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A Look at Tuberculosis and Its Relationship to HIV/AIDS

Kenneth D. Phillips, PhD, RN

As nursing students in the 1970s, my classmates and I were told that tuberculosis (TB) was on the verge of being eradicated globally. At that time, TB could have been definitively diagnosed and affordably treated with standard, affordable, first-line drugs. Unfortunately, that possibility was never realized. The growing TB epidemic was a pervasive theme at The XVI International AIDS Conference.

At the conference it was reported that two billion people, one third of the world's population, are believed to be infected with TB. Each year, 8 million people develop active TB, and nearly 2 million people with active TB die. In 2005, 14,093 cases of active TB were diagnosed in the United States, and it is believed that as many as 15 million U.S. residents are latently infected with TB (Avert, 2006; National Institute of Allergy and Infectious Diseases, 2006).

TB and HIV/AIDS are inseparably linked, and these infections occur most frequently in economically deprived regions of the developing world. The immunodeficiency caused by HIV infection reactivates latent TB infection and accelerates the progression of newly acquired TB (Hausler et al., 2006). TB is one of the defining illnesses that marks the progression of HIV infection to AIDS (Avert, 2006), and it is responsible for one third of all HIV-related deaths (Avert, 2006; Raviglione et al., 1997), making it the leading cause of death for persons living with AIDS (Centers for Disease Control and Prevention, 2005; Harries, 2000; Raviglione, Harries, Msiska, Wilkinson, & Nunn, 1997).

TB infection can be latent or active. In the latent form it is held at bay by the immune system, does not cause illness, and cannot be spread from one person

to another. In the active state it can be transmitted to others, and severe illness and death can result if it is not diagnosed and effectively treated. Anyone who is latently infected is at risk of developing active TB later in life if his or her immune system fails.

Unlike HIV infection, which is not spread by casual contact, TB infection can be acquired by healthy individuals who inhale *Mycobacterium tuberculosis*. TB is more likely to be spread in crowded living conditions (such as homeless shelters, prisons, or crowded homes) and areas of high prevalence in which uninfected individuals are in close proximity with persons with active TB.

The first call for the elimination of TB in the United States was issued in the 1930s, and that call has been reissued in each successive decade. In an editorial published in the *American Journal of Public Health* in February 1972, Kimmey asked, "What needs to be done to eradicate tuberculosis?" In July of that same year, Rosenblatt, the state TB control officer of New Mexico, responded with these words:

To me, the most important question in this context appears to be this: Is eradication of tuberculosis needed? Without doubt, it would be desirable. But how much would we accomplish, following the author's plan, as compared with the Herculean effort necessary to carry out such a plan? If everything were feasible and worked out properly, we or our successors would, let us say within the next thirty years, have buried the bulk of presently known infected (without preceding slaughter, of course) and, within seventy years, almost all of them. All along however, we would have a con-

tinued influx of infected persons from other countries, already a considerable source of new cases for certain states. Unless we extended our efforts all over the world, this would perpetuate our task. This then would be a rather modest result, considering the fantastic cost involved in carrying out all the testing (Rosenblatt, 1972, p. 905).

In the 1980s after a resurgence of TB in the United States, once again scientists recognized the great need for its elimination. Unfortunately, it was not TB that was eliminated; the funds specifically targeted at TB have been reduced if not eliminated at all levels of government (Institute of Medicine [IOM], 2000). The United States has been neglectful of TB within its own borders and virtually absent in the TB pandemic in the rest of the world. That neglect has led to a resurgence of TB and to the appearance of multiple drug resistant tuberculosis (MDRTB).

Three decades later, I would like to respond to the views presented by Rosenblatt. Of course Rosenblatt could not have predicted the appearance of HIV/AIDS at the beginning of the 1980s—no one could have—but yes, even in the absence of HIV/AIDS, eradication of TB was needed. The shortsightedness and the isolationist policies of political leaders around the world have allowed MDRTB to spread at alarming rates.

