

**NRS 425 Benchmark – Epidemiology Paper**

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As countries begin to develop, research is being done to establish a new normal so the world will not be devastated by disease. As nurses, the most important thing we can do is educate our patients on these disease processes to ensure their awareness. It is not enough that we spend countless hours and funding on treatment; we must also be aware of what we are facing and give each person the tools they need to enter the fight well-prepared and educated. In this paper, I will discuss a communicable disease, social determinants of health that make a population more vulnerable to that disease and its process, the epidemiological triangle of the illness, community nurses and how they help with the fight, a national organization that ensures people are aware of the disease, and what global implications are to prevent the spread and come together against the fight to eradicate this disease.

### **Communicable Disease**

Tuberculosis (TB) is caused by a bacterium called *Mycobacterium tuberculosis*, which attacks the lungs and various other parts of the body, such as Kidneys (CDC, 2016). Tuberculosis is an airborne disease transmitted through the air when someone infected with the virus talks, coughs, sneezes, etc. Moreover, someone who is not infected breathes it in. Many complications are associated with TB, including the obvious respiratory issues since the virus attacks the lungs. Many people do not know, however, that through circulatory blood, TB can attach itself to and infect the kidneys and other organ systems, including the brain, which is why diagnosis is essential. Signs and symptoms include a cough lasting more than three weeks, chest pain, coughing up blood, weakness, fatigue, weight loss, no appetite, sweating, chills, and fever.

TB can be characterized in two ways; you can have latent TB, in which the bacterium is in your lungs, but you do not have any symptoms of the disease, and in this case, you cannot

spread TB to anyone else. Whereas TB disease, the person experiences the symptoms of TB and can spread the virus to others. Treatment for TB is based upon whether the patient has latent TB, TB disease, or if they have encountered someone who has a drug-resistant strain of TB. Latent TB is treated with a variety of choices that include Isoniazid (INH), Rifapentine (RPT), and Rifampin (RIF) these drugs can be used together or by themselves. A regimen of 3 months of once-weekly isoniazid plus rifapentine is a preferred regimen that is strongly recommended for adults and children aged >2 years, including HIV-positive persons. A regimen of 4 months of daily rifampin is an approved treatment that is strongly recommended for HIV-negative adults and children of all ages. A regimen of 3 months of daily isoniazid plus rifampin is a preferred treatment that is conditionally recommended for adults and children of all ages and HIV-positive persons as drug interactions allow (Berman, 2020).

The shorter regimen is recommended because these drugs have a high probability of developing hepatotoxicity with long-term use. TB disease is treated with isoniazid (INH), rifampin (RIF), ethambutol (EMB), or pyrazinamide (PZA) over 6-9 months. Drug-resistant TB is treated with fluoroquinolone antibacterial drugs, which, unfortunately, is a medication that the FDA cautions its users to avoid. However, with TB, the risks do not outweigh the benefits. Patients diagnosed with TB have to report this information to their local health department, and they are followed by a nurse who comes to their home daily and gives them their medication to ensure they are taking it as directed.

The new data from the Centers for Disease Control and Prevention shows that Alaska's TB infection rate in 2019 was 8.1 cases per 100,000 people — three times the national average of 2.7 cases per 100,000 people. Tuberculosis is such a big thing here in Alaska that the public schools require the children to be tested before they are allowed to start school.

## Social Determinants of Health

Social determinants of health are the conditions where people live, learn, work, and play, which affect a wide range of health risks and outcomes (Centers for Disease Control and Prevention, 2018). These factors contribute to the development of TB for many reasons. We can trace this history back to the late 1700s when colonizers brought the disease to Alaska, and it has been the leading cause of death since then (Centers for Disease Control and Prevention, 2018). This can be associated with the seclusion of many of the villages and the fact that healthcare is often unavailable due to that fact. This can also be attributed to someone whose immune system becomes weak, and the latent virus becomes active and then spreads to others. Helping these patients become educated about their SDOH will allow them to move toward optimal health on the health-illness continuum spectrum.

The health-illness continuum is essential because it helps our patients have a visual of where they are on the path to health or illness, which sometimes leads to death. Achieving health allows the patient to live their "best life" and keeps them from the edge, which can push them over if they are infected with TB. Helping our patients understand and visualize the continuum will help them to be able to see that they have their health or sickness within their control concerning how the body deals with and handles illness and the ability to recover faster. This is especially important within the Alaska Native bush communities, which are villages that are accessible by plane only because care is not easily obtained if they become ill with TB, which can have a devastating impact on the communities. Geographical isolation makes access to health merely impossible in some areas. The travel in which they must do to receive treatment is often a deterrent to receiving preventative healthcare and causes them to seek medical services once the disease process calls for medical intervention that is unavoidable.

