

Contact Investigations

Tuberculosis 101
Web-based Workshop

SESSION 3
May 23, 2007

Objectives

- Describe the new contact investigation guidelines
- Determine when to conduct a contact investigation
- Describe the steps in a contact investigation
- Describe which contacts should be considered high-priority contacts

Contact Investigations – A Crucial Prevention Strategy

- On average, 10 contacts are identified for each person with infectious TB in the U.S.
- 20%–30% of all contacts have latent TB infection (LTBI)
- 1% of contacts have TB disease
- Of contacts who will ultimately have TB disease, approximately one-half develop disease in the first year after exposure

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Benefits of Contact Investigations

- Finding and treating additional TB disease cases (potentially interrupting further transmission)
- Finding and treating persons with LTBI to avert future cases



Contact Investigation Responsibilities

- Health departments are responsible for ensuring the conduct of contact investigations
- Contact investigations are complicated activities that require:
 - Many interdependent decisions
 - Time-consuming interventions

Key Terms

- **Case** – A particular instance of a disease (e.g., TB). A case is detected, documented, and reported
- **Contact** – Someone who has been exposed to *M. tuberculosis* by sharing air space with a person with infectious TB

Key Terms (2)

- **Index** – The first case or patient who comes to attention as an indicator of a potential public health problem
- **Source case or patient** – The case or person who was the original source of infection for secondary cases or contacts; can be, but is not necessarily, the index case

Factors that Predict Likely Transmission of TB

- Anatomical site of the disease
- Positive sputum bacteriology
- Radiographic findings
- Behaviors that increase aerosolization of respiratory secretions
- Age
- HIV status
- Poor patient adherence to treatment
- Inappropriate/ineffective treatment

Characteristics of the Index Patient Associated with Increased Risk of TB Transmission

- Pulmonary, laryngeal, or pleural TB
- Acid-fast bacilli (AFB) positive sputum smear
- Cavitation on chest radiograph
- Adolescent or adult patient
- No or ineffective treatment of TB disease

Behaviors of the Index Patient Associated with Increased Risk of TB Transmission

- Frequent coughing
- Sneezing
- Singing
- Close social network

Initiating a Contact Investigation

- Consider if index patient has:
 - Confirmed or suspected pulmonary, laryngeal, or pleural TB
 - Chest radiograph consistent with pulmonary TB
- Recommended if:
 - Sputum smear has AFB on microscopy
 - Chest radiograph indicates presence of cavities in the lung (AFB sputum smear negative)

Initiating a Contact Investigation (2)

- Not generally indicated if:
 - Sputum smear has AFB on microscopy and nucleic acid amplification (NAA) tests for *M. tuberculosis* are negative

Initiating a Contact Investigation (3)

- Persons with AFB smear or culture-positive sputum and cavitory TB assigned the highest priority
- Should not be initiated for contacts who have suspected TB disease and minimal findings in support of pulmonary TB diagnosis

Comprehensive Index Patient Information

- Foundation of a contact investigation
- Information to be gathered includes:
 - Disease characteristics
 - Onset time of illness
 - Names of contacts
 - Exposure locations
 - Current medical factors (*e.g.*, initiation of treatment and drug susceptibility results)

Pre-interview Phase

- Collect patient background information and circumstances of illness
 - Possible sources include
 - Medical record
 - Reporting physician
- Match patient's name to prior TB registries and the surveillance database

Data to Collect in Pre-interview Phase

- History of previous TB exposure or infection
- History of previous TB disease and treatment
- Anatomical sites of TB disease
- Symptoms of illness
- Date of onset
- Chest radiography results
- Other diagnostic imaging study results

Data to Collect in Pre-interview Phase (2)

- Histologic or bacteriologic analysis results
- Current bacteriologic results
- Anti-TB chemotherapy regimen
- HIV testing results
- Patient's concurrent medical conditions
- Other diagnoses that may influence or impinge on the interview
- Identifying demographic information

Determining the Infectious Period

- Focuses investigation on contacts most likely to be at risk for infection
- Sets timeframe for testing contacts
- Information to assist with determining infectious period
 - Approximate dates TB symptoms were noticed
 - Bacteriologic results
 - Extent of disease

