HIV/AIDS, TB, and Ebola Virus: The Tortoises and the Hare

by Lynn W. Kitchen, M.D.

With only six new cases of Ebola virus infection reported in Zaire over the previous week, the World Health Organization (WHO) announced on May 26 that the Kikwit-centered epidemic was "coming under control" following 160 confirmed or suspected cases and 121 deaths. The international team of health workers summoned to the world's fourth known Ebola outbreak among humans may now be able to focus their efforts on preventing future outbreaks by studying the epidemiology of the disease (i.e., tracking down the natural habitat of the virus and documenting modes of transmission) and by trying to improve sanitation in the epidemic area.

Following an incubation period of 2 to 21 days, infection with Ebola (a thread-like virus named after the Ebola River because a previous outbreak was centered near this river) can cause a type of hemorrhagic fever. The painful and frequently fatal disease is usually characterized by sudden onset, with weakness, fever, muscle pain, headache, sore throat, followed by vomiting, diarrhea, rash, some kidney and liver involvement, and both internal and external bleeding. There is no known effective treatment, although some recover completely (severe cases require intensive supportive care). For more information, see the Internet World Wide Web sites at URL addresses http://ichiban.objarts.com/ebola/ebola.html, http://www.cdc.gov, and http://www.who.ch.

Because the virus kills its victims so quickly and obviously that they do not have much chance to infect others, a sustained epidemic is unlikely. As Dr. Ralph Henderson, an assistant director general of the World Health Organization, has observed, "People who are ill with Ebola are not walking around. They are on their backs."

Infected persons become capable of transmitting the virus primarily when they are extremely ill and are already hemorrhaging or bleeding. Despite great concern about rapid international transmission of contagious diseases via air travel, it is improbable that a person in the hemorrhagic stage of Ebola fever would try to travel on an international flight or would be permitted to board if he or she did try, particularly during a widely publicized epidemic. (However, because primates can carry the virus, careful scrutiny of primate shipments from any location is definitely warranted.)

Ebola virus can be transmitted to persons caring for the patient if the caregivers and burial attendants are not protected against the victim's blood
and other body fluids with masks, gowns, and gloves, and if other basic sanitary equipment (such as household bleach and working autoclaves for disinfection purposes) is unavailable. The virus can probably be transmitted sexually but its victims are generally too ill to engage in sexual relations. There is no evidence of airborne transmission among known Ebola strains harmful to humans. In the three earlier Ebola epidemics (one in Zaire [1976] and two in Sudan [1976, 1979]), the virus flourished in certain hospitals, helped along by such practices as reusing unsterilized needles. In 1995, the international health team was able to stop transmission of Ebola largely by instituting simple hygienic measures—the same techniques used to stop the three previous outbreaks.

Lack of Preparedness at Many Levels

Much of the U.S. media coverage of the 1995 Ebola outbreak focused on widespread corruption in Zaire that reportedly disrupted the cordon sanitaire around Kikwit and contributed to the lack of basic hospital supplies in the outbreak zone.

The Zairian government was not the only poorly prepared player in the Ebola drama. WHO—frequently under fire for its bureaucratic management, allegedly wasteful budgeting, and a lack of follow-up efforts in utilizing a new malaria vaccine developed by Colombian scientists and an old Chinese herbal drug (qinghaosu) useful in treating drug-resistant malaria (see “WHO’s in Charge of Fighting Disease?,” Jack Anderson and Michael Binstein, The Washington Post, May 25, 1995)—had no money in its budget for an emergency response team. When Dr. David Heyman of WHO was summoned to Zaire, “he begged the local pharmacies in Geneva for every gown and glove he could get his hands on” (Time, May 29, 1995). Médecins Sans Frontières rushed in essential equipment, and other organizations and countries rendered follow-up support.

Scientists at the U.S. Centers for Disease Control and Prevention maximum-security laboratory were able to identify the cause of the new outbreak as Ebola within two days, and a medical team was dispatched to Zaire, but CDC officials acknowledge that budget-cutback-related understaffing now limits the agency’s emergency response capacity. For example, they did not know how the agency would cope with the research needed in its maximum-security laboratory should the United States experience another outbreak of hantavirus (a rodent-borne virus capable of causing a deadly accumulation of fluid in the lungs) similar to one that occurred in the southwest in 1993 (The New York Times, May 20, 1995).

