

Applications of Telecommunications and Information Technology for Humanitarian Health Initiatives

John C. Scott
President

Center for Public Service Communications
E-mail: jcscott@cpsc.com

Abstract

From May 18th through -20th, 1998 the Center for Public Service Communications (CPSC) and the Center of Excellence in Disaster Management and Humanitarian Assistance (COE) convened a meeting of experts to discuss applications of telecommunications and information technology for humanitarian health initiatives. Participating in the meeting were 30 professional, world-renowned experts in physical and mental health aspects of humanitarian health planning and intervention, and knowledgeable about the most current uses of telecommunications technologies and techniques. Participants represented the U.S. Department of Defense, the Council of Europe, agencies of the United Nations, non-governmental and international organizations. The meeting was titled "Telecommunications Applications in Humanitarian Relief Operations" (TAHRO).

The TAHRO meeting provided an unusual opportunity for experts of the many disciplines within the fields of disaster management and humanitarian assistance to come together to identify common problems and share successful strategies. These fields may seem small and narrow in focus to observers not familiar with the applications and players, but a thorough examination of the breadth of health applications and professional responsibilities represented at the meeting illustrates that disaster and humanitarian-oriented health applications are many and varied. The meeting also offered an opportunity for many recognized experts in the fields of natural disasters and complex emergencies to share experiences and discuss ways in which new, emerging and, importantly, tried-and-true "old" technologies can improve planning, administration, and operational activities of health professionals in disaster and humanitarian situations.

The high caliber of expertise reflected firsthand experience preparing for and responding to natural disasters and complex emergencies, including land mine

injury and support to refugee and war affected populations. Perspectives ranged from acute and chronic medical care to mental health, disease prevention/health promotion, and other public health applications including disease surveillance and early warning. Participants discussed these applications in the context of policy, operations, administration, and teaching and training.

Introduction

In many countries of the world, new applications of telecommunications and information technologies are proving to be valuable in crisis management and in improving the health status of rural, isolated or otherwise underserved populations. These technologies can be used to provide a range of services to support tracking and management of patients, to provide consultative support to clinicians in remote areas, to deliver training for health providers, and to permit access to and exchange of medical information wherever it is needed.

In the aftermath of natural disasters, and particularly in the context of complex emergencies, civil sectors need to be functioning before stability can be restored and made lasting in the affected area. In addition to specific medical and mental health interventions, reestablishment of basic (and universally available) health services are crucial to economic stability and, in fact, to maintaining peace over time.

In the context of military involvement in humanitarian health initiatives, communications and information technologies used for the administration and management of health services to military personnel in the field may also be used to speed the transition of foreign humanitarian health providers to civilian health providers as national capacities are developed to sustain them, thereby permitting more rapid transition of health services management to the local civilian health sector. This can only be done with proper training.

In July, 1997, an international meeting was convened by the Council of Europe, in cooperation with the Center for Public Service Communications, in Ispra, Italy to discuss the

development and adaptation of telecommunications technologies for health humanitarian interventions, including the improving the effectiveness of the medical and mental health treatment of land mine victims.

Although this initial meeting recommended that uses of telecommunications and information technology must be explored for their benefit in health humanitarian initiatives, it did not discuss how, and in what particular circumstances, telecommunications applications would be valuable.

Participants at the Ispra meeting recommended that a second meeting should be convened to explore specific applications for these technologies. At this meeting, participants would address common protocols for using technologies for such purposes as: health assessments, operational communications and diagnostic support, training of health care providers, availability of knowledge bases, and support of the physical and mental health needs of health workers engaged in humanitarian health initiatives including support to victims of land mine injury.

Center of Excellence in Disaster Management and Humanitarian Assistance agreed to host this second meeting, and the Center for Public Service Communications and COE acted as co-conveners, with CPSC acting as Chair. The TAHRO meeting was sponsored jointly by the Center of Excellence, the USCINCPA Surgeon's Office, and the Department of Defense Office of Peacekeeping and Humanitarian Assistance. A list of participants can be found in Appendix 1.

