

Funding is tight for current efforts against emerging diseases . . .

Only a few decades ago, the war against infectious diseases seemed to be going well — new vaccines and antibiotics were being developed, smallpox was near eradication, and so forth. But victory may have been declared too soon. New diseases for which we have no cure, such as AIDS and Ebola fever, have come along, treatable or preventable diseases we thought we had under control such as cholera and tuberculosis are reemerging, and a growing resistance to antibiotics is overcoming our best defense. Infectious diseases are now the leading cause of death around the world and the third most common cause of death in the United States. We are facing a "global crisis," warns a recent report from the World Health Organization (WHO), which calls for commitment and action from the international community. Building an effective global surveillance and response network for infectious diseases will be an integral part of any action, and the need for strengthening it has been stated time and time again through various domestic and international reports. But so far, the agencies issuing these reports have not been able to open a large enough wallet to pay for their words, leading to the question of when — or if — sufficient resources will be anted up to implement these plans.

"We have witnessed a gradual erosion of resources for general infectious disease control and prevention both in the United States and the world for a number of years," said Ruth Berkelman, deputy director of the National Center for Infectious Diseases of the US Centers for Disease Control and Prevention (CDC). Nevertheless, plans to strengthen both the US and global infectious disease network continue to roll in. In 1994, CDC published a primarily domestic plan for controlling emerging diseases. The plan addressed surveillance, as well as the need for a strong network of diagnostic facilities, good communications and a training venue as part of an effective US response capacity. The CDC plan was followed by a September 1995 report by the Committee on International Science, Engineering, and Technology Policy (CISSET) of the presidential National Science and

Technology Council that made recommendations for the US role in a global network.

Officials at CDC hope to realize their plan incrementally, requesting US\$125 million annually once it is fully implemented. But the incremental release of the funds may prove to be even smaller than expected: CDC was granted only \$6.7 million for the plan in 1995, \$10.6 million for the 1996 fiscal year, and only \$27 million has been recommended in the White House's proposed budget for 1997. The rise is encouraging, said Gail Cassell, chairman of the microbiology department at the University of Alabama at Birmingham, but "it is certainly way under what's needed to really implement the plan." She believes that the limited funds reflect both a tight US budget as well as an opinion in Congress that does not consider infectious diseases to be a high enough priority. This perspective may also help explain why the 1995 report from the CISSET group has failed to receive any funding at all for its implementation to date.

Despite the funding constraints, CDC is determined to implement as much of the plan as possible. For example, the plan had asked that ten emerging infections programs be established across the US, and so far they have had to settle for four. CDC has also used the funds they received to strengthen 15 state health departments and to revive a public health microbiology fellowship program in an effort to get more young people in the loop, because microbiologists trained in the sixties and seventies are now retiring, often without replacements.

Although CDC has accomplished a fair amount with limited resources, there are still important areas not getting the attention they need because of lack of funding. According to Brian Mahy, director of Viral and Rickettsial Diseases at the National Center for Infectious Diseases of the CDC, insufficient funding has compromised a host of activities, including research on the Ebola virus and hemorrhagic fever viruses, surveillance efforts for the influenza virus (particularly in China), research on hepatitis virus (specifically hepatitis C), and research on the new herpes-8 virus that may be the cause of Kaposi's sarcoma tumors that

appear in AIDS patients. "The programs we put in place are helping but they're not adequate yet," says Berkelman.

Although the CDC does address global surveillance and response, the agency's main priority is domestic. The World Health Organization (WHO), however, does have a global plan for surveillance of emerging infectious diseases, one much like the CDC plan. Also similar to the CDC plan, there is insufficient funding for its implementation. "It's partly our fault," said Fred Murphy, dean of veterinary medicine at the University of California at Davis. "The US doesn't pay its dues [to the WHO]," he said, an amount that makes up approximately one quarter of the WHO budget. Failure on the part of the US to pay its WHO bill is due, at least in part, to this year's delay in legislating a federal budget because of political differences between Congress and the White House. Mahy said that CDC has been trying to persuade the US to fund the WHO, because of the importance and global nature of this issue. "It's very short-sighted not to fund the WHO," said Mahy, "It takes less time to circle the globe than it does to incubate a virus. What's a problem in Africa could be our problem in the next couple of days." David Brandling-Bennett, deputy director of the Pan American Health Organization, the regional office of WHO, believes that the US has a "moral obligation" to contribute. "I think the US has fallen short of that in many ways," he said. The WHO is part of the United Nations, and dues are typically negotiated with individual countries based on their ability to pay. Developed nations such as the US, Canada, Japan, and nations of the European Union thus support much of the budget.

