface
  - Bluetooth
  - USB
- Internet
  - Broadband
  - Dial-up
- Hospital
  - Firewall / NAT

UPMC 8

Supporting technology – hospital

- Workflow routing
- Support – for home, connectivity, internal
- Data repository
- EMR capture

UPMC 9

What aspects of trauma?

- Acute in-patient discharged to home
- Follow a patient from rehab to home
- Discuss care with a family in a remote location prior to a patient's discharge
- Conduct research, follow medications, research

UPMC 10

Trauma workflow model

- Set-up
  - Staff education
  - Technology support – help desk
- Discharge to home / rehab
- Information triage – nurse, coordinator, physician
  - Capture
  - Decision algorithm / rules processes
- Follow-up / communication
  - Phone
  - Video-teleconference

UPMC 11

Special considerations

- Staff acceptance
- 24/7 Technology support – home, net, hospital
- Medical legal considerations
- Reimbursement

UPMC 12

Corporate Interest

- Devices – need a device library
  - Intel
- Communication
  - Bluetooth / USB2
- Portability
  - Blackberry, Apple
- Network
  - FCC

Imagine

- Follow your most severely injured trauma patients at home, at rehab
- Ensure follow-up for remote patients
- Ensure medications, rehabilitation are successful at home
- Have clinical trials continue at home

Implications

- Telemedicine is expanding exponentially
- Home care is one of the leading topics
- Technology will continue to evolve – it is close
- Leaders such as Dr. Latifi are critical for this to be successful and need to be supported

Teleradiology & Telepathology

Elizabeth A. Krupinski, PhD
Arizona Telemedicine Program

In the Beginning……




Today's PACS & Teleradiology

- Oldest established TM application
- Well integrated in numerous settings
- Facilitated by co-evolution PACS
- Few to no reimbursement issues
- Only interventional radiology currently less amenable to teleradiology applications
- Little/no differences between teleradiology & on-site radiology

Other Teleradiology Facilitators

- ACR-NEMA development DICOM
- Continual updates of DICOM
- Development of standards & practice guidelines that explicitly include teleradiology
- http://medical.nema.org/
- http://deckard.duhs.duke.edu/~samei/tg18.htm

Standards & Guidelines

Digital Radiography Image Quality: Image Acquisition

Mark B. Williams, PhD[a], Elizabeth A. Krupinski, PhD[b], Keith J. Strauss, MS[c], William K. Breeden, III, MS[d], Mark S. Rzeszotarski, PhD[a], Kimberly Applegate, MD, MS[e], Margaret Wyatt[a], Sandra Bjork, RN, JD[a], J. Anthony Seibert, PhD[b]

Digital Radiography Image Quality: Image Processing and Display

Elizabeth A. Krupinski, PhD[a], Mark B. Williams, PhD[b], Katherine Andriole, PhD[c], Keith J. Strauss, MS[d], Kimberly Applegate, MD, MS[e], Margaret Wyatt[f], Sandra Bjork, RN, JD[f], J. Anthony Seibert, PhD[g]

Standards & Guidelines

Digital Mammography Image Quality: Image Display

Eliot Siegel, MD[a], Elizabeth Krupinski, PhD[b], Ehsan Samei, PhD[c], Michael Flynn, PhD[d], Katherine Andriole, PhD[e], Bradley Erickson, MD, PhD[f], Jerry Thomas, MS[g], Aldo Badano, PhD[h], J. Anthony Seibert, PhD[i], Etta D. Pisano, MD[j]

Standards & Guidelines

PRACTICE GUIDELINE FOR DIGITAL RADIOGRAPHY

ACR PRACTICE GUIDELINE FOR RADIOLOGIST COVERAGE OF IMAGING PERFORMED IN HOSPITAL EMERGENCY DEPARTMENTS

PRACTICE GUIDELINE FOR ELECTRONIC MEDICAL INFORMATION PRIVACY AND SECURITY

ACR TECHNICAL STANDARD FOR ELECTRONIC PRACTICE OF MEDICAL IMAGING

Report of the ACR Task Force on International Teleradiology

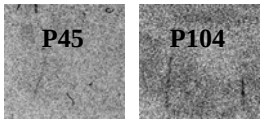
Ari Van Moore, MD[1], Bibb Allen Jr, MD[2], Shannon C. Campbell, MD[3], Richard A. Carlson, MD[4], N. Reed Dunnick, MD[5], Thomas B. Fletcher, MD[6], J. Daniel Hanks Jr, MD[7], J. Bruce Hauser, MD[8], James M. Moorehead, MD[9], Richard N. Taxin, MD[10], Lauren H. Thrall, MD[11]