The focus of the TAHRO meeting was the sharing of experiences in the use of telecommunications and information technologies for various applications in humanitarian health initiatives, and critically evaluated the ways in which those technologies can improve the collection, management, exchange, and dissemination of data and information for strategic decision-making and operational coordination of humanitarian health initiatives as well as for teaching and training.

Also a part of the discussion was an exploration of the relationships between health care providers in the field and between them and their support mechanisms, wherever they may be, and identify ways in which telecommunications and information technologies applications might improve these relationships.

Each participant identified the critical issues, or barriers, to effective use of telecommunications and information technologies from the perspective of their area of involvement.

Questions addressed included:

- . What are communications requirements
--at the disaster site/within the region affected?

-- between the disaster site and national points for coordination (regional/country capital, etc.)?

-- between the disaster site or the national points of coordination and the "outside world"?

- . What has been the experience with Telehealth in humanitarian situations?
- . Are there frequent procedures that could be routinized with Telehealth applications?
- . Have standard clinical and public health protocols been developed for common procedures?
- . If not is this possible or desirable?
- . What needs to be done to enable such protocols to be developed? And evaluated?
- . Can the work of trained health providers be improved or made easier with the use of Telehealth technology and remote support?
- . Can "lesser trained" health providers handle a greater range of health services if they had access to Telehealth technology and remote support?

The objective of the meeting was to come up with a comprehensive picture of applications, technologies, and barriers that might lead to a better understanding of what can to be done:

- . To more effectively coordinate health planning for preparedness and improve medical and mental health response for natural disasters
- . To improve coordination health planning and improve operations for medical and mental health response to complex emergencies
- . To improve coordination for preparedness and response for physical and mental health support for land mine injury
- . To increase awareness of successful application models
- . To increase awareness of barriers to use of telecommunications and information technology and identify strategies to reduce these barriers
- . To identify existence of and need for clinical and public health protocols for more effective use of available technology
- . To identify new technologies and applications that are needed
- . To identify types of demonstration projects that might be valuable

Areas of Focus

Natural Disasters

Sudden natural disasters are often believed to cause not only widespread death but also massive social disruption and outbreaks of epidemic disease and famine that leave

survivors entirely dependent on outside relief. Systematic observation of the effects of disaster on human health has led to rather different conclusions, both about the effects of disaster on health and about the most effective ways of providing relief. Though all disasters are unique in that they affect areas with differing social, economic, and health conditions, there are still similarities between disasters which, if recognized, can optimize the management of health relief and use of resources. The following points may be noted:

- . There is a relationship between the type of disaster and its effect on health. This is particularly true of the immediate impact in causing injury: earthquakes regularly cause many injuries requiring medical care, while floods and tidal waves cause relatively few.
- . Some effects are a potential rather than an inevitable threat to health. For example, population movement and other environmental changes may lead to increased risk of disease transmission, although epidemics generally do not result from disasters.
- . The actual and potential health risks after disaster do not all occur at the same time. Instead, they tend to arise at different times and to vary in importance within a disaster-affected area. Thus, casualties occur mainly at the time and place of impact and require immediate medical care, while risks of increased transmission take longer to develop and are greatest where there is crowding and standards of sanitation have declined.
- . Needs for food, shelter, and primary health care caused by disasters are usually not total. Even displaced persons often salvage some of the basic necessities of life. Further, people generally recover quickly from their immediate shock and spontaneously engage in search and rescue, transport of the injured, and other relief activities

Effective health relief management hence depends on anticipating and as they arise identifying problems and delivering specific materials and the precise times and points where they are needed. The ability to transport maximum supplies and personnel to a disaster area is much less essential.¹

Participants at the TAHRO meeting generally considered that in the onset and acute phases of natural disasters, within the first hours and possibly days, local

and national trained and untrained responders will be the first on the scene and, therefore, it is the local/national health infrastructure (both technical and human) which has to contend with the critical health needs of victims during the early stages of a disaster.

