Evaluation of identifying tuberculosis infection and disease in a rural institutionalized population

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Abstract

CONTEXT: Although the overall prevalence of tuberculosis (TB) in the United States is declining, correctional facilities continue to encounter a higher prevalence of this disease. Despite mandatory reporting laws for active TB, data for latent TB infection (LTBI) remains sketchy because reporting it is not required.

PURPOSE: Investigation of the period prevalence of LTBI in a rural Ohio regional jail compared with other populations in the region to determine the need and adequacy of the screening program.

METHODS: Data collected on inmates was compared with data collected on hospital employees within the same geographic region.

FINDINGS: Between January 2006 and July 2007, staff at the jail tested 1274 inmates for TB using the Mantoux purified protein derivative (PPD) method. Ten inmates (6 in 2006 and 4 in 2007) tested positive. All 10 cases were followed with a negative chest radiograph, leading to the diagnosis of LTBI. The overall incidence for the jail for LTBI was 0.8%, with 0% active cases. However, 85 inmates (6.7% of the population) were released before a PPD interpretation could be completed. In the comparative population, 651 hospital employees were tested for TB. Of these, 32 employees tested positive (LTBI prevalence of 4.9%). There were no cases of active TB reported.

CONCLUSION: The prevalence of LTBI in a rural jail (0.8%) is lower than the comparative sample population at a local hospital (4.9%). The rapid release of inmates (6.7%) indicates that TB data is incomplete and that potential cases of LTBI could have been unreported because of missed opportunity for interpretation of skin tests.

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Tuberculosis is a worldwide pandemic.1 According to the World Health Organization (WHO): “In 2005, the estimated per capita TB incidence was stable or falling in all six WHO regions. However, the slow decline in incidence rates per capita is offset by population growth. Consequently, the number of new cases arising each year is still increasing globally and in the WHO regions of Africa, the Eastern Mediterranean, and Southeast Asia.” As well, the WHO estimated that 1.6 million people worldwide died of TB in 2005, with a rate of 4400 deaths per day.2

In the United States, the rates of TB are declining. In 2007, the Centers for Disease Control and Prevention (CDC) reported a total of 13,299 TB cases (4.4 per 100,000 persons) in the United States, representing a 3.3% decline from the 2006 rate.3 Despite decreasing TB rates in the general US population, incarcerated populations still have a
high prevalence of active TB.\textsuperscript{4} Jail inmates have an estimated TB rate 17 times higher than the baseline rate for the total US population.\textsuperscript{5}

An inmate population is perhaps one of the hardest groups for which accurate health records can be kept, owing to the constant processing and release of prisoners.\textsuperscript{4,6-8} Given that the vast majority of inmates return to the community, TB in correctional facilities represents a potential threat to public health.\textsuperscript{9} In 1996, the CDC issued updated recommendations for the control of TB in correctional facilities. The guidelines focused on four key areas: (1) screening for TB, (2) containment of TB, (3) monitoring and evaluation, and (4) collaboration with correctional facilities and public health departments.\textsuperscript{10}

Although trends for state and national TB statistics have been well documented by the Ohio Department of Health and the CDC, data for latent tuberculosis infection (LTBI) still remain a mystery. It has been documented that inmates of correctional facilities are at higher risk for LTBI than are members of the general population.\textsuperscript{7} In addition, medical conditions such as LTBI and co-infection with HIV are more common in underserved populations (such as jails) than in the general population.\textsuperscript{11} Because LTBI is an asymptomatic condition, it is hard to diagnose. The only means to discover whether a person has LTBI is through screening programs, as it has been mandated in the health care setting and in some correctional facilities and jails. The importance of documenting cases of LTBI is that these patients have a 1-in-10 chance of developing active TB in their lifetime if it is not treated.\textsuperscript{2} If an inmate were to develop active TB while incarcerated, the public health repercussions in the jail could be devastating.

This study investigated the prevalence of LTBI in a rural Ohio regional jail. The data collected was compared with another population in the region that was considered at high risk to determine whether the prevalence of LTBI and TB are higher in this high-risk population. In addition, this study hopes to determine whether this screening for TB is efficacious enough to maintain funding for the screening program in the jail.

Methodology

Regional jail data source

Consecutive jail inmates at a rural Ohio regional jail, who entered the jail between January 2006 and July 2007, were included in the study. All inmates entering the jail were given TB skin tests (TST) with Mantoux PPD. For inmates still incarcerated, the TST was interpreted between 48 and 72 hours after PPD injection. Skin tests with results ≥10 mm in duration were considered positive (abnormal). Inmates with positive tests then underwent chest radiography to reveal whether they had any indication of active TB disease. Inmates were also observed for signs and symptoms of active TB such as persistent cough for longer than two weeks, hemoptysis, weight loss, chills, and/or night sweats, anorexia, and fever.

Inmates with positive test results had data recorded regarding their TST results, radiograph results, and gender; they were then categorized as having active TB or LTBI. Patients who were no longer in the jail for 48 to 72 hours did not have their TST interpretation and were identified as released (REL).

Results

The Ohio regional jail tested 1274 inmates for TB using the Mantoux PPD method between January 2006 and July 2007. Of those tested, 10 inmates (6 in 2006 and 4 in 2007) had positively interpreted TSTs. There was a 0.8% prevalence of those testing positive on the TST. Those testing positive with the TST had a chest radiograph ordered. If the radiographs were negative for TB, the employee was considered to have LTBI; if the radiograph was consistent with TB, the employee was considered to have active TB.

Regional comparative data

Because TST is not recommended for the general population and no data exists for the rates of LTBI in the general population, the investigators chose to examine other at-risk populations to compare with the jail data. These populations also had mandatory screening programs. The comparative population included employees of a hospital in the same geographic region. The hospital tests its employees annually because of a presumed increased risk for hospital employees’ exposure to TB infection from patients. In 2006, this hospital’s county represented the highest number of TB cases in Ohio’s Southeast (Appalachian) region.\textsuperscript{12} TSTs with induration of or greater than 10 mm were considered positive. Employees who tested positive were required to undergo a chest radiograph. If the radiographs were negative for TB, the employee was considered to have LTBI; if the radiograph was consistent with TB, the employee was considered to have active TB.

With regard to gender differences between the groups, more men (90.5%) than women (9.5%) were represented in the regional jail populations. This was reversed in the hospital employee population, where the females (77%) were predominant (males 23.0%). In the analysis of gender and TB infection, there were no statistically significant differences among the jail (\(p = 0.281\)) and the hospital employees (\(p = 0.554\)).
The period prevalence of LTBI in a rural Ohio regional jail (0.8%) is lower than the comparative sample of hospital staff population (4.9%) of equally high-risk individuals in the same geographic region. The release of inmates (6.7%) indicates that the jail population (4.9%) of equally high-risk individuals in the same geographic region. The release of inmates (6.7%) indicates that the jail population (4.9%) of equally high-risk individuals in the same geographic region. The release of inmates (6.7%) indicates that the jail population (4.9%) of equally high-risk individuals in the same geographic region. The release of inmates (6.7%) indicates that the jail population (4.9%) of equally high-risk individuals in the same geographic region. The release of inmates (6.7%) indicates that the jail population (4.9%) of equally high-risk individuals in the same geographic region. The release of inmates (6.7%) indicates that the jail population (4.9%) of equally high-risk individuals in the same geographic region.
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