TUBERCULOSIS

Tuberculosis, or TB, is caused by the bacterium *Mycobacterium tuberculosis*. TB usually infects the lungs but can affect almost any part of the body including the kidney, spine, or brain, and if not treated properly can be fatal.

Public Health Discussion Points

The answers are contained in the text, or you may refer to the text to at the end of this section.

1. What are key differences between latent TB infection and active TB disease?
2. What are key risk factors for latent TB infection and active TB disease?
3. Which communities in Washington are most affected by TB disease?

Tuberculosis remains a major health challenge even in the 21st century. An estimated one third of the world’s population is infected with TB. Approximately 5-10% of those infected will develop active TB disease during their lifetimes. Worldwide each year over nine million people develop active TB disease and there are almost two million TB-related deaths. TB disease is a leading killer among people infected with HIV.

Latent Infection vs. Active Disease

TB occurs as two conditions: latent TB infection and active TB disease. Latent TB infection (LTBI) occurs when TB bacteria are present in the body without causing disease. For most people, the body’s immune system prevents multiplication so active TB disease does not develop. People with LTBI are not infectious and are asymptomatic but will have positive reactions to the tuberculin skin test or TB blood test such as QuantiFERON-TB Gold (Cellestis Limited). However, the person will develop active TB disease if TB bacteria start to multiply.
Persons with untreated infectious TB disease may spread the bacteria to close contacts through droplet nuclei while coughing, sneezing, or speaking. Interactions such as shaking hands, sharing food or drink, sharing toothbrushes or kissing are not considered ways to spread TB. For more information regarding the transmission of TB, please visit http://www.cdc.gov/tb/topic/basics/default.htm

Droplet nuclei from a sneeze can spread bacteria to close contacts
Image courtesy of CDC
Brian Judd, James Gathany

Risk Factors for Infection and Active TB

There are two groups of principal risk factors for TB. One group of factors increases the risk of infection with TB, while the other group increases the risk of developing active TB disease after infection.

Principal risk factors for infection are:

- Residence in or travel to a country with high rates of TB disease
- Sharing close quarters (e.g. household) with someone with infectious active TB disease
- Living or working in a congregate setting serving a population with high rates of TB disease (e.g. homeless shelters, correctional facilities)
- Being exposed to someone with infectious active TB disease during a medical procedure

Principal risk factors for developing active TB disease once infected are:

- Having an immature immune system, such as for infants and young children under fifteen years of age
- Having an immune system weakened by a medical condition such as HIV infection, diabetes mellitus, silicosis, organ transplantation, kidney disease or cancer
- Receiving treatment with certain drugs that can suppress the immune system, such as anti-rejection drugs taken after organ transplant or prolonged use of corticosteroids
- Having recent exposure to someone with infectious active TB disease
- Abusing alcohol or illicit substances

For more information regarding the TB-related risk factors, please visit http://www.cdc.gov/tb/topic/basics/risk.htm
Case Reporting

Detecting and reporting suspected cases of TB is the key step in stopping transmission by providing prompt initiation of effective multiple-drug treatment to rapidly reduce infectiousness and evaluating close contacts for infection. According to the Centers for Disease Control and Prevention (CDC), delays in reporting cases of pulmonary TB are one of the major challenges to successful control of the disease. As one of the strategies to reduce TB morbidity and mortality, CDC recommend immediate reporting of a suspected or confirmed case of TB to the jurisdictional health agency. By Washington State law and regulation, a case of TB disease must be reported to the local health jurisdiction.

Select Aspects in the Epidemiology of TB in Washington State

Overall Incidence of TB in Washington State: With the exception of increases in 2007 and 2009, crude incidence rates of TB in Washington have progressed downward since 2000, to a current low of 3.5 cases per 100,000 population. The 236 cases of TB disease counted in Washington for 2010 represent a 7.8% decline from the 256 cases in 2009 when the state’s rate of 3.8 cases per 100,000 equaled the national rate.
**Race and Ethnicity:** As in past years and in other regions of the United States, racial and ethnic minority groups remain at highest risk of TB disease in Washington. In 2010 Asian communities experienced 43.2% of the TB disease burden in Washington, and a second-highest incidence rate of 21.4 cases per 100,000 population. While Native Hawaiian and other Pacific Islander communities accounted for only 6.4% of all 2010 cases, they experienced the highest risk of TB disease with an incidence rate of 38.7 cases per 100,000.

