

Tuberculosis

Tuberculosis in Hennepin County 2000 - 2005 Key Findings

- The rate of TB cases in Hennepin County peaked in 2001 and has continued to decrease.
- Hennepin County cases account for 54% of Minnesota cases.
- The majority of TB cases were reported in persons 20 to 39 years of age.
- The percentage of foreign-born cases increased in the mid-1990's and plateaued in the 2000's. In 2005, 85% of TB cases were born outside of the U.S.
- Pulmonary infection accounted for 54% of TB cases. Lymphatic TB occurred in 25% of foreign-born cases and 13% of U.S.-born cases.
- In cases born outside of the U.S., 3% were multi-drug resistant (resistant to both isoniazid (INH) and rifampin). In U.S.-born cases INH resistance was 5% and there was one multi-drug resistant TB case.

Introduction

This *Epidemiology Update* summarizes Tuberculosis (TB) cases and trends in Hennepin County from 2000 through 2005. This issue is one in a series of reports available from Hennepin County Human Services and Public Health Department – Epidemiology.

Background

TB is a communicable disease caused by *Mycobacterium tuberculosis* and is primarily spread by tiny airborne particles (droplet nuclei) expelled by a person who has infectious TB. If another person inhales air containing these droplet nuclei, transmission may occur. Some bacilli reach the alveoli, where they are ingested by macrophages. Infection begins with the multiplication of tubercle bacilli within alveolar macrophages. Some of the bacilli spread through the bloodstream when the macrophages die; however, the immune system response usually contains the bacilli and prevents the development of disease. Persons who are infected but do not have TB disease are asymptomatic and not infectious; such persons usually have a positive reaction to the tuberculin skin test. About 10% of infected persons will develop TB disease at some time in life, but the risk is considerably higher for persons who are immunosuppressed, especially those with HIV infection. Although the majority of TB cases are pulmonary, TB can occur in almost any anatomical site or as disseminated disease.¹

Reporting

Active TB is reportable by law to the Minnesota Department of Health (MDH). MDH notifies Hennepin County Public Health of all cases or suspect cases which reside in the county. The Hennepin County public health clinic provides expert diagnosis, treatment, consultation and referral for persons with suspected or confirmed TB disease and infection. Hennepin County Public Health is responsible for conducting contact investigations, when needed, and providing directly observed therapy (DOT) services for all Hennepin County TB patients.

Hennepin County Tuberculosis 2000 - 2005

Tuberculosis Trends

The incidence of TB in Minnesota increased throughout much of the 1990's and peaked in 2001. Hennepin County TB cases have followed overall Minnesota trends and account for 54% of the state's cases. A total of 689 new cases of TB were diagnosed in Hennepin County during 2000 through 2005. There have been 99-140 TB cases each year since 2000, with 2001 having the highest rate in the past 25 years (Figure 1).

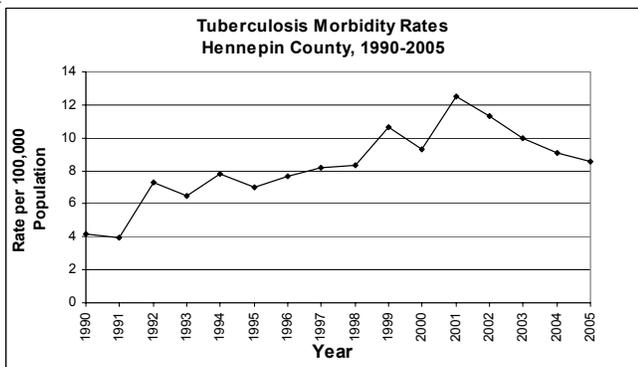


Figure 1.

The percentage of cases born outside of the U.S. increased in the mid-1990's and plateaued in the 2000's. 84% of Hennepin County TB cases were born outside of the U.S. during the past five years (Figure 2).