Display Optimization

- Key is the human-computer interface
- Series of observer performance studies designed to optimize the digital reading room environment
- Performance metrics
  - Diagnostic accuracy (ROC)
  - Search efficiency (eye position)
- Human Visual System Modeling

Displays & Perception

- Softcopy display parameters
  - Luminance
  - Calibration (tone scale)
  - Type of phosphor
  - CRT vs LCD
  - MTF
  - Viewing angle
  - Number of displays
  - Ambient lighting
  - Compression
  - Role of color



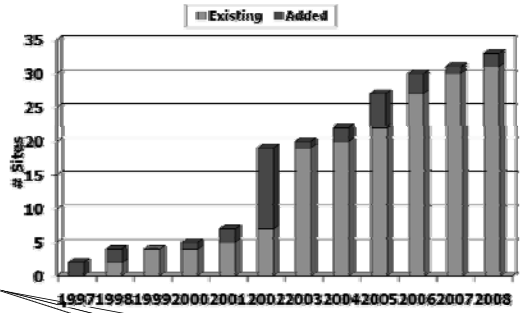
Optimized Displays & Search

- Total viewing time shorter
- Time to first hit shorter
- Total time on lesion shorter
- Fewer returns to lesion
- Total path length shorter
- Overall = more EFFICIENT

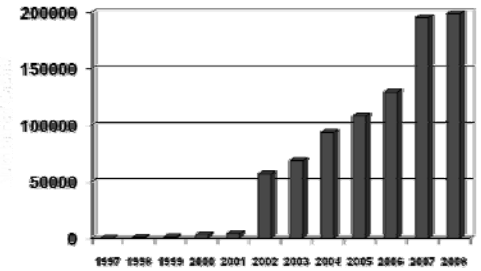
TR Facilities

- Hospital/MC
- Clinics
- Mobile van
  - Mammo
- Dedicated
  - PET clinic
  - THH
  - UASA
- Public Health
- Battlefield
- Hand-held

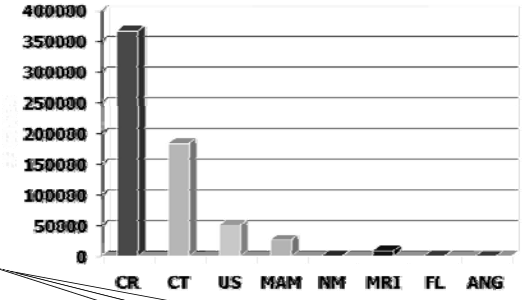
Univ AZ TR Site Additions



TR Case Volume



Types of Cases



TR in 2008

- Medical Imaging Consultants -> ?
  - Data acquisition & archiving
- RadWorks (GE) -> Siemens/Fuji
  - Viewing station
- 35% of department's reading volume
- 25% department's income
  - Reading only & reading + archiving
  - $/case & $/set volume

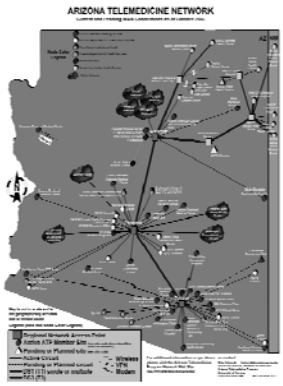
Telemed Engine

- 68% sites using AHSC hub for TM services use TR service
- TR typically 1st service requested
  - 79% of sites with TR use only TR
  - 21% started with TR & added services
- TR specialty with most volume

Telemammography

- Time from mammography to consult with oncologist ~ 28 days
  - Screening mammography
  - Diagnostic mammography
  - Biopsy
  - Pathology processing & report
  - Oncology consultation
- THIS IS TOO LONG!

