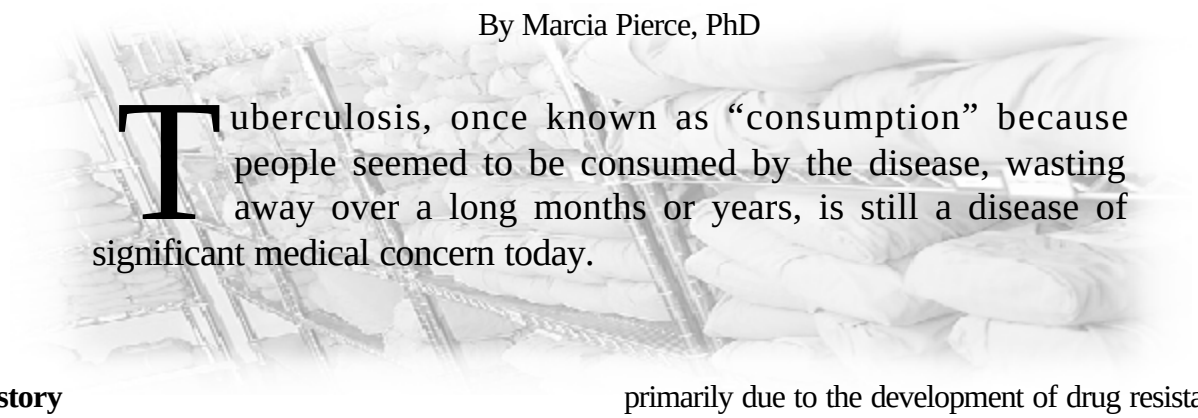
Tuberculosis and the Laundry Manager in the 21st Century

By Marcia Pierce, PhD



Tuberculosis, once known as "consumption" because people seemed to be consumed by the disease, wasting away over a long months or years, is still a disease of significant medical concern today.

History

Tuberculosis, once known as "consumption" because people seemed to be consumed by the disease, wasting away over a long months or years, is still a disease of significant medical concern today. Tuberculosis (TB) has occurred in humans since ancient times; symptoms of the disease, including lung lesions, have been found in the spines of mummies dating as far back as 3,000 years B.C. Tuberculosis was first named by J. L. Schönlein, a German professor of medicine, in 1839. However, it took another 40 years before the cause of the disease, *Mycobacterium tuberculosis*, was isolated and identified by Robert Koch in the 1880's.

In 2006, the number of cases of TB in the U.S. declined 3.2% from those reported in 2005, according to the Journal of the American Medical Association. This rate, consisting of 4.6 persons per 100,000 population, represents the lowest recorded since 1953. However, the rate of decline has actually slowed since 2000. In addition, there is a persistent disparity between foreign-born persons and U.S.-born persons, and between racial/ethnic minorities and whites. Individuals who are foreign-born are 9.5 times more likely to have TB, while those of ethnic or racial minorities have a higher incidence than is found amongst whites.

Given that rates have declined in the U.S., why are we still concerned about this disease? Our concern is primarily due to the development of drug resistance in the bacterium responsible, *Mycobacterium tuberculosis*. This species, which is transmitted through respiratory droplets floating in the air, reproduces very slowly in the lungs of those it infects. This slow reproduction therefore requires long-term therapy, which in turn requires that the patient complete the 6 or 12 months of drug regimen – and therein lies the problem. Many people begin to "feel better", and stop taking their medication after only a few months. This gives the bacteria a chance to adapt to the drugs and then become resistant. As a result, the next person infected can no longer be treated with the same drug.

Facts about TB

TB is diagnosed in the U.S. using the tuberculin skin test. In this test, a small amount of protein taken from a culture of *M. tuberculosis* is injected under the skin. After two days, the skin is examined for the presence of a reddened area, indicating the individual has been exposed to TB. Many people who are foreign-born, however, have received the BCG vaccine as a child, which causes them to react positively to the skin test. This vaccine is used to prevent early childhood cases of TB in many of the nations of the world, but is not used in the U.S. When these "false positive" tests occur, they must be further tested to determine if they are a carrier of TB.

A person with TB frequently shows no symptoms; in fact, 90% of carriers are asymptomatic, with only a 10% chance of proceeding to symptomatic TB. Infections are usually pulmonary, meaning located in the lungs, and symptoms include chest pain, coughing up blood, fever, chills, night sweats, weight loss, and wasting. TB can occur in other parts of the body as well, including the spine, the central nervous system, and the lymphatic system. When latent TB becomes active, 50% of cases will die without treatment. Therefore, this disease remains a significant cause of mortality, especially in developing countries.