### **Epidemiological Triangle**

The epidemiologic triangle of TB can be identified as the who, what, and where, whereas the who is recognized as the host or simply stated as the thing that can become affected by the disease. The what or agent is the organism that infects the host, and the where is the environment that gives the agent the ability to grow and thrive. *Mycobacterium tuberculosis* (infectious disease agent) is readily spread to susceptible humans (host) through respiratory exposure in communal settings or public gatherings (environment) (Centers for Disease and Prevention, 2016). Many environmental factors can be identified as risk factors, increasing a person's susceptibility to the disease. These include people of different ethnic backgrounds, those who fall below the poverty line, those who are homeless, those who live in a home where there is overcrowding, those in jail, and those individuals who have migrated to the States.

### **Community Nurses**

To assist a community, a nurse must be well-versed and competent in the culture within the community to be a useful tool in helping them in becoming more aware of their health and the things that affect it. To assess the community, the nurse relies on the nursing process to help gauge the community's issues, such as TB, and how they can improve their health based on the needs, factors that inhibit optimal health, and the readiness to be educated on the issues. The community health nurse (CHN) is responsible for gathering information about the host and mostly backtracking to see who else may have been exposed to the disease and contact them so they can be tested. They also are tasked with ensuring that the person who has been diagnosed with TB takes their medication as directed by going to their home daily and providing them with the medicines.

Demographic data is necessary for ongoing, systematic collection, analysis, interpretation, and dissemination of health data" (CDC, 2010). With the data received, CHN can initiate evidence-based practices that align with the research and evidence obtained by these nurses. The role of the CHN is one of vital importance to the community in which they serve. The magnitude of their effectiveness in the community is unparalleled and often taken for granted and overlooked. The value of CHN within the community is crucial to understand. Although it is not a favorable position, there are many facets that the job description of these nurses entails. The dedication to the communities in which they serve is nothing short of amazing. Their knowledge and efforts to the community scale beyond what the community is aware of as they continue to help them reach optimal health.

### **National Organizations**

A national agency that addresses TB is the World Health Organization (WHO), to ensure the containment of the disease the infected person is monitored often. This includes following the person throughout diagnosis and treatment and collecting data on what medications were useful, how long treatment lasted, and any complications the patient had during treatment. The development of specific software to improve the recording of the data collected is an essential asset in monitoring this disease. Many factors have to be logged, such as the patient's age, the community they live in, etc. These are valuable because they allow the data collected to represent what population and community of people are most at risk. This data is used to create systemic efforts for the continuation of helping countries ensure they are not debilitated by pandemics of different diseases that could, if allowed, wipe out human existence as we know it. This is why they have one of the most critical jobs in establishing ways to monitor the health of individuals, communities, and populations.

## Global Implications

The global initiative of the fight against TB has continued for years, and due to the support and sharing of information, a decline in the transmission of TB has occurred in most areas. Governments have come together, recognizing that this virus must be a shared effort in working towards the complete eradication of this virus. Since its declaration as a global health emergency world organization, the number of people diagnosed with TB has fallen worldwide. Nearly all cases (97%) occur in low- and middle-income countries, particularly in Southeast Asia, Africa, and the Western Pacific, as do most deaths (Kaiser Family Foundation, 2020).

WHO outlines interventions for addressing TB and include early diagnosis and treatment, scaled-up diagnosis and treatment, screening that is systemic for the management of those diagnosed with TB and HIV, vaccines that prevent the disease, and research that is aimed at developing new approaches. These interventions break the chain of infection, which helps ensure that TB is no longer something that could potentially affect communities. Participation and unified efforts from global implications help to ensure that TB is contained and eventually eliminated. Having a full understanding of a disease is the first step in containing it. Through multiple levels and participation of different organizations, the efforts are being recognized through a reduction in numbers. Airborne diseases are especially difficult to contain because a simple sneeze can contaminate any individual with the feet of the infected person. So, the efforts to understand the disease process and ensure that treatment is done precisely are of grave importance. As with anything, education is the first step to prevention and a decrease in the number of individuals infected.

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