TUBERCULOSIS CONTACT INVESTIGATION

LEARNING OBJECTIVES
 Upon completion of this session, participants will be able to:
   1. Describe the criteria used and method for determining an infectious period (IP) for TB
   2. Describe the characteristics of the TB patient, contact, and exposure that should be assessed in order to prioritize contacts
   3. Name and apply the essential steps and timelines in a contact investigation (CI)
   4. List three criteria used to determine when to expand the scope of a CI

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| 1. | Tuberculosis contact investigation – slide outline  
   Presented by: Ann Raftery, RN, BSN, PHN, MSc | 1-31 |

SUPPLEMENTAL MATERIAL


REFERENCES


ADDITIONAL RESOURCES

- Firland Foundation. Home interview during a contact investigation. 2010. Available online at: [http://www.son.washington.edu/portals/idc/cases/contact/v6/](http://www.son.washington.edu/portals/idc/cases/contact/v6/)


- California Department of Health Services and Francis J. Curry National Tuberculosis Center. Contact Investigation in Schools Toolkit. December 2004. Available online at: [http://www.cdph.ca.gov/programs/tb/Pages/ResourcesLHDsTBCB.aspx](http://www.cdph.ca.gov/programs/tb/Pages/ResourcesLHDsTBCB.aspx)

- Southeastern National Tuberculosis Center. Corrections Toolkit. Available at: [http://sntc.medicine.ufl.edu/CorrectionsToolkit.aspx#.WA__JC0rLIU](http://sntc.medicine.ufl.edu/CorrectionsToolkit.aspx#.WA__JC0rLIU)

Tuberculosis Contact Investigation

Ann Raftery, RN, PHN, MSc
Curry International Tuberculosis Center
Case Management and Contact Investigation Intensive
November 3, 2016

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- List 3 criteria used to determine when to expand the scope of a CI
Background

CDC National Guidelines for the Investigation of Contacts of Persons with Infectious TB (2005)
- Provide a standard framework for assembling information related to exposure to TB
- Describe how to use findings to:
  - Assess for evidence of transmission
  - Inform decisions on whether to expand the investigation

CDPH/CTCA Joint Addenda (2011)

Why do we do TB contact investigations?
TB Control Priority Strategies

1. Prompt detection, reporting and treatment of persons with active TB
2. Identification and evaluation of contacts of persons with contagious TB
3. Targeted testing and treatment of persons with latent TB infection
4. Strengthening infection control measures in settings at high risk for TB transmission

Why TB Contact Investigation?

Find active TB cases: treat and prevent ongoing transmission
Find persons with TB infection: treat and prevent future cases
### Contact Investigation (CI) Performance

#### Targets and Average 5-Year Outcomes

**United States and California, 2009-2013**

<table>
<thead>
<tr>
<th>National Performance Targets for 2020</th>
<th>Performance Outcomes (range 2009-2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>United States</td>
</tr>
<tr>
<td>Contacts are <strong>identified</strong> for 100% of sputum AFB smear-positive TB patients</td>
<td>94% (94-95%)</td>
</tr>
<tr>
<td><strong>93%</strong> of contacts are <strong>evaluated</strong></td>
<td>81% (78-83%)</td>
</tr>
<tr>
<td><strong>91%</strong> of contacts to sputum AFB smear(+) patients with newly diagnosed LTBI will <strong>start treatment</strong></td>
<td>70% (68-72%)</td>
</tr>
<tr>
<td><strong>81%</strong> of contacts who start LTBI treatment will <strong>complete treatment</strong></td>
<td>71% (66-71%)</td>
</tr>
</tbody>
</table>

Data provided by the California TB Control Branch

### Trends in CI Performance Outcomes

**California, 2010-2014**

<table>
<thead>
<tr>
<th>CA Performance Targets for 2019</th>
<th>CA Performance Outcomes</th>
<th>5-Year Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
<td>2011</td>
</tr>
<tr>
<td>Contacts are <strong>identified</strong> for 98% of sputum AFB smear-positive TB patients</td>
<td>94%</td>
<td>93%</td>
</tr>
<tr>
<td><strong>96%</strong> of contacts are <strong>evaluated</strong></td>
<td>80%</td>
<td>81%</td>
</tr>
<tr>
<td><strong>94%</strong> of contacts to sputum AFB smear(+) patients with newly diagnosed LTBI will <strong>start treatment</strong></td>
<td>59%</td>
<td>65%</td>
</tr>
<tr>
<td><strong>88%</strong> of contacts who start LTBI treatment will <strong>complete treatment</strong></td>
<td>62%</td>
<td>63%</td>
</tr>
</tbody>
</table>

Data provided by the California TB Control Branch
Definitions

- **Case** - a particular instance of disease (e.g., TB). A case is detected, documented, and reported.
- **Index case** - the first case or patient that comes to attention as an indicator of a potential public health problem.
- **Source case** - the case or person who was the original source of infection for secondary cases or contacts.
- **Infectious** - refers either to TB disease of the lung or throat which has the potential to cause transmission to other persons, OR to the patient who has TB disease.