Even Worse in Rural

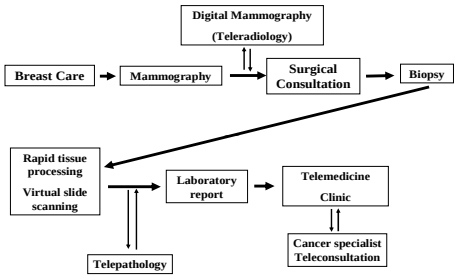


- DS3 (45 Mbps) backbone
  - ATM protocol
- T1 (1.5 Mbps) links
- 65 direct link sites
- ~ 85 with affiliated
  - NARBHA
  - DOC
  - IHS
- RT & SF applications
- ~ 55 sub-specialties
- Teleradiology core app.

Telemammography

- Started in 2001 to rural sites
- 7/28 telerad sites send mammo
- Mostly use GE system
- Directly to TBC for reading
- Some archive some do not
- Contracts specify 30-45 min TAT
- > 26,000 telemammography

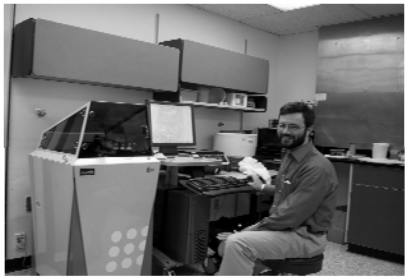
UltraClinic Model



Quick Processing

Milestone Medical Systems RHS-1-30 Vacuum Histoprocessor

Telepathology



DMetrixTM -40 Slide Scanner System

Telepathology

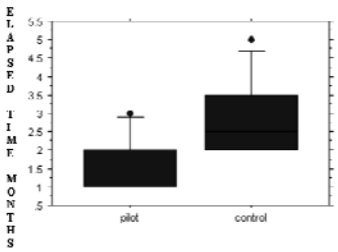
Timing Results

Lab Process	Minutes
Grossing	3
Tissue Processing	58
Embedding	13
Cutting	10
Stain/Dry/Coverslip	32
Scanning (2 Slides)	13
LM Interpretation	6
Telepathology	14

Teleoncology

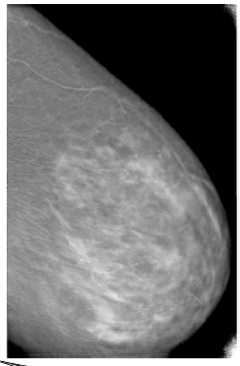
- Telepathology report sent S&F to oncologist
- Oncologist connects RT videoconference to rural location
- Discuss pathology results
- If necessary discuss treatment options and plan of action

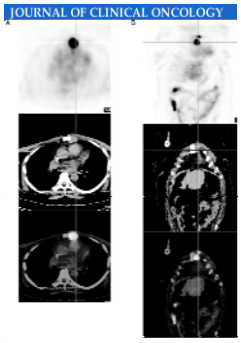
Saved Time



The Future of TR & PACS

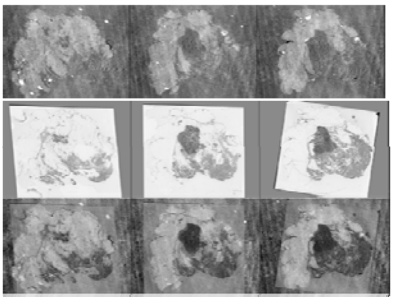
- MI = prevention, detection, diagnosis, treatment & therapy
- Acquisition & display technology continually changes
- Clinician shortages are not easing
- Rapidly expanding types & number images
  - Multi-modality & fusion complimentary information sources is becoming common
  - Anatomy & function gross & molecular levels
  - Merging specialties





(Quon et al. J Clin Oncol; 2005; 23:1664-1673)

Merging Specialties



Clarke et al. Validation if Tumor Burden Measurements Using 3D Histopathology. In: Digital Mammography 2008. Springer-Verlag.