Many countries of the world, including many developing countries, currently have a relatively high level of health disaster preparedness. What is missing, frequently, is information technology infrastructure and specific technical assistance required to implement appropriate applications that will strengthen local and regional services. Access to telecommunications and information technologies which can serve to connect key regional health sector agencies in a preparedness networking could permit:

- .- Support for maintaining effective coordination and cooperation between and among national and regional organizations (public as well as private) in the implementation of national disaster management plans;
- . Maintenance of current inventories of human, material, and institutional resources in the medical care area;

Preparation and presentation of national and international workshops and courses on topics ranging from refugee health care and emergency sanitation to administration of health relief and hospital disaster preparedness;

Preparation and dissemination of technical manuals, audiovisual training material, simulation exercises and access to epidemiology and other health science articles and data bases; and

- . "On-line" access to short-term services of experts in disasters as they relate to primary health care, health services management, disease surveillance and control, water supply and sanitation, mental health, and nutrition.

Land Mine Injury

Land mine injuries are characterized by the need for acute care, long-term, clinical support (both physical and mental), and the need for training and education. In these applications telecommunications and information technologies may prove to be particularly helpful tools.

Each year land mines kill and maim about 30,000 people, usually civilians. The United Nations Department of Humanitarian Affairs reports that if no more land mines were laid in the world, at current clearance and funding rates it would take more than a thousand years to remove the estimated 110 million that exist in more than 64 nations throughout the world today. Mines continue to be laid each day, several million each year.

Professional de-mining teams include trained medical

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personnel, expert in land mine injuries, but only 100,000 (per year) of the world's 110 million mines are cleared by professionals.

With the aid of low-cost telecommunications, it may be possible for medical specialists with appropriate expertise in distant locations to support lesser-trained health providers in the field in treating the physical and mental trauma caused by land mine injuries. These specialists could also support efforts to train local physicians and other health providers and develop effective community health education programs.

Beneficiaries of these technologies would include refugee and migration camps, hospitals, clinics in remote villages of particularly vulnerable areas, and regional or tertiary hospitals that support them.

Because vulnerability to land mines is understood to be a long-term threat, the approach to addressing the health issues must be long-term as well. It is believed that we are at a time -- of rapidly increasing attention to landmine issues and concurrent interest on the part of institutions, organizations, and nations to take immediate action -- that there is a risk that many disparate initiatives will be developed in an uncoordinated manner. There is a need to begin now to establish the groundwork that will permit, as appropriate, an integration of efforts. Protocols for delivery of care and standards for the collection, management, and exchange of information must be established so that the ensuing efforts make a positive impact.

During the TAHRO meeting it was interesting to note that the land mine experts present were not so much encouraging a unique focus on landmine issues as they were arguing for a better focus on integration of the land mine issues onto a broadened approach that would include such things as utilization of telecommunications and information technology for collection and dissemination of key epidemiological data, including population-based data and individual patient records and tracking.

The group agreed that there is a need to encourage a coordinated international effort to collect information, in standardized formats, on incidents of landmine injury. Information resulting from such an effort should be made broadly available in an effort to support prevention of landmine injury and to improve treatment and allocation of health care resources. The group also called particular attention to the need for standardizing processes in the management and treatment of landmine-related health issues. For example, it was considered an important requirement to standardize the process of making the initial evaluation of medical need or mental health need so that appropriate and timely

decisions can be made that may save lives and reduce the cost, to the individual and society, of long-term health care. There was no detail offered, though, about what should be the standards and how they would be implemented.

Complex Emergencies

Complex emergencies, national and/or regional civil conflicts affecting large civilian populations and involving a combination of war or civil strife, food shortages, population displacement.

The international humanitarian health community has given attention to the need for better early warning, better planning for preparedness, and improved information on the response to complex emergencies. Vital historical and operational information is collected and exchanged on a variety of levels: by governments, agencies, and organizations using prescribed institutional protocols, and by individuals and colleagues among whom a trust has been built through time and experience. Communication and information technologies can help make possible enhanced cooperation at all levels of information sharing.