Global Implications

The 1995 Ebola outbreak has resulted in renewed awareness of the world’s increasing vulnerability to infectious diseases. As the Harvard School of Public Health’s Dr. Jonathan Mann wrote in the preface of Laurie Garrett’s The Coming Plague (Farrar, Straus and Giroux, 1994):

This new and heightened vulnerability is not mysterious. The dramatic increases in worldwide movement of people, goods, and ideas is the driving force behind the globalization of disease. For not only do people travel increasingly, but they travel much more rapidly, and go to many more places than ever before. A person harboring a life-threatening microbe can easily board a jet plane and be on another continent when the symptoms of illness strike. The jet plane itself, and its cargo, can carry insects bringing infectious agents into new ecologic settings. Few habitats on the globe remain truly isolated or untouched, as tourists and other travelers penetrate into the most remote and previously inaccessible areas in their search for new vistas, business, or recreation.

Other factors are also contributing to the spread of communicable diseases. Population movements due to urbanization, war, and ethnic conflict can result in crowded and unsanitary living conditions, malnutrition due to lack of direct access to land for farming purposes, disruption of traditional family structures, an increased availability of (possibly diseased) sexual partners, and sometimes forced reliance on female and/or male prostitution for economic survival.

Ecological changes can also play a role. Global warming, for example, could increase the geographic reach of diseases currently prevalent mainly in tropical and subtropical regions by creating conditions favoring the spread of insect vectors and by accelerating the development of parasite stages in a vector. Climate-related changes in soil characteristics could alter the prevalence of helminth (parasitic worm) infections. Global warming might also adversely affect the quantity

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and quality of fresh water available for drinking, cooking, and washing.

**Stealth Microbes**

Despite the dramatic nature of Ebola outbreaks, other infectious diseases—stealthy illnesses that refrain from killing their hosts long enough to have a greater opportunity to spread to other persons—are far more likely to give rise to protracted, widespread epidemics.

**AIDS.** HIV, the virus that causes AIDS, is a slow killer. There is a long asymptomatic incubation period during which the infected person—perhaps unaware of his HIV status—is capable of transmitting the virus and can travel widely.

The length of the asymptomatic phase makes it easier (at least for a time) to engage in denial of the HIV problem. As Dr. Chai Podhista, a Thai health official, remarked in 1992: "We have an expression in Thailand... It goes, 'If you don't see the body in the coffin, you don't shed a tear.' Rapid spread of the virus is possible—is ignored—because there hasn't yet been mass death. And there won't be for a few years. Hundreds of thousands of people are all getting infected at once, in a clandestine epidemic. Years from now when they all get AIDS the entire Thai society will go into a state of shock." (Garrett, p. 494).

Another reason HIV has been hard to control is that it can be transmitted sexually, and many cultures find it difficult to discuss sexual issues openly and rationally. As Randy Shilts wrote regarding the U.S. response to HIV in his book *And the Band Played On* (Penguin, 1988, p. xxii), "[p]eople died while scientists did not at first devote appropriate attention to the epidemic because they perceived little prestige to be gained in studying a homosexual affliction." And in Zimbabwe, according to some reports, the mistaken rural belief that having sex with a virgin will cure AIDS only hastens the spread of the disease among young women.


**Tuberculosis.** Tuberculosis, the world’s leading single infectious killer of adults (The Economist, May 20, 1995, p. 81), is the only known opportunistic infection in HIV patients that can be transmitted via aerosol to HIV-uninfected persons. A few documented cases of TB transmission have occurred during long airline flights. For most people, infection with TB is an innocuous event because the immune system contains growth of the bacilli. On average, infected people have a 10 percent chance of developing active disease sometime during their lives, and about a 1 percent chance of coming down with a lethal TB illness, depending on the strength of their immune systems (Garrett, p. 513). About 2 billion persons, almost half the world’s population, are believed to be infected. WHO estimates that tuberculosis killed some 3 million people in 1993, accounting for more than 5 percent of deaths globally. An estimated 8.8 million others will contract TB in 1995 (WHO, *The World Health Report* 1995).

