Tuberculosis in Santa Clara County: A Summary

Tuberculosis (TB) is a preventable and curable communicable disease that remains one of the top ten causes of death in the world. TB is caused by the bacteria Mycobacterium tuberculosis, which can spread from person to person through the air when an individual with infectious TB disease coughs, sneezes, or speaks. Transmission occurs when others breathe in the bacteria while in close and prolonged contact with a person with infectious TB disease. Although TB commonly affects the lungs, it can affect any part of the body including lymph nodes, bones and joints, kidneys, and the brain. Fortunately, TB can be prevented, treated, and cured!

TB can infect anyone who lives, works, or breathes in close proximity to someone with infectious TB disease, regardless of their age, race, sex, or socioeconomic status. When individuals are infected with the bacteria that causes TB, but they do not yet have symptoms or evidence of TB disease, this is called latent TB infection (LTBI), which is not contagious. When the body’s immune system can no longer contain the infection, the bacteria multiply and cause disease. Individuals with LTBI may become sick with TB disease within weeks to many years after becoming infected. Overall, 5-10% of patients with LTBI develop TB disease over their lifetime; this risk is higher for those with risk factors for progression from LTBI to TB disease, such as immunosuppression, diabetes, and end-stage renal disease. Certain behaviors, such as alcohol or drug abuse, and smoking also increase an individual’s risk for developing TB disease. If treatment is delayed, TB disease can cause serious illness and death.

It is estimated that one out of three people in the world, or 2-3 billion people, are infected with Mycobacterium tuberculosis. During 2015, it is estimated that 10.4 million people developed TB disease and that this resulted in 1.4 million deaths [1]. Most cases occurred in Asia (61%) and Africa (26%) [1]. It is estimated that 1.2 million persons with TB disease (11%) also had HIV co-infection [1]. Multidrug resistant TB, which is more difficult to treat, affected almost 480,000 people worldwide [1].

TB Cases and Rates

There were 160 cases of tuberculosis (TB) disease in Santa Clara County (SCC) in 2016, which decreased compared with 2015 (197 TB cases) and was similar compared with 2014 (162 TB cases) (Figure 1). This represents a case rate of 8.4 per 100,000 residents. The case rate is 1.5 times as high as the overall California rate (5.3/100,000 persons) [2] and 2.9 times as high as the national rate (2.9/100,000 persons) [3]. SCC has the fourth highest number of cases among all jurisdictions in California, after Los Angeles, San Diego, and Orange counties (Figure 2) [2].

Figure 1: Trends in TB Case Counts and Rates in Santa Clara County, 2007-2016

Cases meet the laboratory (positive culture, nucleic acid amplification test, or demonstration of acid-fast bacilli or granulomas when a culture was not obtained or is falsely negative), or clinical case definition, or are verified by provider diagnosis. Source: Santa Clara County Public Health Department, Tuberculosis Information Management System, 2007-2009; California Reportable Disease Information Exchange, 2010-2016. Data as of February 16, 2017, and are provisional; Department of Finance, Race/Ethnic Population with Age and Sex Detail, 2000–2010. Sacramento, California, September 2012; State of California, Department of Finance, State and County Population Projection, 2010-2060. Sacramento, California, December 15, 2014.
TB Cases by Race/Ethnicity

TB cases occurred predominantly among Asian (81%) and Hispanic (12%) populations, with a small percentage in African-American/Black (4%) and White (3%) populations (Figure 3). TB case rates have also been consistently highest among Asians in SCC: the rate was 20.3 per 100,000 residents in 2016 compared with the overall case rate of 8.4 per 100,000 residents.

In 2016, 91% of TB cases were among persons born outside the U.S., primarily from the following countries: Vietnam (26%), the Philippines (19%), India (23%), Mexico (10%), and China (10%). Case rates vary considerably by country of origin with the highest rate among those born in the Philippines (45.1/100,000 residents), Vietnam (37.7/100,000 residents), and India (30.6/100,000 residents), which is much higher than the overall case rate (Figure 4).

Length of Time in US

The majority (68%) of TB cases among persons born outside the U.S. occurred among those living in the U.S. for more than five years.

Age Group

In 2016, the majority of patients with TB (57%) were between 25 and 64 years of age. One out of three (33%) patients with TB were aged 65 years or older. Children less than 15 years of age accounted for 2% of TB cases, and young adults between ages 15 to 24 years accounted for 8% of TB cases.

