N94-11793

Tropical Medicine: Telecommunications and Technology Transfer

Llewellyn J. Legters, M.D., M.P.H.
Professor and Chairman
Department of Preventive Medicine/Biometrics
Uniformed Services University of the Health Sciences
Bethesda, Maryland

I have just returned from the Annual Meeting of the ASTMH, where we presented a workshop on "Telecommunications and Technology Transfer" (slide 1). This workshop was a demonstration of some uses of modern telecommunications in medical technology transfer between U.S. and Third World institutions.

I want, first, to say something about the genesis of the idea for the workshop. Some of us are concerned about the potential for global outbreaks of tropical infectious diseases, and about our ability (more correctly, our inability) to identify and respond to such outbreaks. The disease threats I'm talking about include not only the familiar ones like malaria, but also the so-called "emerging" diseases like Lyme, HIV, Lassa.

The rapid increase in international air travel since the 1950s has increased the risk of importation of these diseases to non-endemic areas (slide 2). Meanwhile, the number of people in tropical medicine in the world is small and decreasing, and the capacity to train more of them is limited. This is the situation in the U.S. (slide 3).

We view rapid, efficient telecommunications as part of the solution to this set of problems—the means to link a network of epidemiological field stations via satellite with U.S. academic institutions and government agencies, for purposes of research, training in tropical medicine, and observation of and response to epidemic emergencies.

At the workshop in Boston, we demonstrated applications of telecommunications technology in long-distance consultation, teaching and disaster relief. We also looked at futuristic systems of medically dedicated satellite remote sensors for use in disease prediction and control. I will speak only about applications in teaching and consultation in tropical infectious diseases. Dr. Roberts is speaking later about remote sensing applications in public health.

The organizational and corporate sponsors of the Boston workshop are listed here (slide 4). The program would not have been possible without generous grants from NASA and WRAIR. The other sponsors generously donated equipment and personnel in the production, including a live HD uplink from Walter Reed.

The teleconference was carried live by PBS and the National Broadcast Satellite Network to several hundred medical teaching institutions and VA hospital centers around the U.S.

I now want to present two short videotaped segments from the teleconference. The first was intended to demonstrate how one might use videoconferencing to improve an epidemiologist's knowledge and understanding of a remote area prior to his actually arriving there. By being able to actually see the landscape and its people, and the places where they live and work, study design and logistical preparations are easier. More importantly, by being able to talk face-to-face, study collaborators are able to develop a measure of trust and confidence before actually working together.

(Slide) The scene is Belize. In May 1991, concern that cholera might be spreading north through Central America prompted officials of the Belizean Ministry of Health to initiate a search for possible cases of cholera. (Slide) In the Cowpen area of southeast Belize, banana farm workers reported no illness resembling cholera, but they did express concern about the large numbers of people who were ill with hepatitis. (Slide) Residents pointed to stagnant streams and shallow, foul-appearing wells as the probable source.

(Slide) The Belizean Ministry of Health requested assistance from the joint Belize-U.S. Epidemiological Research Center in Belize City, which is sponsored by USUHS. (Slide) In response, a team of scientists went to Cowpen to collect information and specimens from ill people and their contacts.

The preliminary data indicated that new cases of hepatitis A and B, probably new cases of hepatitis E, and possibly new cases of hepatitis C were occurring primarily among young adults in a population with an extremely high background of hepatitis B.

Seventy percent had hepatitis B markers. Sixteen percent had HBsAg. The hepatitis E and A could have been waterborne.

Through telephone conversations and exchanges by fax, attempts were made to obtain critical data about the involved populations and the important environmental variables. In spite of this, considerable time was required after arrival for repeated revisions of the study protocol. Questionnaires had to be revised and transported by aircraft to and from Belize City for reproduction. If this had been a disease with significant mortality, the time delays and communications problems we experienced would have been much less tolerable.

How could we have planned better? We feel that the most effective means of communication would have been a series of on-line teleconferences conducted in seminar fashion, using satellite television. Unfortunately, the system to support such an undertaking did not exist. It is my goal to create such a system to permit both scheduled and unscheduled teleconferencing with our several overseas programs.

The idea occurred that we could simply use videotapes. What you are about to see is an edited videotape. It contains the sort of information we might have been able to get by teleconferencing if we had the necessary facilities in place:

(Video on:)

Roads—Here we see the roads that are quite vulnerable to heavy rains.

Village—Moving into one of the villages where banana workers live:

*** We see food preparation.

*** We see interested people.

*** And we learn that the local health workers are very interested in health education about water treatment.

*** We also note that there are a lot of people with fevers.

Questionnaire—Here a questionnaire is being evaluated.

