Confronting a World of Infectious Diseases

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Bioterrorism and international epidemics are global public health problems. They are international, not just national, issues. Agents that are potential bioweapons and the fight against these agents need to be put into the framework of the fight against infectious diseases in general.

To put things in perspective, we're not dealing with a threat. We're dealing with a reality: the leading infectious killers. We're dealing with diarrheic diseases, acute respiratory infections, HIV/AIDS, tuberculosis, malaria, and measles. When it comes to diseases that are particularly epidemic prone, it's clear to everyone that epidemics are not new to humankind. They've been around for centuries, certainly, and usually accompany population movements.

When it comes to more recent years, I sometimes use the analogy of traffic accidents. They occur everywhere and are not restricted to developing countries. The nature of these outbreaks varies between the developing world and the developed world, but epidemics and the threat of infectious diseases occur everywhere. Ebola viral hemorrhagic fever in Uganda, yellow fever in Guinea, foot-and-mouth disease in the UK, Singapore and Malaysia, cholera in South Africa, malaria in Afghanistan, Rift Valley fever in Saudi Arabia and Yemen, and Crimean-Congo hemorrhagic fever in Pakistan: all of these diseases are still occurring, and these are just the main ones to appear since October 2000.

When it comes to the issue of how developed countries can deal with exotic agents, realize that, even without day-to-day bioterrorism, it is a day-to-day problem. On a continuous basis, there are some exotic diseases coming into the developed world with which we must deal.

All these dynamics of the microbial world constitute a threat to health security, and it's time for global epidemic surveillance and response. We're dealing with epidemics, emerging infections, and drug resistance.

The influenza pandemic in 1918 and 1919, the Spanish flu, killed millions. The estimated number of casualties worldwide is more than 40 million. More recently, the Marburg viral hemorrhagic fever outbreak in the Democratic Republic of Congo resulted in significant loss of life. The United Kingdom is currently dealing with "mad cow disease," or bovine spongiform encephalopathy.

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When it comes to intentional epidemics, the World Health Organization (WHO) is concerned, certainly, with the possible use of biological weapons. WHO is concerned because of the possible disastrous consequences, because biological weapons combine maximum destructiveness and easy availability. Biological agents can be created *in vitro*. An example is the antibiotic-resistant strain of anthrax. Large amounts of biological agents can be easily produced, not to mention the potential implication of research on bioregulators, genomics, cell receptors, and so on.

Thus, WHO's interest in bioweapons is not new. In the 1970s, WHO published *Health Aspects of Chemical and Biological Weapons*. That publication is currently under revision by a network of bioweapon experts for the public health response to deliberate epidemics. This revised publication will be a scientific reference document for all those concerned with the public health consequences of chemicals and biological agents, but it will not be an operational tool for countries wishing to apply the recommendations. It will be up to the countries to develop their own preparedness plans. This revision includes input from more than 80 experts from all six WHO Regional Offices, seven international organizations and nongovernmental organizations (NGOs), Food and Agriculture Organization, Red Cross, Office International des Epizootis, Organization for the Prohibition of Chemical Weapons, and Harvard-Sussex Programs. It involves many WHO clusters because we're not dealing only with infectious diseases but also with chemicals. Five informal meetings already have been held between February 1998 and November 2000. The second edition comprises seven main chapters and 10 annexes plus an executive summary. This second edition should be available by the end of 2001.

WHO does not address global health security alone. We use a system of networks and governmental and private institutions. WHO's own network comprises WHO regional and country offices, a vast variety of WHO collaborating centers, epidemiology training program networks, military laboratory networks, ministers of health, and national disease control centers, such as Centers for Disease Control and Prevention.

A number of UN agencies are in the field, such as UNICEF and the High Commission for Refugees, and there are a number of nongovernmental organizations, or NGOs.

The media network—they play an important role, as I will show later—includes a number of electronic discussion groups and the Global Public Health Information Network.

When it comes to collaborating centers, WHO, just for infectious disease, in this particular area, has more than 270 collaborating centers worldwide. The distribution of these centers is mainly in the developed world. We do have some geographical and technical gaps that need to be filled, and some diseases are not always well addressed.

The WHO Influenza Network is the oldest network of WHO collaborating centers. It's a worldwide laboratory network that now uses World Wide Web (WWW) technology to share information on circulating strains of influenza, for instance in the Middle East and Indian Ocean. This information is used every year, twice a year actually for the northern and southern hemispheres, to make antigen recommendations for the vaccine industry for the strain that will be used. This network has immediate implications. It is key for providing information for the vaccine against influenza.