Each government and organization involved in humanitarian operations, acting within the framework of its own mandate or mission, has to make decisions about such things as: the types of health services needed, movement of resources, money, people, medical supplies, and equipment. These decisions can be more accurately made if they are based on reliable information about current health infrastructure and resources in the affected area and with knowledge of what other responders are planning. This is especially true if mechanisms are developed to facilitate joint planning by various organizations. Collaborative information networks can provide added value by establishing common access points to usefully organized information, designed to permit a more universal understanding of events (real or potential), as well as provide a solid basis for the decisions of policy-makers.

Telecommunications and information technologies can support the following objectives common to complex humanitarian emergencies:

- . Developing, through a collaborative process, practical information sharing networks for use by the health sector which will enhance and facilitate the decision-making processes and support contingency planning and operational coordination of health services in all phases of an emergency;
- . Utilizing, complementing, and building upon the existing crisis information collection and analysis efforts of participating agencies, without compromising sensitive information (e.g., vulnerability analyses and epidemiological data);
- . Serving as channels of dialogue or conferencing for

health professionals involved in humanitarian issues (not necessarily on a real-time basis);

- . (To the extent that standards issues are attended to) Building user friendly, easily accessible and -- to the extent possible -- platform-neutral networks.
- . Developing mechanisms by which rapid response teams in the field will have real-time access to the pool of available information.

Observations

Observation 1. With respect to preparedness and response to natural disasters, in the normal course of events, authorities of stricken countries are the most knowledgeable and capable of providing support, such as communications, transportation, power, water, and sanitation services to the health sector. To rely on these institutions is to acknowledge and respect the valued principle of national sovereignty.

Reliance on such institutions during complex emergencies is problematic.

Throughout many regions of the world nations have established national disaster organizations in an attempt to respond swiftly and effectively to disasters that may frequent their countries. Also, in many cases, disaster coordinators in key ministries, emergency services, utilities, and the like have been designated and trained.

In many instances rapid and effective post-impact evaluation is carried out jointly by local armed forces and civilian authorities with the support of regional institutions.

Participants at the TAHRO meeting agreed that where these relationships exist they should be strengthened. In part this can be done by using telecommunications and information technologies for pre-disaster planning and training. Where institutional relationships do not exist and communication is poor efforts should be made to support and encourage national and local governments in their development.

Observation 2. Though use of telecommunications and information technologies (Telemedicine) might fill gaps of service in developing countries, there will be new cultural challenges that will have to be sensitively addressed. Important among the issues that have been largely unexplored is the question of the potential cultural impact of importing health care via Telemedicine. Are measures being taken by distant providers to learn the local values and health practices? Providing health services directly to populations without understanding the implications of change in referral patterns can bypass competent local providers who know the culture of the communities they serve.

What is the realistic potential to sustain these new telemedical applications (the history of telecommunications development is rife with stories about hand-me-down rusted relics; equipment “donated” without training for its use or spare parts for its maintenance)? With respect to delivery of health services, major changes in traditional patterns of patient referral may have other economic implications, as well. The livelihood of local providers depends upon compensation for their services, and a compound negative effect of (large scale) primary care Telemedicine initiatives could be a “local or regional bypass” that might diminish rather than strengthen health care at the local or regional levels. What happens if, after time, there is insufficient interest on the part of the foreign providers, when the level of care that was imported cannot be sustained?

Another “policy” issue to be addressed is whose standards of care should be the norm? With respect to sustainability, in the developing world it may be most appropriate, for short-term interventions such as the case in many disaster situations, that Telemedicine consultation should be geared to bringing the standard of practice to the norm of the recipient country. It should only be during the mid- to long-term health programs that attempts be made to upgrade the standard of care from the recipient country's norm.