The risk of TB is often closely associated with poverty. Inadequately treated *M. tuberculosis* flourishes when the immune system is under attack (e.g., from malnutrition, parasitic diseases, or HIV). Environmental factors also play a part. As *The Lancet* (May 27, 1995, pp. 1379-1380) has documented, a release of toxic smoke in India caused lung injuries that necessitated administration of corticosteroids; the immunosuppressive side effects of the medication permitted unchecked growth of TB in some latently infected persons. It is possible that if global warming occurs, the spread of malaria to new regions could (by burdening the immune systems of presently malaria-free persons) render people with previously dormant TB bacilli more susceptible to active TB infection.

In *The Coming Plague* (p. 513), Garrett calls our attention to the tendency of *M. tuberculosis* to exploit vulnerabilities:

For decades it might silently lurk inside a *Homo sapiens* awaiting a moment when defenses were down, and then, when the victim’s immune system was preoccupied with malaria or cancer, famine or pneumonia, it would strike. It was also possible for people living in densely crowded situations to be continuously reexposed to the *M. tuberculosis* exhaled by others, which greatly increased their risk for developing an active case of the disease. That was why TB had historically been so strongly linked with urbanization and, in particular, slum housing and institutionalization.

A case in point is that of South Africa’s President Nelson Mandela, who in 1988, at the age of 70, developed symptomatic tuberculosis (complicated by pleural effusion [extra fluid on the lung]) while in prison (see *Long Walk to Freedom: The Autobiography of Nelson Mandela*, Little, Brown, 1994, pp. 470-473). According to Garrett, “Mandela fits three classic risk groups for active tuberculosis: elderly, living in cramped, densely populated quarters, and black. In South Africa, 15 percent of infected blacks... develop active TB, compared with only 3 percent of whites, largely because of inequities in housing and health care.”

TB has resurfaced despite widespread use of a supposedly prophylactic vaccine (which worked well in animal trials but was not critically evaluated in a timely manner in terms of epidemiologic studies involving humans). Recent investigations indicate that this vaccine may be most effective when given at birth.

Antituberculous chemotherapeutic agents are available in the developed world, but are not always within the financial reach of persons in developing countries (and manufacturing equally effective but less expensive substitute drugs is not a priority of developed-world pharmaceutical companies). Currently available antituberculous drugs can lose their effectiveness if not used appropriately. In sum, drug-resistant TB is a major global health problem.
Toward Preventing Future Epidemics

The Institute of Medicine of the National Academy of Sciences has recommended that the United States take the lead in establishing a global surveillance system for infectious diseases. Such a surveillance system would no doubt make sense to those professionals summoned to remote areas again and again to bring epidemics under control—at considerable risk to their own safety. However, it is not clear that (1) such a surveillance system would be necessary to prevent an Ebola-related "outbreak" scenario in the developed world (where the much higher level of sanitation would probably suffice) or (2) an early warning system could have prevented the global spread of "new" diseases such as HIV or "old" diseases such as TB. Knowledge that epidemics exist—and could threaten political stability and global security—does not automatically translate into political will, appropriate resource mobilization, strengthened infrastructure, or full cooperation among international agencies, particularly in the more inward-looking post-cold war era.

A broader approach to epidemic prevention is warranted. As I noted in a 1994 contribution to CSIS Africa Notes, "supporting the empowerment of women through such means as improved access to education and employment" is a logical step toward reducing the spread of HIV and stabilizing population growth, because it aims at giving women greater control over their sexual and reproductive lives and their families' health and nutrition. Upholding basic tenets of international human rights and national civil rights laws could help avoid a situation in which future epidemics fester in marginalized groups of people. Environmental stabilization—including minimizing climatic change—also warrants attention. In terms of preventing another Ebola outbreak, improving basic hygiene in Central African hospitals is clearly a priority.

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