It is hard to tell if more resources will be forthcoming in the near future. But Murphy believes that the high level of public awareness and concern about the threat of infectious diseases may be just what it takes to get more funding. "There's very good public survey information that the public is very concerned and wants more done and is willing to pay," said Murphy, "if this doesn't turn into some new resources nothing ever will." Cassell is also cautiously optimistic about increased funding, particularly because the threat of biological warfare has made infectious diseases a national security issue, in turn escalating its level of priority with the Clinton administration and Congress. The potential for infec-

tious agents to be introduced as biological warfare is a concern because several countries, including Iraq, have successfully made such weapons, despite being a violation of international treaty.

The number of emergent infectious diseases is on the rise, and the dimension of their threat has been magnified both

by the risk of biological warfare as well as by global travel and trade. "Infectious diseases that are emergent today are grim reminders of what will continue to happen in the future," said Murphy. The need to strengthen surveillance and response networks has been voiced repeatedly through CDC, WHO and

CISSET reports. We certainly are not short on plans for action, and while they may differ with respect to strategy, they all appear to be joined by one common theme — insufficient resources. Beating the microbes will require more than plans.

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... but new plans for surveillance are still being proposed

From tuberculosis and AIDS to potato blight and bovine spongiform encephalopathy (BSE), infectious diseases kill not only people, but whole economies. The links between seemingly far-flung events involving pathogens and their hosts deserve a new kind of scrutiny if we are to deal effectively with emerging and reemerging infectious diseases. Indeed, some experts now contend it would be prudent to anticipate important consequences — perhaps by preparing formal "infectious disease impact statements" — before embarking on substantial public or private development projects, particularly when they are planned for easily disturbed habitats.

Until now, researchers and public health officials have "compartmentalized" infectious diseases, usually according to the causative agent or the target host, rather than viewing them as part of a broad continuum, according to Anne Vidaver, head of plant pathology at the University of Nebraska in Lincoln.

Vidaver and others with different expertise but a common interest in infectious diseases are calling for a far more comprehensive strategic approach to surveillance, basic and applied research, and immunization, treatment or other appropriate responses. They are also urging Congress and a slew of departments and agencies to better coordinate the currently diffuse range of infectious disease-related programs within the US government.

Their plans are ambitious, to say the least. They encompass human, plant and animal diseases as well as the viral, bacterial and fungal agents that cause them and the insects or other vectors that help disseminate them.

It is well known that there is reason for concern that current approaches are not sufficient. Infectious disease remains the leading cause of human deaths world-

wide, accounts for about one-quarter of all physician visits in the United States, and adds up to a sizable fraction of all health care costs, says Gail Cassell of the University of Alabama in Birmingham. Drug-resistant pathogens, food- and water-borne agents, and emergent pathogens such as HIV and the hantaviruses are but a few of the manifold problems now occupying this segment of human medicine.

Along the border of human and non-human infectious diseases, attention focused this spring on BSE in British cows and its potential link to a small cluster of cases involving young adults who died from a neurodegenerative disorder that resembles so-called "mad cow disease." Although BSE has not been detected in US cattle herds, comparable encephalopathies affect elk and mule deer that occupy overlapping habitats in the western US and Canada, according to Victor Nettles of the College of Veterinary Medicine at the University of Georgia in Athens. No one is claiming a link between the disease found in feral animals and any cattle or human illnesses. But surveillance seems prudent. Some herds of domesticated elk carry tuberculosis and others brucellosis, diseases that will surely cause problems if they spill over into cattle herds. And tuberculosis has now also been found in free-ranging deer in Michigan, again posing an economic threat to local cattle herds.

Meanwhile, new forms of rabies seem to be moving between wild and domesticated animals, and a new bacterial disease detected in song birds is causing serious and economically damaging outbreaks among poultry flocks. And in major crop plants, new or reemergence infectious diseases are also causing problems for farmers, including a resurgent potato blight and several new or reemergence forms of devastating infectious

diseases in wheat.

With so much at stake and so many dimensions to account for, some experts are calling for an anticipatory, more systematic approach to activities that impinge on infectious diseases. For example, earlier this year, a task force of the World Health Organization in Geneva, issued a plan recommending formal assessments of major land use projects if they risk increasing the incidence of diseases such as malaria by disturbing local environments. The WHO task force also suggests that funding organizations, especially the World Bank, routinely conduct such health assessments as they now do environmental assessments.

Independently, Edward McSweeney of the US National Institute for Allergy and Infectious Diseases in Bethesda, Maryland, has outlined a plan for a formal infectious disease impact statements, based on the established process for developing environmental impact statements. McSweeney argues that the drafting of an infectious disease impact statement would "provide a more rational basis" for predicting and perhaps controlling infectious disease outbreaks on a local or even international level.

These days, the US political climate makes even the well-established environmental impact statement requirement something of an endangered species, casting doubt on the near-future implementation of the infectious disease impact statement concept. Nevertheless, a message about the broader importance of infectious diseases has been percolating in Washington policy circles. Last year, for example, top officials in the Clinton Administration explicitly elevated emerging and reemerging infectious diseases to the level of a national security issue.

However, when even established programs are seriously underfunded (see facing page), the likelihood of adequate money for any new recommendations is minimal.

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