Observation 3. Participants found that reaching agreement on common definitions in terminology is challenging, but critical. Over the course of three days the meeting was punctuated by discussion of the difference in perceptions of terms that too often are taken for granted as common. For instance, “Telemedicine.” In an effort to avoid difficulty with its meaning TAHRO conveners agreed that to the extent the term was used it should be defined broadly and in operational terms as “the application of telecommunications and information technologies for health.” Although some of the participants were comfortable referring to Telemedicine in broad terms, others were used to its more narrow characterization as the application of clinical video diagnostic interaction and voiced the opinion that Telemedicine was not appropriate for disaster response. In some cases, however, these same participants recognized the need for better “collection, management, and exchange of information,” terms also used to define Telemedicine. There is, therefore, a need to resolve the problem of definition. Perhaps a way to do this is to refer to the applications in operational terms rather than reach for ambiguous monikers.

Observation 4. Though availability and cost of equipment is frequently a topic of discussion it wasn't foremost on the minds of TAHRO participants, at least with respect to disaster response. Most major NGOs, UN Agencies, militaries engaged in humanitarian activities have access to and can afford the communications equipment they need, particularly in relief applications when support is high. The

recurrent costs of satellite time are frequently waived by telecommunications service providers (an example of this is the initiative of the International Maritime Satellite Organization/ INMARSAT and its signatories which waive cost for a limited amount of satellite time for nationally-sanctioned relief activities).

Where money is more of an issue is in preparedness (which doesn't enjoy the attention of commercial sector funding, as does relief) and in local applications, particularly in the developing world. It was noted that early-warning and preparedness applications do not share the same attention as relief and that energy needs to be focused on remedying this situation. The issues that were of greater concern than money were suitability for required application, reliability, and relative ease of operation.

Observation 5. Participants at the TAHRO meeting generally considered that during the onset and acute phases of natural disasters, within the first hours and possibly days, local and national trained and untrained responders will be the first on the scene. It is typically the local/national health infrastructure (both technical and human) which has to contend with the critical health needs of victims during the early stages of a disaster. So the need is to work in preparedness exercises, before disasters, to train these responders and to strengthen local and national health infrastructures. These are requirements that can be supported by telecommunications and information technologies. Telemedicine as a tool for clinical support has not reached a level (of cost or ease) that it is considered useful in the acute phase. Besides, many first responders say that clinical needs are not the first priority. Rather, information gathering, triage, and stabilization of the situation are most the important needs during the acute phase and training, surveillance, warning, assessment tracking victim/patient encounters are the most useful applications of technology.

Observation 6. In addition to the individual medical needs of disaster victims, the broad public health consequences of large-scale natural disasters can be of enormous proportions. Characteristically, major disasters create situations where existing local health facilities and personnel are overwhelmed by the nature and scope of the health emergency.

Additionally, disease control takes on a different dimension after disasters. With a breakdown of public health measures, including lack of sanitation and clean water, diseases endemic to the region may spread. Baseline surveillance data on endemic disease distribution in an area can be used to assess the nature of disease threats to displaced people and enable public health action, such as immunization, to be taken to

protect groups at risk. Access to these data is crucial to evaluate the evolution of eventual outbreaks or epidemics and to adapt appropriate and timely disease control strategies.

Further, telecommunications and information technologies can help mitigate the public health impact of disasters by enabling public health officials to obtain the earliest information about the occurrence and extent of a disaster and to mobilize and coordinate appropriate and adequate resources quickly. Early communication as to the nature of potential problems is critical, as the rapid location of supplies, such as vaccines, treatment drugs, laboratory reagents and other specialized supplies might be the factor that prevents the development of a public health emergency.

The importance to public health of emerging and re-emerging infectious diseases create an urgent need to monitor the situation locally and nationally and to respond in an effective manner. Strong surveillance systems serve as proactive measures, providing immediate reports of disease outbreaks and permitting timely response. Wide geographic coverage is thus important, as is the capability of linking with specialized networks (such as military laboratories) for expanded coverage or expertise.

Observation 7. It was interesting to note that the land mine experts present were not encouraging a unique focus on clinical applications for land mine injury. Rather, they wanted to see the focus broadened to include such things as utilization of telecommunications and information technology for collection and dissemination of key epidemiological data, including population-based data and individual patient records and tracking.