What I discuss now is relatively new in WHO: Global Epidemic Intelligence. It was set up in 1996 after the plague outbreak in India and the Ebola virus outbreaks in Zaire. Its purpose is mainly to improve international preparedness and response for epidemics and to counter confusing information, which disrupts international travel and trade. Global Epidemic Intelligence involves a number of things: active collection of information on ongoing epidemics (or even rumors of epidemics) worldwide to rapidly verify this information, because WHO has privileged access to countries, and sharing of this information with the international public health community. The entire operation is done under WHO's mandate and the International Health Regulations that are currently under revision. A classic example is our Country Report to WHO. With this documentation instrument, we can compile data from, for example, a southeast Asian country about an outbreak in one of its districts, for example, an outbreak of diarrhea. It presents data on the numbers of cases and deaths, date of last case, and so on.

We realize that public health authorities are more and more frequently bypassed because the private sector is more and more important, including in developing countries. In India, for instance, more than half of the primary consultations are actually within the private sector.

NGOs in the network are relied on heavily as are the media. Because an outbreak is a community event, not just a public health problem, it will be reported very rapidly and usually much more rapidly than with the traditional route of surveillance within the ministries of health. The Internet is an increasing source of outbreak-related information: the media wire news (e.g., Agence France Presse, Reuters, BBC) and a num-

ber of electronic discussion groups (e.g., ProMEDmail and PACNET for the South Pacific).

A number of NGO Web sites and a few UN Web sites, among others, are involved in the network. On the WWW today, a variety of sources of information exist that could be relevant and worth looking at just for verification.

A computer application we developed with Canada—Global Public Health Information Network—scans the WWW more than 10 times a day looking for all kinds of information (e.g., infectious disease, war/terrorism). Regarding infectious disease, for instance, the system will search for a subset of topics (e.g., cholera, dengue, HIV, hantavirus). The system is quite complex when it comes to information management, and each event has a unique identifier or code with a country code, disease code, the date, number of reports, and so on. All the information goes into the database. Reports (e.g., on acute jaundice syndrome in the Balkans) are reviewed daily. WHO staff at the regional and headquarter levels follow up on these reports and verify them with the national authorities. This information is shared once a week with the international public health community through the outbreak verification list, which is now four years old. This information is restricted and is not available to the public. It is sent to all our collaborating centers, WHO staff, and WHO's partners. The listings provide information such as disease syndrome, location or outbreak, source and last update, brief description, and the WHO contact. It's more an operational bulletin than a complete summary of what we know. When the information is confirmed and we feel it's worthwhile, these data are entered on our Web site: www.who.int. Outbreak distribution data (i.e., knowing what kind of event we are dealing with) were found for each of the last four years. The most frequent are gastrointestinal diseases and cholera followed by meningococcal meningitis and hemorrhagic fevers. Yellow fever is quite common, as are measles, anthrax, Japanese encephalitis, and leptospirosis, among others.

Articles and health updates can be found in the *Weekly Epidemiological Record Disease* as well as some reports in *Outbreak News*.

Let me turn now to our capacity to respond to this event in the field. I will not discuss much of what's being done at the regional office level or by the ministries of health themselves. I will simply report on the kind of capacity that exists at WHO headquarters. We've been dealing with building this capacity for the last four years, and not only in the African region. We do play a role in coordinating a response, including field activities, logistics, information, contact with national authorities, and fund-raising, which is necessary at the time of an event. We help mobilize the international response, looking for resources from various collaborating centers with relevant expertise, such as CDC, for instance, which has often worked with us in the field. We facilitate access to countries. We can deliver the team members a UN *laissez-passer*. We also facilitate the shipment of equipment in terms of dealing with customs and so on. We try to facilitate research because sometimes it's a unique opportunity for such activities. Of course, we have to support the countries in their efforts to better prepare for epidemic detection and response.

We have developed a number of guidelines that could be relevant to anthrax, plague, or Ebola virus, for instance. When it comes to disease outbreaks, the team that goes into the field is key in providing the WHO website with the latest information.

I now provide an overview of the last two years regarding response directly from headquarters in various places, not only in Africa, dealing with all of these things. An example of a WHO international response involved an outbreak of tularemia in the Balkans in April 2000. Numerous groups participated in this international team: the US CDC in Fort Collins, the Instituto Superiore di Sanita in Rome, people from Hamburg, Germany, and from Ireland, and people from the European program in international epidemiological training, among many others.

It's very important that we build capacity in countries, and not simply provide this fire-brigade approach from the center. We do work a lot in countries. I'm not going to emphasize that because I thought the first part was more interesting and relevant. However, it's very important that countries develop capacity for epidemic alert and response. We use three key points for that: training in field epidemiology (to have a core group of people with the know-how to handle epidemics, investigate, and so on); the laboratory; and communications.

Interestingly, there is a link here with this threat of bioweapons because you have a convention in Geneva, a group of countries that comprise the Biological and Toxic Weapons Convention. This group's Article 10 deals with the scientific and technological exchange for peaceful purposes and technical cooperation and the international cooperation for the peaceful use of biological materials, equipment, and information. Under this Article 10, there is a possibility to raise funds to build country capacity, particularly for laboratory and field epidemiology training. Under the framework of Article 10, WHO is assessing the feasibility of an alliance against infectious diseases.