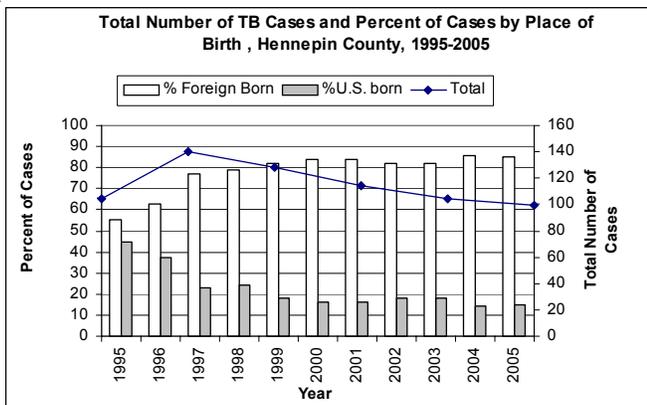


Figure 2.

Persons with TB born in sub-Saharan African countries have remained the highest foreign-born group in the past five years. Somalia, Ethiopia, and Liberia are the most frequent sub-Saharan countries of origin.

The second most common geographic area of TB cases has fluctuated between either South/Southeast Asia or Latin America. In 2005, 7% of cases were from Latin America and 14% of cases were from South/Southeast Asia with Laotian refugees representing 42% of this group.

Overall 51% of TB cases occur in people 20 to 39 years of age. Eleven percent of cases occur in people 60 years of age and older. U.S.-born cases occur in higher numbers in infants and children 0-4 years of age and in adults 40 years of age and older. Cases in foreign-born persons predominantly occur in young adults, 20 to 39 years old (Table 1).

Table 1. Percentage of TB Cases by Age Group, Hennepin County, 2000-2005.

Age Groups	U.S. Born	Foreign Born	Total cases
0-4 years	19.5%	1.2%	4.2%
5-14 years	6.2%	6.1%	6.1%
15-19 years	0.9%	12.8%	10.9%
20-29 years	7.1%	40.1%	34.7%
30-39 years	8.0%	18.1%	16.4%
40-49 years	18.6%	7.3%	9.1%
50-59 years	16.8%	5.9%	7.7%
60 years and over	23.0%	8.5%	10.9%

Risk Categories

The greatest risk category for TB is birth outside the U.S. In foreign-born cases, risk factors, such as drug or alcohol use and homelessness, varied slightly in the past five years and all risk categories were identified for less than 10% of cases.

In U.S.-born cases, alcohol use increased from 24% in 2001 to 53% in 2005. Homelessness was identified for 35% of U.S.-born cases in 2001, and decreased to 27% in 2005. HIV infection increased from 10% in 2000 to 27% in 2005. Intravenous drug use or other drug use was identified for less than 5% of TB cases in the past five years.

Pulmonary and Extrapulmonary TB

Pulmonary infection accounted for 54% of TB cases during 2000-2005. Lymphatic TB occurred in 25% of foreign-born cases and 13% of U.S.-born cases.

Extrapulmonary TB rates are higher in Hennepin County (~50% of cases each year) than in other parts of Minnesota and the U.S. overall. Extrapulmonary TB is especially prevalent in those co-infected with HIV (50% of cases).² Since extra-pulmonary TB is more difficult to diagnose than pulmonary disease it may not be suspected. ***It is important for health care practitioners to be aware of the increased case rate of extra-pulmonary cases residing in Minnesota and Hennepin County.***

Drug Resistance

In foreign-born cases, 17% were resistant to Isoniazid (INH) and 3% were multi-drug resistant (MDR-TB), this is, resistant to both INH and rifampin. In the U.S.-born cases, INH resistance was 5%, and there was only one MDR-TB case.

Of growing concern are extreme drug resistant TB strains (XDR-TB), which do not respond to at least two main first-line drugs and additionally to three or more of the six second-line TB treatments. Most XDR-TB cases in the U.S. have been among foreign-born persons emigrating to the U.S. from countries with a high prevalence of TB. One case of XDR-TB has been reported in Hennepin County in 2006. This case was diagnosed and treated at the Hennepin County public health clinic.