Estimating the Beginning of the Infectious Period

Characteristic of Index Case			
TB symptoms	AFB sputum smear positive	Cavitary chest radiograph	Likely period of infectiousness
Yes	No	No	3 months before symptom onset or 1 st positive finding consistent with TB disease, whichever is longer
Yes	Yes	Yes	3 months before symptom onset or 1 st positive finding consistent with TB disease, whichever is longer
No	No	No	4 weeks before date of suspected diagnosis
No	Yes	Yes	3 months before positive finding consistent with TB

SOURCE: California Department of Health Services TB Control Branch; California TB Controllers Association. *Contact Investigation Guidelines*. Berkley, CA: California Department of Health Services; 1998.

Closing the Infectious Period

Infectious period closed when all the following criteria are met:

- Effective treatment for ≥ 2 weeks
- Diminished symptoms
- Bacteriologic response

Exposure Period for Contacts

Determined by how much time the contact spent with the index patient during the infectious period



Specific Investigation Plan

- Investigation plan should include:
 - Information gathered in interviews and site visits
 - Registry of contacts and their assigned priorities
 - Written timeline for monitoring the investigation progress
 - Data recorded on standardized forms
- Part of the permanent medical record

Timeframes for Initial Follow-up of Contacts Exposed to TB		
Type of Contact	Business days from listing of a contact to initial encounter*	Business days from initial encounter to completion of medical evaluation†
High priority contact: index case AFB sputum smear positive or cavitory disease on chest x-ray	7	5
High priority contact: index case AFB sputum smear negative§	7	10
Medium priority contact: regardless of AFB sputum smear or culture result	14	10
*A face-to-face meeting that allows the healthcare worker to assess the overall health of the contact, administer a TST, and schedule further evaluation.		
†The medical evaluation is complete when the contact's status (LTBI or TB disease) is determined.		
§Abnormal chest x-ray consistent with TB disease, might be NAA positive and/or AFB culture positive.		
SOURCE: California Department of Health Services TB Control Branch; California TB Controllers Association. <i>Contact Investigation Guidelines</i> . Berkley, CA: California Department of Health Services; 1998.		

Assigning Priorities to Contacts

- Priorities based on likelihood of infection and hazards to the contact if infected
- Priority scheme directs resources to contacts who:
 - Have secondary case of TB disease
 - Have recent *M. tuberculosis* infection (most likely to benefit from treatment)
 - Are most likely to develop TB disease if infected or could suffer severe morbidity if they develop TB disease

Prioritization of Contacts

Patient has pulmonary, laryngeal, or pleural TB with cavitary lesion on chest radiograph or is AFB sputum smear positive

Household contact	High
Contact <5 years of age	High
Contact with medical risk factor (HIV or other medical risk factor)	High
Contact with exposure during medical procedure (bronchoscopy, sputum induction, or autopsy)	High
Contact in a congregate setting	High
Contact exceeds duration/environment limits (limits per unit time established by the health department for high-priority contacts)	High
Contact is ≥5 years and ≤15 years of age	Medium
Contact exceeds duration/environment limits (limits per unit time established by the health department for medium-priority contacts)	Medium
Any contact not classified as high or medium priority is assigned a low priority.	

Prioritization of Contacts (2)

Patient is a suspect or has confirmed pulmonary/pleural TB – AFB smear negative, abnormal chest radiograph consistent with TB disease, may be NAA and/or culture positive

Contact <5 years of age	High
Contact with medical risk factor (e.g., HIV)	High
Contact with exposure during medical procedure (bronchoscopy, sputum induction, or autopsy)	High
Household contact	Medium
Contact exposed in congregate setting	Medium
Contact exceeds duration/environment limits (limits per unit time established by the local TB control program)	Medium

Any contact not classified as high or medium priority is assigned a low priority.

Prioritization of Contacts (3)

Patient is a suspect pulmonary TB case – AFB smear negative, NAA negative/culture negative, abnormal chest radiograph not consistent with TB disease

Household contact	Medium
Contact <5 years of age	Medium
Contact with medical risk factor (e.g., HIV infection or other immunocompromising condition)	Medium
Contact with exposure during medical procedure (bronchoscopy, sputum induction, or autopsy)	Medium

Any contact not classified as high or medium priority is assigned a low priority.

