

infrastructure. Thus far, Ostroff reports, a multiagency task force directed by the CDC has strengthened surveillance by setting up emerging-infections programs to track "high priority diseases" and to analyze health risks in specific communities. The CDC is also providing additional funds to help state health departments respond more effectively to emerging diseases. New electronic networks, for example, will allow state officials to make use of laboratory diagnoses in real time. For example, ProMED—the international Program for Monitoring Emerging Diseases—will provide grassroots surveillance of public health problems. (See sidebar article.)

In addition, Ostroff says, "sentinel networks" composed of hospital emergency departments have been formed to identify emerging diseases more promptly. Public health microbiologists receive training through a new fellowship program, he says, and the CDC is "beefing up collaborating World Health Organization [disease] surveillance centers."

In May 1995, WHO identified emerging-disease surveillance as a top priority, reports Lindsay Martinez, a senior program manager in the newly formed Division of Emerging and Other Communicable Diseases Surveillance and Control. The division's key activity is directing a network of laboratories to study antibiotic resistance patterns. "Resistance is an extremely critical problem in the developing world," Martinez says. "When a routine antibiotic for common infections is no longer effective, it's necessary to look to second-line antibiotics, which are usually more expensive and may not be available at all."

The National Aeronautics and Space Administration (NASA), meanwhile, has launched the Global Monitoring and Disease Prediction Program. Using data from satellites and other remote-sensing equipment, NASA is analyzing land-use changes and population demographics to predict outbreaks of Lyme disease, malaria, and other illnesses, says the program's manager, Maurice Averner. NASA is even analyzing the African landscape in search of a nonprimate reservoir, such as a mosquito or tick, that may carry the Ebola

ProMED: A Global Early Warning System for Disease

"Until we knew there was such a thing as AIDS, there was no [monitoring] system that would recognize it. And if AIDS were to come along today as a new disease, we would still be in the same situation," said Stephen S. Morse, assistant professor of virology at The Rockefeller University in New York City.

Currently, an international group of some 35 senior scientists and health experts who make up the steering committee of the Program for Monitoring Emerging Diseases (ProMED), are working to see that this situation soon changes. ProMED's goal is to provide an effective global system of infectious disease surveillance that could give early warning to public health officials and others of new diseases, as well as of outbreaks of familiar ones.

A project of the nongovernmental policy group Federation of American Scientists (FAS), ProMED had its inception when the Institute of Medicine Committee on Emerging Microbial Threats to Health of the National Academy of Sciences issued its *Emerging Infections* report in 1992.

According to Morse, who was a member of that committee, "Many people were very concerned that all over the world, the ability to spot even known diseases and identify them properly, and in time to take appropriate action, is very variable." Hence, one of the report's primary recommendations was that steps be taken to fill that void. In response, a meeting, cosponsored by FAS and the World Health Organization, was held in late 1993 and ProMED was born.

To date, the most visible manifestation of ProMED is its e-mail network. Accessible at majordomo@usa.healthnet.org, the network has some 4,500 subscribers from over 100 countries, says Morse, who chairs the ProMED steering committee. ProMED selected e-mail, the most basic Internet technology, as its primary means of communication so that those in developing countries, where the World Wide Web may not yet be available, can participate fully. However, the group also maintains a WWW site, <http://www.fas.org/promed>, through which its files can be accessed.

Established only two years ago, the e-mail network "has taken off in a way that we are very gratified to see," says Morse. Already it has carried the first report of Japanese encephalitis in Australia. Subscribers have also reported the 1994 deaths of racehorses and their trainer in Australia from the newly identified morbillivirus, the 1995 Ebola outbreak in Zaire, and the 1995 outbreak of avian influenza in Mexico.

But e-mail is only one tool available. A formal international surveillance system must exist on one end of the communications network, with an assessment and response apparatus at the other end for the system to be effective. ProMED is actively working with various organizations to realize these goals.

Victor Chase

virus. Since Ebola victims often lived near charcoal-making pits, Averner explains, surrounding geographic features might help NASA identify the most likely source of the disease.

When antibiotics allowed doctors to triumph temporarily over microbes, "we acted as though we had won the war on infectious disease," says Professor Joshua Lederberg of

The Rockefeller University. But, Lederberg notes, "the fact is, infectious microbes have been around all along and will continue to pose threats to public health."

Ginger Pinholster

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