Observation 8. Not unlike other, more routine applications of technology in health, the discussion focused, in one way or another, on issues of cost quality and access. A general need was expressed that critical evaluation of pilot humanitarian health projects would be valuable.

One such project discussed was a disaster mental health pilot proposed by the Council of Europe.

Observation 9. There are several critical issues that need further attention as we pursue the application of existing, new, and emerging technologies. They include:

- a. An accurate and realistic understanding of the capability and availability of existing, new, and emerging technology;
- b. Whether the technology is affordable relative to the intended application and when compared to other possible options that might accomplish similar objectives;
- c. Ensuring adequate understanding of institutional relationships and protocols required for optimal use of technologies (and all essential parties are a part of the process);
- d. Need to develop education and training programs in

the use of technologies that will lead to the regular application of technology and access to derived data by affected countries;

- e. The need to undertake and support research in developing national and local terrestrial systems and data management applications that complement space hardware;
- f. The need to identify and resolve national and international political issues that may have negative impact on the acquisition and application of technology, and
- g. The need to evaluate, on an ongoing basis the applications of new and emerging technologies and share the results of these evaluations

Issues and Recommendations

Several additional specific observations and recommendations were made during the meeting they included:

Critical approach on using new technologies in difficult environments

Conferences of this sort justifiably emphasize the positive potential of Telemedicine in disaster relief. Various experiences are cited each of which represents n's of one. The down side of bringing any new technology on line is not discussed. Telecommunication that increases the logistical complexity at the disaster site may result in critical systems failures. Decreases in funding for or time commitment to some other more critical system (for example personnel training) may produce failures in medical care that are not attributed to the funding and resources priorities that favored the introduction of telecommunications technology. It is important to examine how we can produce good by using telecommunications technology but it is also important to consider how we can avoid doing harm particularly in the resource constrained environments associated with disasters in developing economies.

International Agreements

The capacity to use telecommunications to cross the barriers between social groups and nations does not mean that such will be politically or diplomatically acceptable. Diplomatic issues and political considerations will affect resource distribution and the capacity to utilize telecommunications. Thus, one driver of the requirement for and use of telecommunications will be such political considerations. Any realistic

planning will take this into account. Control of information technology is an important aspect of projecting power. From one point of view, giving aid to the weak in a disaster situation is a method of projecting power, and establishing dominance. Perhaps it is not surprising that attaining the appropriate diplomatic agreements to provide technical assistance is frequently the most difficult aspect of providing international disaster relief.

Reference was made to the recent *Intergovernmental Conference on Emergency Telecommunications*, June 1998 in Tampere Finland and the *Convention on the Provision of Telecommunications Resources for Disaster Mitigation and Relief Operations*.

Standards

Though it is difficult to overemphasize the difficulties associated with the lack of access to technology, both developed and developing communities share the (sometimes greater) challenge of working out the regulatory, institutional, and professional protocols for application of those technologies that are available. In short, the challenge in applying technology to disaster management is frequently not a question of the suitability, or even availability of the technologies themselves, but the development of the relationships among the users.

Although no specific recommendations were made, standards issues were referenced at the meeting. Most agencies and institutions involved in humanitarian health initiatives have different and varying information requirements ranging from strategic decision-making (i.e., monitoring health status, vulnerability assessments, implementation of preventive measures, monitoring infectious disease, security, logistics and supply management tracking) to information for more general purposes (i.e., periodic situation reports, long-term policy analysis and planning). Many of the health-related institutions participating of this conference currently employ information technologies, or "systems", to collect, manage, and exchange information. At the same time, many others do not.

Each participating agency and institution has its own distinct mandate and mission for which it is responsible. Although the overall objectives of many of these organizations are similar, for varying reasons internal information collection and management schemes have been developed to fulfill each institutions' mandate. There is, therefore, a wealth of information that is being collected that may be valuable to other interested parties if mechanisms could be developed that would make this possible without requiring significant human or financial resources and without putting unreasonable demands on any organization.