Tuberculin Skin Testing

- All high or medium priority contacts who do not have a documented previous positive tuberculin skin test (TST) or previous TB disease should receive a TST at the initial encounter
- If not possible, TST should be administered
 - ≤7 working days of listing high-priority contacts
 - ≤14 days of listing medium-priority contacts

Interpreting Skin Test Reaction

- ≥ 5 mm induration is positive for any contact
- Two-step procedure should not be used for testing contacts
- A contact whose second TST is positive after initial negative result should be classified as recently infected

Contact Investigation

- 23 Screened (14 not screened)
- Past Positive TST: 3
- Current Positive: 14 (70%)
- Negative TST: 6
- Treatment for LTBI: 11

QuantiFERON[®]-TB Gold (QFT-G)

- May 2, 2005, final approval from U.S. Food and Drug Administration as an aid for diagnosing *Mycobacterium tuberculosis* infection
- Blood assay test—one blood draw
- Can be used in all circumstances in which the TST is used

QFT-G (2)

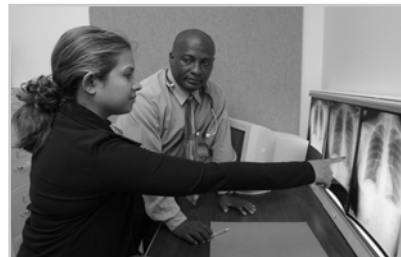
- Used in contact investigations, evaluation of recent immigrants who have had BCG vaccination, TB screening of healthcare workers
- Used in place of (not in addition to) TST
- No need to follow positive QFT-G result with a TST

Post-exposure Tuberculin Skin Testing

- Window period is 8–10 weeks after exposure ends
- Contacts who have a positive result after a previous negative result are said to have had a change in tuberculin status from negative to positive

Medical Evaluation

All contacts whose skin test reaction induration is ≥ 5 mm or who report any symptoms consistent with TB disease should undergo further examination and testing for TB



Evaluation and Follow-up of Children <5 Years of Age

- Always assigned a high priority as contacts
- Should receive full diagnostic medical evaluation, including a chest radiograph
- If TST ≤ 5 mm of induration and last exposure <8 weeks, LTBI treatment recommended (after TB disease excluded)
- Second TST 8–10 weeks after exposure; decision to treat is reconsidered
 - Negative TST–treatment discontinued
 - Positive TST–treatment continued

Evaluation and Follow-up of Immunosuppressed Contacts

- Should receive full diagnostic medical evaluation, including a chest radiograph
- If TST negative ≥ 8 weeks after end of exposure, full course of treatment for LTBI recommended (after TB disease is excluded)

Treatment of LTBI

Treatment (after TB disease is excluded) of presumed *M. tuberculosis* infection recommended for persons:

- With HIV infection
- Taking immunosuppressive therapy for organ transplant
- Taking anti-tumor necrosis factor alpha (TNF- α) agents

Treatment After Exposure to Drug-Resistant TB

- Consultation with physician with MDR expertise recommended for selecting a LTBI regimen
- Contacts should be monitored for 2 years after exposure

Safeguarding Confidentiality

- Challenging and difficult during contact investigations
- Essential to maintaining credibility and trust
- Constant attention required to maintain confidentiality
- Specific policies for release of confidential information related to contact investigations are recommended

Definition of an Outbreak

- During (and because of) a contact investigation, 2 or more contacts are found to have active TB, regardless of their assigned priority; or
- Any 2 or more cases occurring within a year of each other, discovered to be linked, and the linkage is established outside of a contact investigation