TB Treatment

The most current treatment guidelines strongly recommend the use of directly observed therapy (DOT) for all cases of TB disease regardless of the site of disease. DOT involves providing the antituberculosis drugs directly to the patient and watching as he/she swallows the medication. Data indicates DOT along with intensive individualized case management leads to the most successful treatment results. In addition, the current guideline places the responsibility for successful treatment on the provider or program initiating the treatment, rather than on the patient.³

For the most up-to-date medical treatment recommendations, please refer to Hennepin County Public Health TB Control section at 612-348-4131 or 612-348-7512 or MDH at 651-201-5414.

TB Case Investigations

Hennepin County Public Health is responsible for evaluating each TB case residing in the county for infectiousness and evaluating Hennepin County contacts of infectious TB cases. Contact investigations are complex and decisions to initiate a contact investigation are guided by factors that predict a high likelihood of TB transmission. The process begins by determining the period of infectiousness and continues with extensive interviews with the infected person and field/environmental investigations. The investigation often involves multiple jurisdictions including other Minnesota counties and states and may extend internationally.

New Developments

The current test to diagnose latent TB is the Mantoux skin test. A new diagnostic tool, the *QuantiFERON*[®]-TB Gold Test (QFT-G), can be used to diagnose both TB infection and active TB disease. A blood sample is drawn from the patient and then mixed with antigens. After incubation with the antigens, the sample is checked for an immune response. This test was approved by the FDA in 2005.

Advantages—Compared to the Mantoux skin test, QFT-G requires only one patient visit, results are rapidly available, test results are easy to interpret, and QFT-G is not affected by prior TB vaccination with the Bacille Calmette-Guérin vaccine.

Disadvantages—Blood samples must be processed within 12 hours and there is limited data on use of QFT-G for children, persons recently exposed to TB, and immuno-suppressed persons.⁴

At this time, QFT-G is not widely available for use in Minnesota. MDH cites one facility in Minnesota currently using the test on a limited basis.⁵

Resources

Minnesota Department of Health:
651-201-5414

Hennepin County Public Health TB
Control: 612-348-4131 or 612-348-7512

Patients can be seen at the **Hennepin County public health clinic** regardless of health insurance status. In the past five years an experienced team of doctors and health care staff in the public health clinic have provided care to 6,278 Hennepin County residents with TB infections and 529 patients with TB disease.

TB Research in Hennepin County

According to Dean Tsukayama, MD, Medical Director of Hennepin County public health clinic, “after many years, there are new advances in diagnosis and treatment of TB. Hennepin County public health is actively participating in evaluating these new approaches.”

A clinical investigation is underway at the Hennepin County public health clinic to study the next generation of *QuantiFERON* tests, *QuantiFERON Gold In Tube*, and comparing it to the TB skin test. The study further looks at the effect of malnutrition on both the TB skin test and the QFT-G test.

The public health clinic is also collaborating with Hennepin County Medical Center (HCMC) on a research study focusing on the pathogenesis that leads to increased incidence of diabetes and its possible connection to TB in Somali refugees.

Another Hennepin County TB study is utilizing a test developed at Mayo Clinic to evaluate whether the DNA of *Mycobacterium tuberculosis* can be detected in the stool of patients with active pulmonary TB.

References

1. CDC. Core Curriculum on Tuberculosis: What the Clinician Should Know. 4th Ed, 2001. (web based version)
2. Shafer RW, Kim DS, Weiss JP, Quale JM. Extrapulmonary Tuberculosis In Patients With Human Immunodeficiency Virus Infection. *Medicine (Baltimore)* 1991;70:384-97.
3. CDC. MMWR. Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis. 2005;54 (RR15).
4. CDC. Guidelines for Using the QuantiFERON[®] - TB Gold Test for Detecting *Mycobacterium tuberculosis* Infection, United States. 2005.
5. MDH. Disease Control Newsletter. March/April 2006;34(2).