People most at risk for TB infection in the U.S. are those with HIV/AIDS, transplant patients, and other individuals with compromised immune systems. In addition, there is a strong correlation between ethnicity and TB infection; in 2006, more TB cases were reported among Hispanics than any other racial/ethnic population. Multi-drug resistant strains also adversely affect those of foreign birth, as seen in 2005, when MDR-TB occurred in 101 (81.5%) of 124 MDR-TB cases.

Transmission occurs primarily through the inhalation of drops spread by a person with active TB when they cough, sneeze, spit, or talk. These droplets dry out, and, when ventilation is poor, they can float in the air for hours before another individual inhales them. Because the droplets are very small, they can pass deeply into the lungs, where they are taken up by host cells known as macrophages. There the bacteria grow and multiply, and if the immune system is unsuccessful at destroying them, they can remain for years in a latent state. If an individual is a latent carrier, many things can trigger the development of active disease. These include declining immunity due to aging, coinfection with another microbe, such as in HIV/AIDS, or immune suppression due to organ transplant. Other factors play a role in development of active disease which are not yet defined.

Relevance to laundry personnel

What is the risk to soil sort personnel? Are they at risk from contaminated or soiled linens? It has been shown that nearly all cases of TB are transmitted through the air from an infected person – and the few cases that are not are usually through a food source (some species of *Mycobacterium* infect cow's milk, for example).

So there is very little risk of transmission from contaminated linens, although standard precautions should always be followed. A dust mask really will do nothing to protect against infection with *M. tuberculosis*, as the droplet nuclei are very small, less than 5 microns in size, and filter through the pores of such a mask. In fact, particulate respirator masks are required to stop the inhalation of the droplets. However, since transmission is virtually always from another person, the risk of TB from sorting soiled linens remains nearly non-existent in the presence or absence of a mask.

An issue of serious concern, however, lies in the demographics of the laundry workforce. Frequently, individuals working in the profession are from one of the high-risk groups: foreign-born individuals, or those of racial or ethnic minorities. The greatest risk of TB transmission remains from these individuals; therefore, all employees should be regularly tested for reactivity to the skin test, and those who test positive should be further tested. In regions with high levels of immigration, managers should be aware of the symptoms of active TB (coughing, chest pain, weight loss), and should make sure that individuals exhibiting signs of illness remain at home and receive adequate diagnosis and treatment.

Any individual with an active cough should not be allowed to handle clean textiles, and should be encouraged to take a sick day to prevent infection of the remaining work force. An individual diagnosed with active TB should be placed in isolation for about two weeks while treating with anti-tubercular drugs. After this period, the individual with non-resistant TB generally becomes non-infectious. Individuals with MDR-TB must be treated with more aggressive regimens of therapy.

Recommendations to laundry managers

Managers of laundry facilities must obviously follow state- and federally-mandated public health regulations. This does not mean, however, that they cannot increase their own standard to better protect their workers from the risk of TB. State health departments require all individuals immigrating to this country to receive testing for TB, and when an active test occurs, they must undergo further testing and/or treatment. Managers can follow this up with active testing on a yearly basis for all individuals in their facility. This makes sense because TB is frequently spread through close association, as is seen in lower-income extended families, many of whom are employed in entry-level jobs, such as in laundry facilities.

Prevention of further cases of TB, and proper education of employees to encourage them to seek out medical care for their families when TB is diagnosed, is of primary importance in the management of laundry facilities. This education should enhance the decline of TB in this country, which is a major goal of the Centers for Disease Control (CDC).

About the author...

Dr. Marcia Pierce currently instructs in Clinical and Pathogenic Microbiology, Immunology and Virology at Eastern Kentucky University. She is involved in research investigating the pathogenesis of food borne bacteria and presently has three graduate students working in her lab on the interactions of E. coli 157 with native microorganisms found on farm produce.

She received her BS in Microbiology from Texas A & M, an MS in Environment Studies from Baylor University, and her PhD in Microbiology from the University of New Hampshire.

After working in biotechnology in LaJolla, California, she joined the faculty of EKU in 1996. Dr. Pierce is a returning instructor in Laundry & Infection Control and Infection Control in Environmental Services at the American Laundry & Linen College.

REFERENCES

Trends in Tuberculosis Incidence—United States, 2006; JAMA. 2007;297:1765-1767.

MMWR. 2007;56:245-250

Controlling Tuberculosis in the United States: Recommendations from the American Thoracic Society, CDC, and the Infectious Diseases Society of America; MMWR Recommendations and Reports; November 4, 2005 / 54(RR12);1-81.

In a continuing effort to provide accessible education to members, we publish the opportunity to earn contact hours in the *ALM Journal.*

Read the article and complete the corresponding online quiz and click to send to ALM for scoring.

Each article provides one contact hour toward retaining your certification/registration. Participants will only be notified of failure to successfully complete the quiz.

Contact Hours for ALM certificants are updated at the end of each month and can be viewed on the ALM web site.