TB Outbreaks

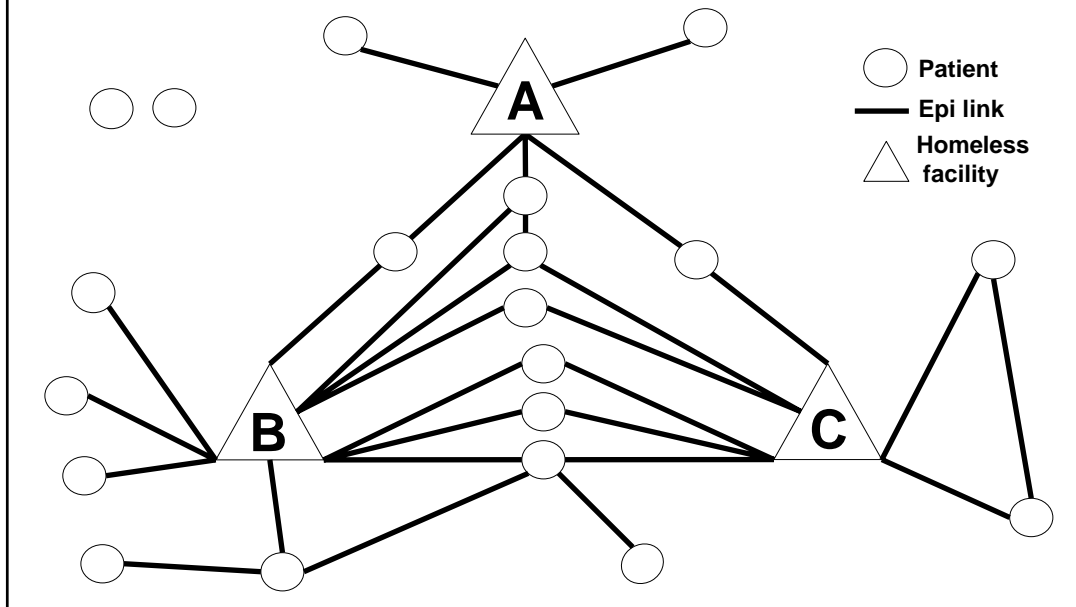
A TB outbreak is a sign of extensive transmission and implies that:

- A TB patient was contagious
- Contacts were exposed for a substantial period of time
- The interval since exposure has been sufficient for infection to progress to disease (interval may be shortened by HIV infection)

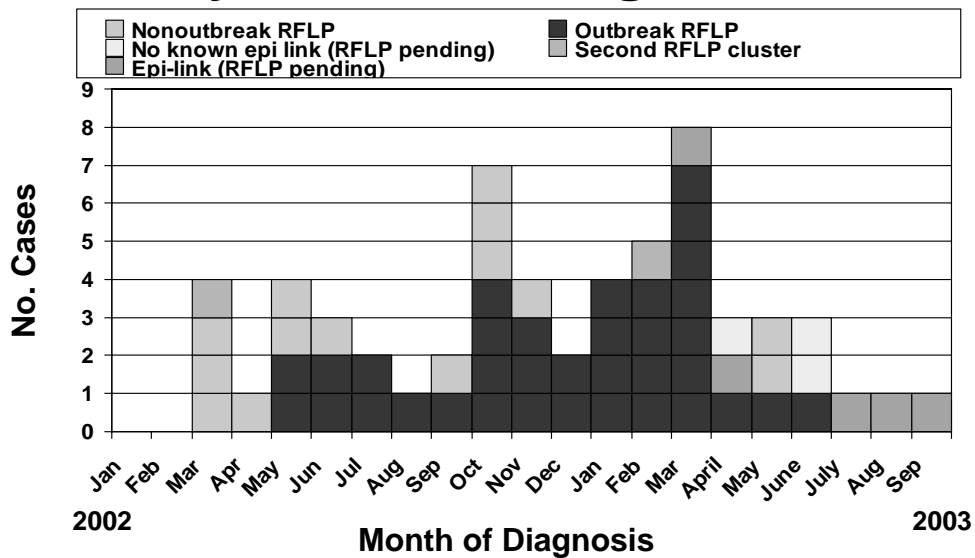
Social Network Analysis

- Social Network – linkage of persons and places where *M. tuberculosis* is spread via shared air space
- Social Network Analysis – methodology of visualizing and quantitating the relative importance of members in a social network
 - Social Network Analysis assumes there is some detectable patterning of the TB cases and their contacts in a community

Epi Links: Patient-Place



Homeless TB Cases in King County by Month of Diagnosis



- **Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis: Recommendations from the National Tuberculosis Controllers Association and CDC**

MMWR 2005; 54 (No. RR-15, 1-37)

<http://www.cdc.gov/mmwr/pdf/rr/rr5415.pdf>