Yes, the influx of persons from other countries who are infected with TB has continued and will continue. More than half of the cases of TB in the United States occur in persons born outside of the United States. Today, our borders are open, and immigration to the United States, for the most part, is uncontrolled. Elimination of TB in the United States will not occur without global attention to this epidemic, universal testing of immigrants to the United States, and effective treatment for persons with latent or active TB.

Yes, we should have extended our efforts all over the world. In the 1970s, U.S. citizens traveled outside the country less frequently. Now, international travel to and from areas where TB is endemic is commonplace. It would be of great benefit to us to help in prevention and treatment efforts around the globe.

Yes, identifying and treating cases of TB in the 1970s would have come at enormous cost. However, the direct costs of treating nonresistant TB at that

time would have been far less than treating MDRTB, which has spread exponentially in the 21st century. Effective treatment for TB in impoverished areas of the world will help persons with TB live longer and better quality lives and will limit the spread of MDRTB to residents of the industrialized world.

Not all of the costs of TB can be measured in dollars. Globally, TB affects persons in the most productive years of their lives. Eighty percent of all persons with TB are between the ages of 15 and 49. The costs are the loss of productivity as a result of the illness, loss of life, and loss of financial support for the family of the person with TB. Death of parents in this age group as a result of TB and HIV infection is leading to an unprecedented number of orphaned children who are left with aged grandparents, in orphanages, or to their own devices. Yes, there could have been enormous savings accounted for by eradicating TB.

The World Health Organization has estimated that one third of the world's population has been infected with *Mycobacterium tuberculosis*. In the next decade, it is estimated that more than 20 million people worldwide will die as a result of TB. A combination of five drugs given over 6 to 9 months effectively treats tubercular disease. These drugs are isoniazid, rifampin, pyrazinamide, and ethambutol or streptomycin. Streptomycin, the first effective antitubercular drug, was discovered in 1944. It is unbelievable that no new antitubercular drugs have been developed since ethambutol was discovered in 1967. The failure of pharmaceutical companies to develop other chemotherapeutic agents because there is not a profit motive is disgraceful. Twenty efficacious antiretroviral drugs have been discovered since the recognition of HIV infection in 1981. There have been strong advocates for persons with HIV/AIDS. Where are advocates for poor people around the world at risk for death from TB? For that matter, where are the activists for HIV/AIDS today?

Mycobacterium tuberculosis is classified as multiple drug resistant when it is at least resistant to isoniazid and rifampicin. Now there are strains of *Mycobacterium tuberculosis* that are resistant to all antitubercular drugs. Even though MDRTB can be effectively treated, the course of treatment may be twice as long and cost as much as 100 times more than treating TB that is not multidrug resistant.

A human vaccine made from attenuated bovine TB, called bacille Calmette-Guerin (BCG), was discovered by two French scientists and made available in the 1920s. BCG provides immunity for 30% to 80% of those who are vaccinated. This vaccine is not used widely in the United States or other countries in which the incidence of TB is lower, but BCG vaccination is considered a priority in countries in which the incidence of TB is rapidly increasing. Reports of the safety and efficacy of BCG have varied, and vaccination with BCG makes interpretation of the TB skin test more difficult. In countries in which the vaccine has been administered, the mortality rate has declined strikingly. Why has there not been a safer and more efficacious vaccine developed since the 1920s? Once again, the profit motive is absent.

In this decade, there is yet another call for eradication of TB in the United States. The prevalence of TB is at a record low in this country, and this is within the realm of possibility. The IOM has published a detailed plan for eliminating TB in the United States (IOM, 2000). The American Thoracic Society, the Infectious Diseases Society of America, and the Centers for Disease Control and Prevention (Taylor, Nolan, & Blumberg, 2005) have published joint recommendations aimed at ending TB in the United States. These guidelines provide valuable direction for this country. What is needed is a best-evidence guideline for ending global TB.

