

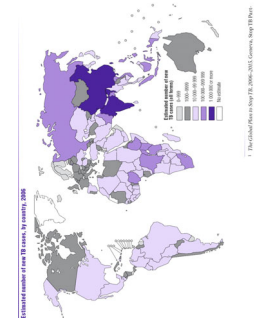


A Multijurisdictional Investigation of Resistant TB in Asian Immigrants

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Timeline



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- 1953**
13 FEB Index case born in China (later fled to Vietnam to escape the cultural revolution).
- 2004**
15 APR Index case arrives in U.S.
- 2007**
10 JUL Index case (female age 54) presents to hospital with hemoptysis, hypotension, a history of gallstones but no acute rheumatoid, and chronic renal insufficiency. She has no history of alcohol or intravenous drug use.
- 11 JUL She initially has a negative AFB (acid fast bacilli) smear and is moved out of airborne isolation and move to a standard hospital room to await further contact CT of the lungs, and bronchoscopy. Chest X-Ray shows abnormal infiltrates in right lower lobe. She is progressively diagnosed as hemoptysis dependent.
- 12 JUL CT scan shows mass nodules in the right upper lobe of the lung with no infiltrates. With no further consultations she was discharged with a diagnosis of bronchiectasis and pneumonia.
- 20 SEP Index case stopped work due to symptoms.
- 24 SEP Initial treatment consisted of 4 drug regimen: Isoniazid, Rifampin, Pyrazinamide, and Ethambutol. The Greene County Health Department's Tuberculosis Control Unit, in collaboration with the Ohio Department of Health and local providers started the index case on an altered drug regimen switching from Ethambutol to Avacomb (maxidosis) in order to avoid side effects related to renal insufficiency. She was prescribed medical isolation and directly-observed therapy (DOT). Chest X-rays were ordered for family contacts that had positive skin tests.
- Directly Observed Therapy (DOT)**
DOT is a program where the healthcare worker watches the patient with TB infection take their TB pills to help the patient stay with their medicine plan.
- 28 SEP Sample collected on Sept 25, 2007 is found to be resistant to Isoniazid and streptomycin. Case is officially reported from confirmatory samples tested by the Ohio Department of Health's Laboratory to be positive for *Mycobacterium tuberculosis*.
- 4 OCT Greene Memorial Hospital notified is employees of potential July exposure to TB.
- 11 OCT Isoniazid stopped; 3 drug regimen continued.
- 16 OCT After 3 weeks of treatment, the GC TB Control Unit ended their isolation (infections period of approximately 6 months from April 10, 2007 to October 16, 2007).
- Setting the Infection's Period**
For immigrants with TB to resist with TB symptoms and remain that is more positive for AFB, the National TB Controllers Association (NTCA) and CDC recommend setting the beginning of the infectious period at 3 months before symptom onset, as the first positive finding consistent with TB disease, whichever is earlier.

Abstract

In July 2007, a Vietnamese immigrant presented with hemoptysis and was placed in airborne isolation. The chest X-ray and sputum microbiology specimen demonstrated TB. Her TB was discharged in late September 2007. The Greene County Health Department was notified that her bronchoscopy specimen was positive for *Mycobacterium tuberculosis*. She was started on a 4 drug regimen, isolated and directly observed therapy (DOT) was initiated. Her isolation ended after 3 weeks of treatment with ongoing DOT. Her infectious period was over 6 months. 210 contacts were identified among a dialysis clinic, hospital, close contacts, and work. 179 persons were skin tested. 16 met the criteria for latent TB infection (LTBI). All LTBI cases were close contacts (n=5) or work contacts (n=11). In this investigation the odds ratio of foreign birth if diagnosed with LTBI was 391 (46 to 1641) Fisher Exact 95% Confidence Interval. This investigation suggests that public health intervention and cross jurisdictional coordination of resistant highly infectious TB is critical and that foreign birth may be of significant concern.

Objectives

- Learn about a highly infectious tuberculosis outbreak among recent immigrants & the multijurisdictional public health response.
- Recognize barriers about tuberculosis & anticipate difficulties with immigrants and resistant strains.
- Enhance epidemiologic response and treatment of tuberculosis that emerged across borders requiring coordinated response from employers, government, and individuals.

Symptoms of TB

Unexplained weight loss, loss of appetite, night sweats, fever, fatigue, pulmonary TB may include: coughing > 3 weeks, hemoptysis (coughing up blood), chest pain.

Diagnosis of TB

Quantiferon TB Gold (QFT-G) and Mantoux Tuberculin Skin Test (TST) are used to test for TB infection. Additional tests are required to confirm active TB disease. The QFT-G is a blood test to measure an antigenic response to MTB complex. The TST is performed by injecting a small amount of tuberculin under the skin in the lower arm. The test is read 48 to 72 hours after placement by a trained healthcare worker who looks for induration on the arm. A chest x-ray is used to detect pulmonary abnormalities which may differ in size, shape, density, or likely cavitation appearance. X-rays are not definitive but may be used to rule out pulmonary TB in a person with no symptoms and a positive TST or QFT-G. The presence of acid fast bacilli (AFB) on a sputum smear or other specimen often indicates active TB disease, but doesn't confirm a diagnosis because not all AFB are MTB complex. A culture (source depends on potential site of infection) is obtained to confirm all diagnosis (but shouldn't necessarily delay treatment initiation). A positive culture confirms the diagnosis of MTB complex. Cultures should be done regardless of smear results. All positive results should be reported to public health TB control unit within 24 hours. All positive cultures should be tested for drug resistance.