The Future of TR & PACS

- Image Display, Analysis & Processing are key links in the imaging chain
- Need to present data to the clinician in the most efficient & informative manner
- Taking into account perceptual & cognitive capabilities of human observer
- Ultimate goal = facilitate decision-making process & enhance patient care
- Related goal = improve workflow & the reading environment

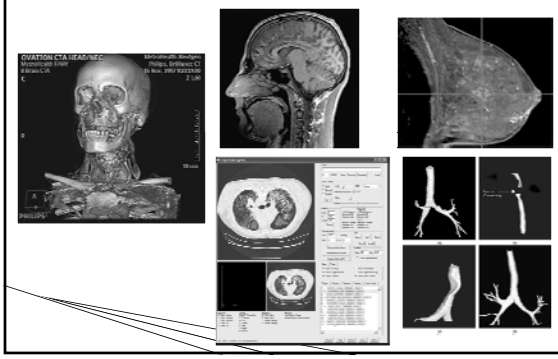
Capitalizing on Capabilities

Stereo vs Traditional

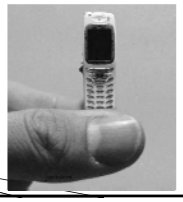
- Az 0.85 to 0.94
- -23% increase TPs
- -105% increase calcs
- - 46% decrease FPs

Getty et al. Stereoscopic Digital Mammography: Improved Accuracy of Lesion Detection in Breast Cancer Screening. In: Digital Mammography 2008. Springer-Verlag.

Computer-Based Decision Aids

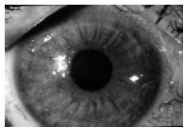


Alternative Technologies

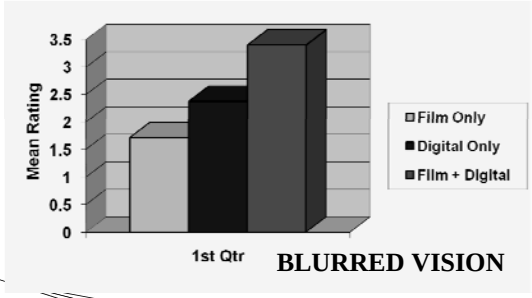


Physical Injuries

- Carpal tunnel syndrome
- Elbow & shoulder (cubital tunnel)
- Neck, back & shoulder strains
- Computer vision syndrome
  - Eye strain
  - Dry eyes
  - Glaucoma
  - Headaches
  - Corneal erosion and abrasions
  - Contact lens problems

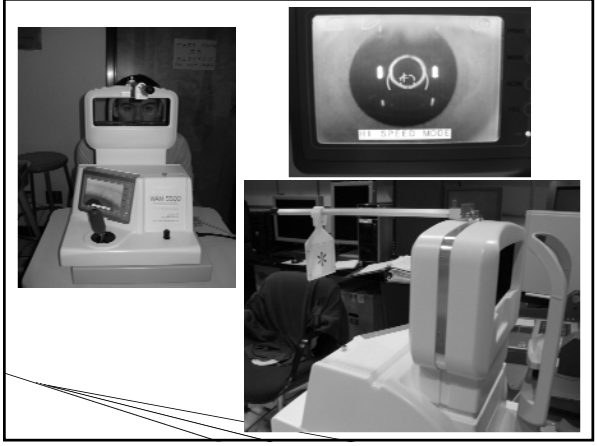


Reader Fatigue

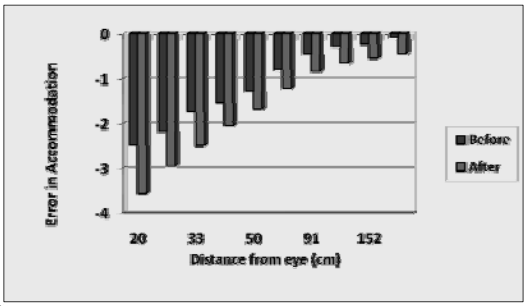


Subjective Fatigue

Variable	How long correlation	How many correlation
Blurred vision	R = 0.344 p = 0.0113	R = 0.422 p = 0.0015
Eyestrain	R = 0.429 p = 0.0012	R = 0.475 p = 0.0003
Difficulty focus	R = 0.384 p = 0.0042	R = 0.446 p = 0.0007
Headache	R = 0.235 p = 0.0899	R = 0.432 p = 0.0011
Neck strain	R = 0.384 p = 0.0042	R = 0.549 p < 0.0001
Shoulder strain	R = 0.250 p = 0.0711	R = 0.469 p = 0.0003
Back strain	R = 0.304 p = 0.0265	R = 0.424 p = 0.0014
General fatigue	R = 0.471 p = 0.0003	R = 0.642 p < 0.0001



Fatigue Results



Conclusions

- TR has made a significant impact on patient care over the past 20 years
- Advances in technology will further change MI & interpretation of medical data by more clinicians
- Costs can increase & decrease
- Optimizing observer accuracy while maintaining efficiency & comfort are critical to continued success


THANK YOU!

