7-29-2019

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Recommended Citation
Puri, Jessica, "Tuberculosis" (2019). Nursing Student Class Projects (Formerly MSN). 370.
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Tuberculosis
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Introduction
Tuberculosis (TB) is a disease that claims the lives of millions each year. TB is an airborne disease spread by inhaling droplets of tubercle bacilli, once penetrated in the alveoli, colonization of droplets can multiply leading to tuberculosis infection (Katanekwa & Allen, 2017). TB is considered the top leading cause of death (WHO, 2018). While TB was discovered over two thousand years ago by Hippocrates, this disease continues to claim lives each year (Katanekwa & Allen, 2016).

Risk Factors
TB is more prevalent in under developed countries, late TB infection and immune response factors (see table 1). Late TB Infection
- Not contagious
- Asymptomatic - patient exhibits no symptoms of active TB disease
- Negative Sputum culture
- Normal chest radiograph
- May have a positive skin test or blood test

Late TB can transition to active TB disease if the immune system is weakened. According to World Health Organization, an individual with immune immunodeficiency virus (VH) is at the greatest risk for activating latent TB (WHO, 2019).

Active TB Disease
Highly contagious
- Persistent cough lasting > 3 weeks
- Night sweats
- Weight loss
- Fever
- Chest pain
- Coughing up blood or purulent sputum
- Abnormal chest radiograph
- Positive TB skin test or blood test

TB most commonly develops in the lungs. However, TB can attack the brain, kidneys, liver, bones, tongue, and spine (Parmer, Allen, & Walton, 2017, p. 26).

There are 2 types of TB related conditions, latent TB infection and active TB disease. TB is spread through the air from person to person. "When a person with infectious tuberculosis disease coughs, speaks, or yawns, tiny particles containing M. tuberculosis are expelled into the air, and are suspended into the air for up to several hours (Parmer, Allen, & Walton, 2017, p. 26). Afterwards, if a person inhales those droplets, that person may or may not be exposed to TB. According to Parmer, Allen, & Walton (2017) latent tuberculosis infection occurs when an individual inhales droplet of microal containing the microorganisms tubercle bacilli (p. 27). After exposure, particulars of tubercle bacilli that survives the alveoli multiply and spread through the blood stream. Afterwards, the immune system of a healthy individual fights off the infection, thus inhibiting the bacteria from multiplying, and that same individual is categorized as having latent TB infection. However, after exposure, if the immune system cannot stop the spread of the tubercle bacilli, the individual is considered active TB disease. Once an individual is suspected of having TB disease, further testing can confirm diagnosis.

Significance of Pathophysiology
- "The Center for Disease Control and Prevention estimates that about 13 million people worldwide, and the United States have late TB infection, of which 8% lead to active TB disease each year" (Parmer, Allen, & Walton, 2017, p. 27).
- "In 2017, 10 million people fell ill with TB, 1.4 million of those people died" (WHO, 2019).
- TB Disease is extremely contagious, proper measures must be taken to prevent the spread of infection.
- The first line of treatment for TB disease is rifampicin. However, noncompliance and misuse of this medication has led to drug resistant TB.
- "Multidrug-resistant TB (MDR-TB) remains a public health crisis and a health security threat. WHO estimated that there were 558,000 new cases of TB with resistance to rifampicin—the most effective first-line drug of which ~10% had MDR-TB (WHO, 2019)."

Underlying Pathophysiology
TB is spread through the air from person to person. "When a person with infectious tuberculosis disease coughs, speaks, or yawns, tiny particles containing M. tuberculosis are expelled into the air, and are suspended into the air for up to several hours. After exposure, particulars of tubercle bacilli that survive the alveoli multiply and spread through the blood stream. Afterwards, the immune system of a healthy individual fights off the infection, thus inhibiting the bacteria from multiplying, and that same individual is categorized as having latent TB infection. However, after exposure, if the immune system cannot stop the spread of the tubercle bacilli, the individual is considered active TB disease. Once an individual is suspected of having TB disease, further testing can confirm diagnosis.

Diagnostic Testing
- Nearly four million cases of TB go undiagnosed each year (Fauci, 2018, p. 1315).
- According to Kumatari et al. (2016), five factors that play a role in a TB compliance.
- Knowledge about medication
- Self-discipline about medication and management
- ability in curtailing the adverse effects of medication
- an ability in monitoring and evaluating the result of treatment (p. 103)
- Non-compliance to TB treatment is a primary contributory factor to drug resistance TB

Treatment
"Between the year 2000 and 2017 an estimated 54 million lives were saved through TB diagnosis and treatment" (WHO, 2019).

Active TB Disease
- The most common treatment for active TB disease includes isoniazid, rifampin, pyrazinamide, and ethambutol. Treatment 6-12 months (CDC, 2016)

Nursing Implications
- Early detection and treatment of TB is of utmost importance (WHO, 2019).
- Noncompliance to treatment was the greatest impediment to achieving the end goal of TB eradication (WHO, 2019).
- Relapse of TB disease is the reason for further increase in mortality (WHO, 2019).
- Currently, TB treatment is a highly complex and a lengthy process (WHO, 2019).
- "TB is primarily treated using standardized drug regimens with rifampicin, isoniazid, pyrazinamide, ethambutol, and streptomycin (CDC, 2016)."

Conclusion
In summary, TB is a highly contagious airborne disease that affects millions of people worldwide. Early diagnosis and prompt treatment are crucial steps to stop the disease. Early TB and help eradicate TB. As a future nurse practitioner, understanding the pathophysiology of TB can help tip the scale to eliminate this deadly disease.

Additional Sources
Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4556262/

Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4556262/


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Presentation of Case/ Process
TB remains a global health concern due to its prevalence. While this disease is curable, TB continues to rank as a leading cause of death worldwide. As a future nurse practitioner it is imperative to understand the pathophysiology of TB. mode of transmission signs and symptoms to aid in early diagnosis and treatment. Ultimately, primary preventive efforts must be enforced to eradicate this deadly disease.

Figure 1. Incidence Rate of TB in 2016 (CDC, 2015)

Figure 2. Extrapulmonary Sites (Ford, 2017)