Latent TB Infection

Latent disease means the person is infected but the TB organisms are dormant. They may have been closed off by granulocytes or calcified. Disease may re-emerge if immunity wanes (as with HIV-associated infections), or other factors. With latent disease, infected persons don't infect others. Persons with latent TB should still take medicine to kill the TB bacteria. TB infection can turn into active disease if left untreated. Infected persons must take all the doses of the medicine to be cured. Latent disease is usually treated with just INH (Isoniazid) for 6 to 9 months. Treatment only cures the current infection, the patient could get infected if exposed again. In cases with active TB, others around the person can become infected. Treated patients with active TB have a 90% survival rate.

Active TB

Active TB cases will stop being infectious to others after taking medicine for at least 2 weeks, the cough has resolved or follow-up sputum smears are negative. Medicine needs to be taken consistently for at least 6 months. Regardless of latent or active TB, persons should continue to take their medicine even if they do not feel sick.

Table 1. Number of Persons Diagnosed and Treated for Latent TB Infection by Priority Groups After Exposure to Resistant *Mycobacterium tuberculosis*.

Area of Contact	Home County	Total	Received TST		Received LTBI Diagnosis		Received LTBI Treatment	
			No.	(%)	No.	(%)	No.	(%)
Dialysis Clinic	Greene	6	6	100%	1	17%	0	0%
	Greene	130	99	76%	0	0%	0	0%
Hospital	Greene	6	6	100%	5	83%	5	83%
	Butler	14	14	100%	0	0%	0	0%
Work	Greene	3	3	100%	1	33%	0	0%
	Montgomery	29	29	100%	8	28%	8	28%
Household and close social contacts	Shelby	2	2	100%	0	0%	0	0%
	Warren	20	20	100%	3	15%	3	15%

Public Health Multijurisdictional Response

Goals: To collaborate with multijurisdictional local public health agencies, state public health agencies, and local health care providers, to investigate and determine the extent of TB transmission, including identifying and screening the exposed cohort of contacts, and provide treatment if indicated to contact with latent TB infection (LTBI) or TB disease.

Priority Groups, Assisted by Public Health: Contacts of the patient were identified and assigned to priority groups based on NTCA/CDC recommendations. According to these recommendations, work and household/close social contacts who had an much longer duration of exposure were categorized as high priority (Table 1). In coordination with the TB Control Unit's Physician and Nurses, the Health Commissioner, and the hospital's Medical Director, the epidemiologist continued case strategies including testing, diagnosis, information on prior vaccination status, and foreign birth.

Hospital's Response: The hospital notified employees on October 4, 2007 of the potential exposure to TB in July of 2007. All employees are screened yearly for TB predominantly by skin testing and when indicated by history. If the test was positive, the hospital provided confirmatory chest x-rays. **Public Health Multijurisdictional Response:** Greene County Health Department coordinated regional conference calls with neighboring jurisdictions, health care providers (hospital, dialysis clinic, and others), and the Ohio Department of Health. The index case lives in Greene County and works in Warren County. Warren County Public Health skin tested all workers. Positive workers were referred to their local health departments. The workers lived across 5 counties in Southwest and West-Central Ohio.

Case Contacts: Greene County Health Department is continuing to provide DOT to the index case and weekly pill counts to the family. The positive skin tests of the family have been prescribed Ethambutol due to the resistant strain of TB. One close contact had prior BCG vaccination and had negative symptomology, so was not offered treatment. The close contacts of the index case were also immigrants from Vietnam. The number of persons with latent TB infection were 18. All but one were of Asian birth. Eight of the 192 non-Hispanic persons were foreign birth. These numbers provide for an odds ratio of foreign birth if infected with TB in this outbreak of 391 (46 to 1641) Fisher Exact 95% Confidence Interval. This investigation supports the paradigm of public health intervention, coordination, and control of resistant highly infectious TB.

Take Home Messages

Contrast of Outbreak

Index case and coworkers very limited in English. Interpreter always required. Initially discharged without information due to language barrier. This patient had family support and was extremely compliant with DOT.

Multiple Local Points of Exposure

Multiple jurisdictions involved (5 counties and 4 local points of exposure: Large nuclear family, work site, hospital, & dialysis clinic) index lived in one county, worked in another. Coworkers spread across SW Ohio. Factory manager had frequent international travel. Workers concentrated at work site. Immigrant workforce were all from endemic areas.

Pharmacy

A working relationship with the local pharmacy avoided loss of compliance with prescribed drug regimen.

Complex Case

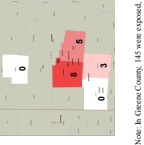
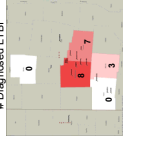
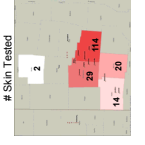
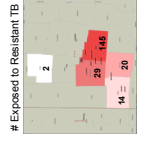
Limited knowledge about the historical public health measures, infected a very long time ago. Treatment history unknown.

Complex Case

Presents with hemoptysis and initially negative AFB smear. Discharged with diagnosis of hemorrhagic bronchitis and without any TB information, resulting in 2 months of exposure in region. Language interpreter needed every time.

Evidence

Etiology of TB infection is unclear. Comorbidity (renal insufficiency) may have led to her LTBI to become active TB.



Conclusions

- In this outbreak of resistant highly infectious TB foreign birth was associated with disease with an odds ratio of 391.
- Have ready access to interpreter services for immigrant populations in your community.
- Outbreaks require time and resources; physician and staff may be able to devote the time to DOT and attend to medical adjustments due to resistance.
- Cross border cooperation (both geographically and between public and private sectors) were required to mitigate this outbreak.
- Getting Health Commissioner & CEO's on board early on with public health activities (including the hospital and factory employers) facilitated testing and treatment of those infected.