The Business Aspects of **Telemedicine and e-Health**

Gail Barker, PhD
Co-Director, Administration & Finance
Arizona Telemedicine Program
Phoenix, Arizona

Program Topics

1. Business Principles
2. Revenue Streams
   - Contracts and Grants
   - Parent Organization Support
   - Billing and Collection Activities
   - Service or User Fees
3. Expense Considerations
4. Lessons Learned

Introduction

- More than $1.55 Trillion is spent each year in the U.S. on health care
  - 15-16% of GNP
- Medicine is big business!

Top 10 Reasons Businesses Fail

10. Lack of fundamental business skills
9. Complacency
8. No support team
7. Wrong location
6. Refusal to delegate
5. Poor hiring and management
4. Insufficient marketing
3. Poor understanding of customers
2. No written business plan
1. Not enough money

Arizona Daily Star 9/22/03

Business Principles

- You must know what the <u>needs are,</u> yours & your customers'
- Business must have a <u>revenue stream</u> to pay for expenses
- Expenses should <u>not exceed</u> revenue
- Ideally telemedicine must at least <u>break even</u> over time
- If not it must be "<u>loss leader</u>" – a program that is a highly valued part of an organization's mission

Business Principles

- Economies of scale and shared services are important <u>cost saving</u> elements
- Understanding <u>why</u> an initiative is being proposed and …..
- …that any new initiative <u>must support</u> the organization's mission and strategic goals

ATP Key Goals

1. Improve access to specialty care for underserved areas
2. Provide cost-effective healthcare alternatives for prison inmates
3. Improve continuing education for healthcare professionals
4. Evaluate telemedicine technology and assess its efficacy
5. Establish a multi-site telemedicine program.

Business Principles

- Understanding what an organization values and how it fits into the overarching mission

Business Principles

Valued Added:

1. New or expanded project line
2. Expense reduction or deterrent for unwanted business
3. Customer satisfaction
4. Improved public relations
5. New associations (affiliation with a prestigious organization)
6. Quality improvement
7. Competitive advantage
8. Overall improved "bottom line"

Revenue Streams

- Contracts and Grants
- Parent Organization Support and Philanthropy
- Billing and Collection Activities
- Service or User Fees

Contracts and Grants

Government Contracts and Grant Funding

- In the U.S there are many Government contract and grant funding opportunities
- Usually the candidate needs to submit a sustainability plan to obtain funding
- This ensures the project will continue at the end of the contract or grant period

Parent Organization Support and Philanthropy

Parent Organization Support and Philanthropy

- Some organizations or donors will fund the initiation of a new telemedicine program
- The support will probably be time-limited and a sustainability plan will need be developed

Billing and Collection Activities

Revenue from Patient Services

- Clinical needs identified
  - How to fill: Which technology?
  - Consulting versus ongoing treatment
  - Referring provider & patient expectations
  - Payment mechanism
    - Block time
    - Fee for Service
    - Protocol for uninsured or denied services
  - Paying for the network

Telemedicine Medical Billing in the U.S.