Mental Health

The delivery of mental health services -- to disaster victims, their relatives and response teams -- may be improved by using direct real time interactive linkages that make it possible for mental health professionals in distant areas to see patients and interview them in collaboration with mental health professionals on site. Although non-interactive telecommunication is useful before or after the disaster, non-real time interaction (e.g., via e-mail, etc.) Was not considered sufficient for consultation during the acute phase of relief efforts.

The need to develop mechanisms for tracking victim/patient encounters is also important, particularly in the field. It is frequently the case that no records are made of field management of patients. There is little or no capacity for data reporting and information processing in the field. Frequently there is nothing other than voice communications in the field (if that). It was recommended that a project might be initiated to develop and test a system that would permit archiving the field treatment experience, which will be helpful for developing future protocols.

As identified during several other discussions, collecting and maintaining disaster epidemiology information, particularly in areas vulnerable to recurrent disasters, was also considered to be a helpful resource for psychiatrists and psychologists and other mental health professionals involved in preparing disaster contingency plans.

Land Mines

During the meeting a recommendation was made to assess the use of telecommunication regarding treatment and rehabilitation of injuries particularly in developing countries as a support to peripheral health services. The landmine project could be used as a demonstration project in selected African countries and such activities could be developed by WHO as part of the Plan of Action for a concerted public health action on anti-personnel mines.

Another recommendation made by the group was in support of de-mining teams. It was recommended that a program of information sharing be developed that would promote Internet-based communications networking between and among deminers.

Appendix 1

**Exploring the Potential of Telecommunications Applications in
Humanitarian Health Initiatives**

List of Participants

Andrew Andrea

Division of Emergency and Humanitarian Action
World Health Organization
CH 1211 Geneva 27, Switzerland
Phone: 011-4122-791-4723
E-mail: andreaa@who.ch

Frederick M. Burkle, Jr., M.D.

Director
Center of Excellence in Disaster Management and
Humanitarian Assistance
1 Jarrett White Road
Tripler ARMC, Hawaii 96859-5000
Phone: (808) 433-7035
E-mail: skip@website.tamc.amedd.army.mil

Marc-Antoine Crocq, M.D.

Department of Psychiatry
Centre Hospitalier PB 29
F-68250 Rouffac, France
Phone: 011-33.3.89.78.7120
E-mail: marcantoine.crocq@forenap.asso.fr

Col. Thomas J. Eslick

Chief, Medical Plans & Operations Division
USCINCPAC ATTN: J07, PO Box 64045
Camp HM Smith, HI 96861
Phone: (808) 477-1022
E-mail: eslicktj@hq.pacom.mil

Herbert Frey

Head of Radio Communications
International Committee of the Red Cross (ICRC)
19 Avenue de la Paix
CH - 1202 Geneva, Switzerland
Phone: 011-4122-734-6001
E-mail: hfrey@icrc.org

Victoria Garshnek, PhD

Telemedicine Evaluation Initiative Project Manager
AKAMAI Project Office
Tripler Army Medical Center, Hawaii 96859-5000
Phone: (800) 322-8262 ext. 3600
E-mail: garshnek@mhpcc.edu

Claude de Ville de Goyet, M.D.

Chief Emergency Preparedness and
Disaster Relief Coordination Program
Pan American Health Organization
525 Twenty-third Street, N.W.
Washington, D.C. 20037-2895
Phone: (202) 974-3520
E-mail: cdevill@ibm.net

Fred Gusman, MSW

Director
National Center for Post Traumatic Stress Disorder
795 Willow Road
Menlo Park, California
Phone: (650) 493-5000 Ext. 27314

Harry C. Holloway, M.D.

Department of Psychiatry
Uniformed Services Univ. of the Health Sciences
4301 Jones Bridge Road
Bethesda, Maryland 20814-4799 USA
Phone: 301-295-3720
E-mail: hhollowa@erols.com

LTC Kyung-Sup Chung, M.D.

Clinical Director
Republic of South Korea Army

Craig H. Llewellyn, M.D., M.P.H.