Medical Comorbidities

In 2016, nearly one-third (31%) of patients with TB had one or more medical conditions associated with an increase in the risk of progression from latent tuberculosis infection to TB disease. The most common comorbidity in 2016 was diabetes mellitus (26%). Other risk factors included: end-stage renal disease; immunosuppression not related to HIV/AIDS (e.g. leukemia; lymphoma; cancer of the head, neck, or lungs; chronic systemic oral steroid use; TNF-alpha inhibitor therapy; or history of organ transplantation); excess alcohol use; and injection drug use.
TB Drug Resistance

Isoniazid Resistance

In 2016, 17% of patients with culture-positive TB were resistant to at least one first-line medication (i.e., isoniazid, rifampin, pyrazinamide, or ethambutol). Among patients born outside the U.S. with culture-positive TB during 2010–2016, Isoniazid (INH) resistance was present in 13% of patients who had no prior history of TB (Figure 5) and 19% of patients with a prior history of TB. Among patients with culture-positive TB and no prior history of TB, isoniazid resistance rates were highest among those born in the Philippines (18%), Vietnam (16%), and India (13%). Among individuals born in the U.S., INH resistance was present in 3% of patients with culture-positive TB who had no prior history of TB.

Figure 5: Percentage of INH Resistance per Country of Birth — Santa Clara County, 2010–2016

Cases are culture-positive with initial drug susceptibility testing done and no prior history of TB. Excludes cases with susceptibility testing not done or unknown for isoniazid. Source: Santa Clara County Public Health Department, California Reportable Disease Information Exchange, 2010-2016; Data as of February 16, 2017, and are provisional.

Multi Drug Resistant (MDR) TB and Extensively Drug Resistant (XDR) TB

MDR TB cases are resistant to both isoniazid and rifampin. Treatment of MDR TB is more complicated and treatment duration is typically 18-24 months. There are currently nine patients with MDR TB undergoing treatment in SCC, with eight new cases reported during 2016. The proportion of patients with TB who have MDR in SCC is highest among patients born in India, followed by Vietnam, and then the Philippines. XDR TB cases are resistant to both first-line drugs (i.e., isoniazid and rifampin), in addition to any fluoroquinolone, and at least one of three injectable second-line drugs (i.e., amikacin, kanamycin, or capreomycin). There have been no known XDR cases in SCC.

Rapid Molecular Testing to Detect Mycobacterium Tuberculosis and Drug Resistance

Nucleic acid amplification tests (NAATs) can lead to earlier diagnosis and treatment of patients with TB as results can be obtained at least one week earlier than culture. Consequently, guidelines from the Centers for Disease Control and Prevention (CDC) recommend that NAATs be performed on at least one respiratory specimen for each patient with signs and symptoms of pulmonary TB for whom a diagnosis of TB is being considered but has not been established, and for whom the test result would alter case management or TB control activities [4]. In 2016, NAATs were used for 77% of pulmonary cases, including 92% of smear-positive cases and 60% of smear-negative cases in SCC. Mycobacterium tuberculosis was identified in 84% of specimens tested, including 96% of smear-positive cases and 63% of smear-negative, culture-positive cases. Utilization of molecular tests for drug resistance (e.g. Xpert MTB/RIF) can also provide an early indication of possible rifampin resistance. As most patients with rifampin resistance have multidrug resistance, this information can expedite initiation of an appropriate treatment regimen in consultation with the Public Health Department. The Xpert MTB/RIF assay is available through the Santa Clara County Public Health Laboratory.
Prevention

It is estimated that of the 1.9 million residents of SCC, 8.5%, or over 160,000 people, have latent tuberculosis infection. This represents a very large reservoir of individuals from which future cases of TB disease will develop. In order to significantly decrease the number of patients with TB disease, it requires that more individuals with risk factors for TB are tested and treated for LTBI. In September 2016, the U.S. Preventive Services Task Force (USPSTF) issued new recommendations for screening asymptomatic adults at increased risk for LTBI [5]. This underscores the need for primary care providers to conduct targeted testing and treatment for LTBI as part of routine preventive care, similar to providing diabetes screening for overweight adults and use of low-dose aspirin for primary prevention of cardiovascular disease in persons at increased risk. Treatment for latent TB infection is very effective – it can decrease the risk of developing TB disease by over 90% when medications are taken as prescribed. Utilization of the short-course isoniazid-rifapentine regimen, which is given weekly for 12 weeks, is associated with higher treatment completion rates as compared with daily isoniazid X 9 months [6].

References:

Additional Resources:
- Centers for Disease Control and Prevention TB resources: http://www.cdc.gov/nchstp/tb/default.htm
- California Tuberculosis Controllers Association (CTCA): http://www.ctca.org
- California Department of Public Health Tuberculosis Control Branch: http://www.cdph.ca.gov/programs/tb
- Curry International Tuberculosis Center: http://www.currytbcenter.ucsf.edu

Data Sources:
California Reportable Disease Information Exchange
State of California Department of Finance
Tuberculosis Information Management System