- Government Payers – Regulatory mandates apply
  - Medicare – Limited services, Real Time only, rural areas
  - Medicaid – State by state, Arizona covers almost all services
  - Tri-Care/Champus – Follows Medicare
  - Veterans Administration – Has its own system and uses telemedicine
- Private Insurance – variable
- Self Pay

Patient Billing & Collection Activities

- Patient billing and collections are generally not a good primary mechanism to pay for a telemedicine program…

Unless

- It is a closed or capitated clinical environment where significant cost savings can be realized

Service or User Fees

Service or User Fees

- Allows the program to distribute fixed expenses
- For every minute the equipment and telecom lines sit idle, the program experiences lost opportunity
- Other uses for network:
  - Education
  - Administrative Meetings
  - Business activities, email
  - Support Groups

ATP Membership Model

(example of a telemedicine business model)

- Structured after an Application Service Provider (ASP) model
- ATP has initiated several partnerships with independent providers and agencies across the state
- Shared communications infrastructure results in economies of scale

Rationale

- Factors leading to the development of this membership model
  - Creation of a shared telemedicine/telehealth communications network
  - Requirement from state to develop a self-sustainable program for telemedicine
  - Requests from customers for different levels and types of services

Business Analysis

- We looked at ATP business from this viewpoint
  - Joining the ATP network was the "attraction"
  - Model needed to be flexible
  - Clients only purchased or provided services desired
- Result – a "layered" business model
  - Flexible fee schedule based on "needed" services
  - From turn key to consulting (only) services
  - Open to anyone in the state, but no "exclusivity"

Business Analysis

- We divided ATP services into four layers
  - Professional services (e.g. legal, clinical)
  - Operational services (e.g., business or technical operations)
  - Infrastructure services (ATP dedicated ATM network)
  - Vendor services (leased lines from telcos)
- Clients reside in the top layer to be supported by all layers

Business Model

Application Service Provider Enterprise

- **Client Layer**
- **Professional Services Layer**
- **Operational Services Layer**
- **Infrastructure Services Layer**
- **Vendor Services Layer**

Membership based

Membership Benefits

- **Access to Statewide Broadband Network**
- **ATP Service Provider Status**
- **Free TM Training**
- **Continuing Medical Educ Program**

ATP Benefits

- Statewide infrastructure for the Department of Corrections telemedicine program
- Development of major technology transfer program
- State of the art in e-healthcare
- Improved access to specialty medical care for rural population

Other ATP Membership Benefits

- New healthcare partnerships in state
- Delivery of continuing education to rural health care providers and patient support groups
- College of Medicine viewed a statewide resource
- Economic development

Expense Considerations

Expense Considerations

- Fixed and Variable Expenses
  - Personnel
  - Equipment and operations
  - Technology
  - Overhead
- Some expenses could fall into either category AND need to be considered for both the referring and receiving sites

Expense Considerations

Personnel – all sites

	Fixed	Variable
Medical director	X	(NP)*
Site coordinator	X	(NP)*
Other clinical	X	
Technical	X	X
Administrative	X	X

*Not Preferred

Expense Considerations

Equipment and operations – all sites

	Fixed	Variable
Space cost	X	X
Network equipment*	X	
Installation costs*	X	
User end equipment*	X	
Transmission costs	X	X
Supplies (clin,tech,ops)		X
Travel and training		X

* One time expense

Expense Considerations

Technical and Maintenance – all sites

	Fixed	Variable
Maintenance contracts	X	
Help Desk	X	X
Equip refresh fund	X	(NP)

Other??

Expense Considerations

Overhead

	Fixed	Variable
Medical records	X	X
Billing & Collection	X	X
Human Resources	X	X
Contracting	X	X
Legal and Compliance	X	X
Malpractice	X	
Central Administration	X	

Other ??

Other Considerations

- Reduced transportation costs
- Improved access to clinical/specialty services
- Convenience, customers and providers
- Referring physicians learn from specialists
- Network availability for other services
  - (education, administration, clin conferences)
- Value added list

Lessons Learned

ATP Lessons Learned

- Understand organization and what is rewarded
- Make sure telemedicine program fits into organizational mission
- Have a written plan
  - —Include sustainability
  - —Set goals and timeline….yet
  - —Understand everything will take longer than anticipated

ATP Lessons Learned

Start with a few key initial services

- Consider starting with a pilot
- Consider a few services with high volume or high need
- Implement easier services first
- Consider services with capacity
- Make sure TM service delivery is incorporated into normal workflow at all sites