Prof & Chair, Dept of Military & Emergency Med.
Professor, Preventive Medicine
Uniformed Services Univ. of the Health Sciences
4301 Jones Bridge Road
Bethesda, Maryland 20814-4799 USA
Phone: 301-295-3720
E-mail: cllewell@usuhs.mil

Georgia Macdonough, MS, NP

American Red Cross
Asst. Chair, Disaster Committee
6135 N. Black Canyon Highway
Phoenix, Arizona 85015
Phone: 602-944-7547
E-mail: phxaz@crossnet.org

Jean-Pierre Massué
Secretary General
European Federation of Scientific Networks
Council of Europe
F-67075 Strasbourg Cedex, France
Phone: 011-33-3-88-41-26-14
E-mail: jean-pierre.massue@aprn.coe.fr

John Navein MB ChB MRCPG DCH DTM&H LRCP MRCS
Medical Director
Telemedicine Clinical Advisory and Training Team
Penstone, 5 The Grange, Kingham, Chipping Norton
Oxfordshire OX7 6XY, England
Phone: 011-44-1608-65-9902
E-mail: navein@ttad.org

Neal I. Neuberger
Senior Partner
Center for Public Service Communications
5315 Lee Highway
Arlington, Virginia 22207 USA
Phone: 703-536-5642
E-mail: nealn@cpsc.com

G. Nicolai, M.D.
European Center for Disaster Medicine
c/o Gallery Centre, Via Appia Nuova, 41, B319
I - 00183 Rome, Italy
Phone: 011.39.6.77201523
E-mail: heologpn@rdn.it

John C. Olsen, M.D., Commander USN
Peacekeeping/Humanitarian Assistance
The Pentagon, Room 1D473
Washington, D.C. 20301-2000 USA
Phone: 703-697-9675

Ron Poropatich, M.D.
Chief, Telemedicine Directorate
Walter Reed Army Medical Center
Washington, D.C. 20307-5001 USA
Phone: 202-782-8935
E-mail: poropat@vs.wramc.amedd.army.mil

Frank Rawlerson
U.S. Defense Information Systems Agency
Honolulu, Hawaii

Claude J. Romer, M.D.

Chief, Violence and Injury Prevention Unit
World Health Organization
CH 1211 Geneva 27, Switzerland
Phone: 011-4122-791-3468

Hakan Sandbladh, M.D.
Head, Relief Health Department
International Federation of Red Cross and Red Crescent
Societies, PO Box 372
1211 Geneva, Switzerland
Phone: 011-4122-730-4407
E-mail: sandblad@ifrc.org

John C. Scott (Chair)
President
Center for Public Service Communications
5315 Lee Highway
Arlington, Virginia 22207 USA
Phone: 703-536-5642
E-mail: jcscott@cpsc.com

Rolf Sommerhalder
Head of Telecommunications
Swiss Disaster Relief
Swiss Federal Institute of Technology (ETH)
Gloriastrasse 35, 8092 Zurich
E-mail: rs@ife.ee.ethz.ch

Jean Pierre Thierry, M.D.
Vice-President, French Association of Telemedicine
3 rue Lecuirot, F-75014 Paris, France
Phone: 011-33.3.89.78.7120
E-mail: ymbion@club-internet.fr

Ellen Wilder
Health Communications Specialist
Division of Global Health
Centers for Disease Control and Prevention
1600 Clifton Rd., N.E.
Atlanta, Georgia 30333 USA
E-mail: eww7@cdc.gov

RADM Dennis Wright
Command Surgeon
USCINCPAC Attn: J07, PO Box 64045
Camp HM Smith, HI 96861
Phone: (808) 477-6181
E-mail: diwright@hq.pacom.mil

Commander Kevin Yeskey
U.S. Public Health Service
Director
Center for Disaster Medicine and Humanitarian

Assistance
Uniformed Services Univ. of the Health Sciences
4301 Jones Bridge Road
Bethesda, Maryland 20814-4799
Phone: 301-295-3720