**Country of Origin:** Washington residents born abroad to foreign-born parents remain at greatest risk of TB disease, accounting for 75.9% of all TB cases in 2010. Of these, 16.7% developed TB within 12 months of arrival in the United States while 27.8% developed active TB disease within 1 to 5 years of arrival.

**HIV Co-Infection:** TB is a leading cause of death among those with HIV. HIV co-infection also has important implications in determining appropriate TB treatment. It is thus essential that definitive HIV status be determined for all TB cases. Of all cases counted in 2010, 3.0% were documented as HIV positive, 84.3% were documented as HIV negative, but the HIV status of 12.7% was undetermined.

**Drug-Resistance:** Drugs used to treat TB disease can be divided into several classes. “First-line” drugs - which include isoniazid, rifampin, pyrazinamide, ethambutol, and streptomycin - are preferred medications when selecting a TB treatment regimen, as they are least costly, least toxic, and when used appropriately in combination keep the length of treatment as short as possible.

Drug-resistance in TB is described using several different classifications. Cases of TB in which the strain of bacteria is resistant to multiple first-line drugs - particularly those resistant to both isoniazid and rifampin (“multidrug-resistant TB” or MDR-TB) - pose immense challenges to both clinical management and public health. Treatment is more expensive, more toxic, and requires a much longer treatment course. Such drug-resistance is most often seen among patients previously treated for TB where inappropriate treatment has promoted the growth of drug-resistant mutants. Extreme drug-resistance (XDR-TB) strains are resistant to isoniazid and rifampin, as well as to at least one member of two second-line drug groups. In all TB cases counted in Washington for 2010, five were found to be multidrug-resistant; four among those born abroad to foreign-born parents.

An anteroposterior X-ray showing lungs with bilateral pulmonary tuberculosis.
The “caving formation” in the right apical region indicates far-advanced tuberculosis.
Image courtesy of CDC

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Tuberculosis is a treatable condition that nonetheless remains a significant health concern in most countries. Rapid diagnosis and treatment of patients and evaluation of their contacts for TB infection and disease are essential for its control.

**Answers to Public Health Discussion Points**

1. Latent TB infection means exposure to TB bacteria but the immune system remains capable of keeping the bacteria in check. The person is asymptomatic and not infectious. Active TB disease develops when the immune system does not keep TB bacteria from multiplying. There are generally symptoms and the person is infectious; untreated tuberculosis can be fatal.

2. Key risk factors for latent TB infection include: coming from or traveling to a country where incidence of TB disease is high; sharing living space with someone having infectious TB disease; and living or working in a group setting occupied by groups with higher rates of TB disease (such as homeless shelters or correctional facilities). Key risk factors for developing active TB disease once infected include having an immune system that is immature (i.e. young children) or weakened (e.g. having HIV, chronic disease); and recent exposure to someone with active, infectious TB disease.

3. Communities that suffer the greatest burden of TB disease in Washington include racial and ethnic minority groups, and those born aboard to foreign-born parents.

**Note from outgoing Managing Editor**

For the past six years it has been my honor, privilege, and great pleasure to serve as the Managing Editor of EpiTrends. In 2005, I assumed the role from Sandy Marvinney who had been serving in this capacity for the previous ten years. During this tenure, we have transitioned EpiTrends from a mailed-out hard-copy publication to an all online publication with an electronic listerv for distribution to subscribers. The articles in EpiTrends provide information on emerging diseases, issues new to Washington State, new regulations and testing procedures, and general education for communicable disease investigators. In putting together materials for each issue, I have had the opportunity to communicate with scientists, public health leaders, and institutions around the world. This has been an exciting role.

For any questions, concerns, suggestions, or issues regarding EpiTrends, please contact Dr. Marcia Goldoft, Scientific Editor: marcia.goldoft@doh.wa.gov, 206-418-5500.

Yours sincerely, Deborah Todd, RN, MPH

If you have any questions or comments specifically about this article, please contact authors Shawn McBrien, MPH, or Marcia Goldoft, MD, MPH, at Communicable Disease Epidemiology Section (206-418-5500), Washington State Department of Health.