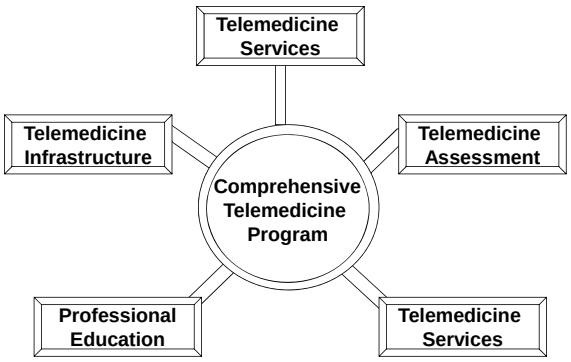
ATP Lessons Learned

- Champions at all sites
- Understand staffing needs at all sites
- Recruit carefully
  - —Define responsibilities
  - —Written job descriptions
- Formalize affiliations (contracts)

ARIZONA TELEMEDICINE PROGRAM

Ronald S. Weinstein, M.D.
Director, Arizona Telemedicine Program

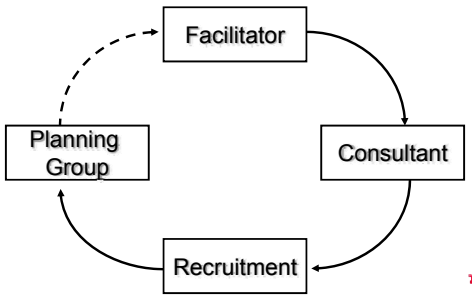
Strategies for Institutionalizing and Achieving Long Term Sustainability of Telemedicine and Telehealth Programs and Services



Components of Telemedicine Program

- Strategic Planning
- Facilities Design and Implementation
- Authority Management
- Practice Administration
- Health Care Services
- Risk Management
- Network Operations
- Financial and Business
- Legal and Regulatory
- Inter-institutional Relations
- Governmental Affairs
- Marketing and Public Relations

Planning Telemedicine Program



Planning Telemedicine Programs

Phase	Goal
1. Facilitator	Establishes outcome expectations
2. Consultant	Designs the program and list tasks
3. Recruitment	Leader, champion for the program
4. Planning & implementation	Move from concept thru start-up

Planning

- Shared Visions
  - Priorities
  - Strategies
  - Action items
  - Implementations schedules

Planning

- Vision Matrix

Set 1 (groups)	Set 2 (tasks)
Organization(s)	Goals
Management	Priorities
	Strategies
	Implementation

Planning

- Vision Matrix

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Set 1 (groups)	Set 2 (tasks)
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	Strategies
	Implementation

Staffing

- *Program Champion*
  - Clear vision
  - Credible
  - Missionary zeal
  - Political acumen
  - Entrepreneurial
  - High energy

Telemedicine Staffing

- *Program Managers*
  - Experienced
  - Team players
  - Institutional support

Telemedicine Training

- *Comprehensive Plan*
  - Core competencies
  - Orientation / in-service
  - Team building
  - Outreach
  - Culture of the “virtual corporation”

Outcomes

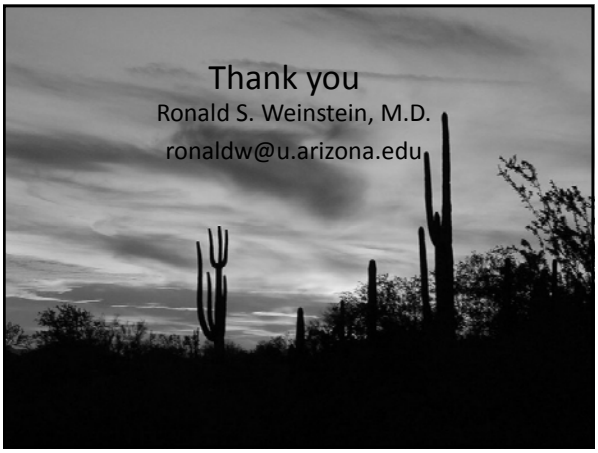
- *Measurements of Success*
  - Meeting needs
  - Patient outcomes
  - User satisfaction
  - Provider satisfaction
  - Cost effectiveness
  - Clinical outcomes

Financial Performance

- Costs and Benefits
- Coding Issues
- Reimbursement
- Accounts Receivables
- Bad Debt
- Network Utilization