Implications for Nurses in AIDS Care

Many people, healthcare workers and lay persons alike, have overcome their ignorance and fear about the modes of transmission of HIV infection and have joined the ranks to care for persons living with HIV/AIDS. Even health care workers, who are comfortable with providing care for persons with HIV/AIDS, which is not spread by casual contact, are concerned about the risk of acquiring TB, which is spread from the respiratory system of one person to the respiratory system of another person. To become infected with TB, a person must inhale only a small number of the bacilli. With proper equipment and precautions, the risk of infection is minimized. In impoverished nations where the infection rate is high and sanitation measures, antitubercular drugs, and isola-

tion equipment are very limited, the fear of TB may deter some persons from providing care to HIV-infected individuals. As was pointed out in this year's conference, Kenyan hospital workers are at increased risk for occupationally acquired TB. In a case-control study presented at the conference by Dalai et al. (2006), factors that were independently associated with TB infection among the hospital workers were being HIV-infected themselves (odds ratio [OR] 33, 95%; confidence interval [CI] 5.7-192), having greater than 5 hours of patient contact per day (OR 6.5, 95%; CI 2.3-18.4), and working in areas where TB patients receive care (OR 2.2, 95%; CI 1.1-4.4).

Another key consideration for nurses in AIDS care is that activation of the immune system by TB accelerates the progression of HIV/AIDS, and many HIV-related deaths can be attributed to TB. Sixty percent of HIV-infected persons in Africa will die as a result of TB.

Several studies at this year's conference showed that HIV/AIDS and tuberculosis are strongly associated with poverty (Bachmann & Booyesen, 2006; Langlo, Pierotti, Atim, Ojom, & Cioantia, 2006; Upham & Kaitiritimba, 2006), and one presentation linked the spread of HIV/AIDS and tuberculosis with global capitalization (Newman, 2006). The poor must have advocates to speak for them, and nurses in TB and AIDS care must become advocates of the poor. TB and HIV infection occur more frequently and are the most common causes of death in poverty-stricken areas of the world (Mhalu, 2005). In almost all situations, TB and HIV diminish a family's income level and standard of living, and separately and together, TB and HIV infection force approximately 30% of families below the poverty level (Wiker, Mustafa, Malen, & Riise, 2006). As Benatar (1995) points out, "Failure to appreciate that the emergence and spread of infectious diseases (afflicting predominantly the poor) are attributable to the ideology and economic forces that perpetuate poverty, will diminish our ability to control HIV/AIDS and tuberculosis and probably favour the emergence of more new infections" (Benatar, 1995, p. 235). We must hold the political leaders of all nations accountable for the use of resources in ways that will benefit the health of humankind. Industrialized (wealthy) nations have a responsibility to the developing (impoverished) na-

tions of the world, but we are reminded by Benatar (1995) that development aid is often a smokescreen for robbing them of their resources.

As nurses in AIDS care, we must continue our advocacy and care for persons living with HIV/AIDS, but we must also join the fight against TB and other infectious diseases. It is impossible to effectively care for persons with HIV/AIDS without providing care for other infectious diseases. The IOM has pointed out that there is a decline in the number of health care professionals who are experts in the prevention, diagnosis, and treatment of TB (IOM, 2000). The Association of Nurses in AIDS Care should consider broadening its sphere of concern to other life-threatening infections, and nurses in AIDS care must develop expertise in the prevention, treatment, and eradication of other infectious diseases. A task force to develop recommendations for nursing's response to TB and HIV coinfection is recommended.

During the decade of compassionate conservatism, there has been much talk about morality. For the most part that talk has centered on sexual and reproductive matters, and very little concern has been expressed and far less action has been taken regarding the enormous moral imperatives of caring for others, treating others with respect, feeding the hungry, providing clothing for those in need, offering shelter for the homeless, and providing comfort and treatment for those who are ill. How moral is this? (Kimmey, 1972).

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