

Microbes in the 21st century
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I thank you for the invitation to address you on the occasion of the opening of your 29th annual Conference. It is a special pleasure to see so many old friends in the audience, comrades arms from WHO, from my CDC days, from the Johns Hopkins School of Public Health and many with whom, at the end of a long and gritty day, I happily raised a glass at a refreshment stand unlikely ever to be patronized by tourists. They were memorable days, never to be forgotten.

Unfortunately, for the best part of 4 years, I have had to curtail my involvement in international health affairs. Ugly problems have arisen and because of them, I have been fully engaged in devising strategies to deal with the problems of bioterrorism. Ironically, one of the agents of greatest concern is smallpox.

Just 22 years ago this month, the nations of the world proclaimed that smallpox had been eradicated and recommended that vaccination everywhere could be stopped. For all of us who have grappled with the smallpox demon for fully 14 years and more, it was a moment to be savored. More than 700 international staff and 120,000 national staff had labored under some of the most difficult conditions imaginable to reach this point -- target zero. A number of those who were part of that struggle are here today. These are the people who not only eradicated smallpox but, as well, initiated the Expanded Program of Immunization and laid the groundwork for polio eradication.

Today, it is difficult to imagine the devastation wrought by smallpox. By 1980, more than 300 million people had died of the disease in the 20th century alone; millions had been rendered permanently blind. Indeed, since the beginnings of history, this had been the greatest scourge known to man. As of May 8, 1980, it was no more. What we did not know then was that the Soviet Union had been engaged in a massive biological weapons development program. In 1972, a Biological Weapons Convention had been signed by virtually all countries, including the Soviet Union and Iraq. Most countries that were engaged in developing biological weapons scrapped the programs. The Soviet Union, in the context of the Cold War, saw the existence of this Convention as providing it the opportunity to gain a decisive advantage and so greatly expanded its bioweapons activities..

The declaration of smallpox eradication offered new prospects for smallpox virus to be used as a weapon. Accordingly, as we were later to learn, an intensive effort began in the Soviet Union to weaponize smallpox; to produce the virus in ton quantities and to perfect its use on inter

continental ballistic missiles. The awesome dimensions of that program came into increasingly sharp focus during the 1990s. But then, the Soviet Union broke up; the Russian Federation began experiencing serious economic problems. Support for the bioweapons laboratories decreased and many of the scientists left for other countries -- bearing with them the expertise for production of biological weapons and, very likely, quantities of biological agents. However, the laboratories continued to operate. One, of particular concern is the major smallpox weapons laboratory at Sergiev Posad, less than 50 miles outside of Moscow, still under the Ministry of Defense and still a totally closed, totally secret facility that presumably still has the capacity to produce smallpox in multi-ton quantities.

The release of smallpox again in the world could be an unprecedented catastrophe for this is a world where vaccination has not been practiced for more than two decades. Thus, in 1998, I shifted from concerns for international health, to an effort to alert a complacent medical and public health community that we --all of us throughout the world -- had a threat that was acknowledged to be more serious than the threat of use of either chemical or nuclear weapons. Recognition of this concern grew slowly. But then, there was the dramatic event of September 11. In October, anthrax organisms were dispatched through the mails and, at last, the magnitude of the threat was finally appreciated.

What do we do to counter the biological weapons threat? It is clear that the release of a biological weapons would result in an epidemic. The question then is how does one deal with an epidemic? It is clear that the first thing one needs is a competent, trained public health staff who can develop and manage a surveillance system for early detection of an outbreak and can mobilize infectious disease specialists to help in diagnosis. Also needed is a public health laboratory service capable of diagnosing a strange and perhaps unfamiliar agent. Epidemiologists are needed to chart the epidemic; public health staff to isolate patients and to mobilize resources for large scale distribution of drugs or vaccines. A public health agency is likewise required to organize the community's curative care services -- to find the needed beds, arrange for patient isolation, and to recruit emergency care personnel.

As national and local policy makers began to take stock of the situation and to decide on a strategic response, they became aware of the fact that the most important component of all -- the fundamental skeletal structure upon which all else had to be built -- was public health. And it was, everywhere, pathetically weak. In the US and most industrialized countries, vaccines, antibiotics, better housing and better diet have resulted in a healthier population but forgotten is the fact that the microbes are not defeated, only in temporary abeyance, ready to strike again.

The HIV epidemic, first recognized in 1982, should have sounded the alarm. To some it did but, today, it is an epidemic that threatens many countries especially of Africa and Asia as no other disease since the Black Death of the Middle Ages and Smallpox in the New World of the 1500s. And, still, despite billions of dollars in support of research, we still have no curative drug and no preventive vaccine.

Are there other agents that perhaps will follow. No question. New and emergent organisms are occurring with a frequency we have never before witnessed and there are more on the horizon. The world itself has changed dramatically just in the past two to three decades. Urbanization is occurring at an unprecedented pace and with it, the growth of enormous cities, especially in tropical and subtropical areas, with large numbers of malnourished people living with minimal sanitation under crowded conditions. The microbes, ever mutating, ever changing, could not ask for a more fertile soil in which to gain a foothold and to grow. The pace and speed of travel has grown exponentially and many now penetrate lush tropical rain forests where, not so long ago, few ever ventured.

Today, we have many more laboratories with many more well-trained people able to serve the world for good or for evil. Producing organisms for use as biological agents is comparatively simple -- and what one needs to know is well-provided on the internet; anthrax today can be directly ordered from more than 40 laboratories; and the costs are small. There are reasons why the biological weapons have been labeled the poor man's nuclear weapon. But, at the same time, we have the challenge of new and emergent organisms.

Both challenges require a newly rebuilt and strengthened public health infrastructure in every country and this is the basic building block of the strategic defense for our country. This has been difficult to sell but, today, even Congressmen have been known to use the 3 words public health and infrastructure in the same sentence.

The terrorist events that have occurred have represented, for America, an important wake-up call and that is the good news. More than ever before, we are one world facing an array of traditional challenges posed by population growth and the familiar nemeses of tuberculosis, malaria, malnutrition and environmental pollution. Now we must make preparations to deal with potentially catastrophic events of all types. These we ignore at our own peril.

However, I would be remiss if I did not offer the somber caution provided by Nobel laureate Joshua Lederberg. I paraphrase him when he said: man's only competitor for dominion of the planet are the viruses -- and the ultimate outcome is by no means a certainty.s