Long-Range Strategic Planning

- Assessment
- Goal setting
- Updated Vision



Development of Telemedicine Network in the Region: The Do's and Don'ts When you Establish Telemedicine and e-Health

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Development of Telemedicine Network in the Region: The Do's and Don'ts When you Establish Telemedicine and e-Health

Ismet Lecaj, MD[2,3], Flamur Bekteshi[2,3], Kadri Haxhihamza, MD[2,4], Mateja de Leonni Stanonik, MD, PhD[3,5], Erion Dasho, MD, MPH[6], Svetlana Stojanovic, Ing. DipI[7], Charles R. Doarn, MBA[3,8]

[2]Telemedicine Program of Kosova, Prishtina, Kosova; [3]International Virtual e-Hospital, Anchorage, Alaska; [4]Psychiatry Clinic, University of Skopje, Macedonia; [5]George Washington University, Washington DC; [6]University Clinical Center "Mother Teresa", Tirana, Albania; [7]Ministry of Health of Montenegro; and [8]Center for Surgical Innovation, Department of Surgery, University of Cincinnati, Cincinnati, Ohio

Telemedicine Program Is Not a Factory: It is Empire of Mind and Technology

- Project Leadership
- Local Leadership
- Design
- Multiple partners
- Prepare
- Predict Unpredicted Problems
- Predict Success and think Success
- Think Growth
- Add Content

The Must Do's

- Know your stuff- be an expert and be honest.
- Make sure you have the support and commitment of your institution and your family, as this will take you from your professional and family time. This is particularly important if telemedicine is not your main occupation.

- Work very closely with local governments, especially if working in another country.
- Identify local champions and work with them in close partnership

The Must Do's Continued

- Identify the goals and objectives of your program and stick to them, although you may have to be flexible.
- Perform the feasibility study and analysis of your geography of operation.

- Secure the space from where you will operate and identify the political and physical geography of the operation.
- Create the business model to ensure sustainability. Involve as many experts as possible when you create this.

- Secure the budget for at lest 3-5 years- be as detailed as possible
- Think replenishing technology

The Must Do's (Continued)

- Identify technical infrastructure and have a solid plan, but be ready to change if needed and as technology changes.
- Acquire state of the art equipment: do not compromise on quality- consult the technical experts what technology you should adopt.

- Ensure interoperability between your telemedicine and e-health project with long term goals for transforming health care information technology of the hospital, region or the country you are working in.

The Must Do's (Continued)

- Make your plan public. Publish it in the local paper. Ensure good public relations for the project.
- Use media whenever possible to educate the public about your project.

- Ensure continuous education of all the members of your team. This is the most valuable time and expense you will spend on the project.
- Maintain continuous international presence. Invite your expert friends to give talks and have them speak out in public about the program.

The Must Do's (Continued)

- Report on the project collectively- when you write a paper on the project, make sure everyone's name is on the paper.
- Keep a close eye on the project and maintain line of accountability.

- Make sure that every one on the project knows their job description and their obligation.
- Adapt, respect the local tradition, culture and environment, and be very sensitive to their tradition and culture.

The Must Do's (Continued)

- Total transparency is crucial. Plan and spell out every detail of the project- no secrets in your plan. Send a copy of your plan to every one involved.

The Don'ts

- Do not allow repeated mistakes- intervene early. Early interventions will prevent failure of the projects, especially if you picked the wrong team the first time. You should be able to change the team or members of the team. Do not be afraid to do that.
- Do not abandon your private life and your family If you do you will lose everything else. Try to make them part of your project but do not pay any of them.

The Don'ts Continued

- Do not promise things you will not be able to deliver
- Do not take sides in local politics- stay indifferent in local politics.
- Do not sweat the small stuff- keep the big picture on your mind. This will help you overcome the difficulties with the project.

The Don'ts Continued

- Do not get discouraged; few things are destined to fail or go wrong.
- Do not take part in anything that will compromise you and the project, especially bribes and gifts that may be offered to you.

Conclusion: Prediction

- Balkan Telemedicine Network completed in 3-5 years
- We will all be talking to each other through telemedicine network
- The Balkan Telemedicine Society will have plenty of members (both national and individual)
- The Balkan Telemedicine will become a “how to learn telemedicine and e-health and will set new standards