Water—Here is a local stream, which is being used for bathing, food preparation, washing clothes, recreation, and as a source of household water.

Wells—This is representative of the local wells. Most are shallow and somewhat protected; however, some are poorly placed, for example, next to latrines.

Water System—Here is a village with a water system. Why does it have a water system, and has the system made any difference with respect to disease incidence?

Lab—Lastly, we are able to look at the up-to-date laboratory and the available laboratory equipment.

(Video off.)

In summary, fax machines, telephones, speaker phones, videotapes, and full-motion TV are all potential means of communicating before initiating a field study. The more sophisticated means, like teleconferencing, offer several advantages, but they are less available.

A second segment of the teleconference in Boston consisted of case presentations of cutaneous leishmaniasis. We used edited HD footage of case presentations collected on-site in Belize and a live HD uplink from Walter Reed Army Medical Center to demonstrate its potential use in teaching tropical medicine in U.S. classrooms. We selected HD to demonstrate its value in situations where a high degree of visual discrimination is needed. Unfortunately, while resolution is good, it is not nearly as good on these regular monitors as it would be on HD monitors. Let me show you one of the cases.

(Video on and off.)

Where are we going from here? Within the context of John Scott's and Jay Sanders's excellent presentations, the objectives I'm about to present may sound somewhat parochial and limited in scope; however, they are things we can probably accomplish institutionally here at USUHS, and they do represent experiential components of a more comprehensive program.

(Slide 5) First, we want to develop a series of teaching modules on selected high-priority tropical infectious diseases, directed toward educating U.S. medical students and practicing physicians. The modules would combine edited videotaped footage collected on-site in endemic

areas, with live interactive videoconferencing conducted by subject matter experts. The sessions would be carried over public broadcasting networks to medical teaching institutions and hospital centers in the U.S. The modules would provide a visual supplement to this manual, "Control of Communicable Diseases in Man."

(Slide 6) Second, we want to develop an operational plan (a plan "on paper") for a deployable telecommunications package that could be used during the acute phases of a disaster. This idea is borne of the frustration of seeing a need for such systems in support of "disasters," but without any organizational mechanism for putting the system together. By the time such a system can be "jury-rigged," cost proposals developed, and necessary coordination accomplished with appropriate agencies, the emergency is over and the problem forgotten until the next disaster.

There is a need to develop telecommunications systems to support international teaching and research programs in tropical infectious diseases, for epidemic observation and response, and for disaster relief. I have tried to describe our limited efforts in this direction so far and our plans for future development. Thank you for your attention.

ATTACHMENT

Slide 1

DISEASES OF THE TROPICS
TELECOMMUNICATIONS AND TECHNOLOGY TRANSFER

Workshop Purpose

Demonstrate uses of telecommunications in medical technology transfer between U.S. academic centers and "Third World" institutions

SOME FACTS ABOUT INTERNATIONAL TRAVEL

- **One trillion passenger air miles are flown annually—a 20-fold increase since 1950**
- **40 million U.S. citizens travel internationally every year—10-12 million to endemic areas for tropical infectious diseases**
- **6 million foreign tourists and 500,000 immigrants from endemic areas for tropical infectious diseases travel to the U.S. each year**

ASTMH, 1988. Tropical Medicine—Proud Tradition, Grave New Challenges. A statement in support of the Legislative Plan of Action.

THE U.S. CAPACITY TO ADDRESS TROPICAL INFECTIOUS DISEASE PROBLEMS*

- **No more than 400 clinical tropical disease professionals**
- **Fewer still with overseas experience**
- **Only eight U.S. academic tropical medicine "centers"**

*BOSTID-IOM Report, National Academy Press, Washington, DC 1987

Slide 4

DISEASES OF THE TROPICS
TELECOMMUNICATIONS AND TECHNOLOGY TRANSFER

Organizational and Corporate Sponsors

Life Sciences Division
National Aeronautics and Space Administration

Walter Reed Army Institute of Research

REBO Studio, New York City

Hillmann and Carr, Inc., Washington, DC

Scientific Atlanta, Atlanta

Public Broadcasting System
and its local affiliate
WGBH, Boston

TELEMEDICINE/DISASTER RELIEF

1. Teaching and Consultation

Produce teaching modules on high-priority infectious disease topics. Modules would include:

- Videotaped segments of field studies, clinical presentations and laboratory diagnostic procedures
- "Live" teleconferences between disease experts and "front-line" health workers

Modules would supplement established communicable disease texts.

TELEMEDICINE/DISASTER RELIEF

II. Disaster Relief

Develop plans for a deployable telecommunications package to support disaster relief operations, including:

- **System specifications**
- **Equipment and personnel requirements**
- **Operational concepts**
- **Vendors and costs**