Definitions (2)

- **Contact** - someone who has been exposed to *M. tuberculosis* infection by sharing air space with a person with infectious TB.
- **Converter** - a change in the result of a test for *M. tuberculosis* infection that is interpreted to indicate a change from uninfected to infected.
Definitions (3)

- **Infectious period** - the time during which a person with TB disease might have transmitted *M. tb* organisms to others
- **Exposure period** - the coincident period when a contact shared the same air space as a person with TB during the infectious period
- **Window period** - the interval between infection and detectable reactivity to the tuberculin skin test (TST)

TB Contact Investigation Steps

1) Collect and Evaluate Index Case Information: Decide Whether to Initiate a CI
2) Interview the Index Case
3) Determine the Infectious Period
4) Examine Sites of Transmission
5) Prioritize Contacts
6) Locate and Evaluate Contacts
7) Treat and Follow up Contacts
8) Evaluate Contact Investigation Activities
Step 1

Collect and Evaluate Index Case Information: Decide Whether to Initiate a CI

What information is collected?

- Background information regarding the patient and circumstances of the illness
  - Demographics, identifiers, locating information
  - Site of disease, TB regimen, and start date(s)
  - History of previous TB exposure
  - History of previous TB disease and treatment
  - TB symptoms and the onset date(s)
  - Results of diagnostic tests
  - Concurrent medical conditions, diagnoses, or important social factors
Assessing Transmission Risk

<table>
<thead>
<tr>
<th>TB CASE FACTORS</th>
<th>LIKELIHOOD OF DISEASE TRANSMISSION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MORE LIKELY</td>
</tr>
<tr>
<td>Site of TB Disease</td>
<td>Laryngeal / pulmonary or pleural</td>
</tr>
<tr>
<td>Smear status</td>
<td>Positive</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td>Cavitation</td>
</tr>
<tr>
<td>Symptoms/behaviors</td>
<td>Coughing, singing, sneezing, sociability</td>
</tr>
<tr>
<td>Age</td>
<td>Adult or adolescent</td>
</tr>
<tr>
<td>Anti-TB drugs</td>
<td>No or ineffective Rx</td>
</tr>
</tbody>
</table>

Decision to Initiate a TB Contact Investigation

*Acid-fast bacilli  †Nucleic acid assay  §Approved indication for NAA  ¶Chest radiograph

Handout 1.1a
**Index Case TB Classification**

- **TB 3: Culture + Pulmonary, laryngeal or pleural TB**
  - Always

- **TB 5: High Pulmonary, laryngeal or pleural TB and TB treatment initiated**
  - Always

- **TB 5: Low Pulmonary, laryngeal or pleural TB and TB treatment not initiated**
  - C+
  - Always

- **TB 3 or 5: EPTB**
  - C-
  - Not indicated

- **TB 3 or 5: EPTB**
  - No pulmonary, laryngeal or pleural involvement

**Decision to Initiate a Contact Investigation (2)**

**Exercise #1:**

**Deciding Whether to Initiate a CI**

TB3= Active TB case; TB5= Suspect case

Handout 1.1b
Step 2

Interview the Index Case

Index Case TB Interview Goals

- Patient understands transmission and treatment of TB
- Problems/concerns identified and addressed
- Infectious period (IP) determined
- Areas of transmission identified
- Contacts identified, prioritized, and locating information obtained
- Contact investigation priorities established
Interview Timeframes

Conduct a minimum of 2 interviews

- 1st interview
  - ≤ 1 business day of reporting for infectious patients
  - ≤ 3 business days for others
- 2nd interview
  - 1-2 weeks later
- May need additional interviews

Use a trained interpreter when indicated

Step 3

Determine the Infectious Period
What is the Infectious Period?

Time during which a TB case is likely to transmit *M. tuberculosis*

Importance of Estimating the Infectious Period (IP)

- Focuses the investigation on contacts most likely to be at risk of infection
- Sets the timeframe for testing contacts
  - (e.g., when repeat TST or IGRA is due)
- **NOTE:** current methods only estimate the IP. Certain circumstances might warrant extending the onset or end of the IP beyond the recommended guidelines
## Estimating Onset of Infectious Period

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>TB symptoms</th>
<th>AFB sputum smear positive</th>
<th>Cavitary chest radiograph</th>
<th>Recommended minimum beginning of likely period of infectiousness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td></td>
<td>3 months before symptom onset or 1st positive findings consistent with TB disease, whichever is longer</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>3 months before symptom onset or 1st positive findings consistent with TB disease, whichever is longer</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>3 months before 1st positive finding consistent with TB disease</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
<td>4 weeks before date of suspected diagnosis</td>
</tr>
</tbody>
</table>

### Closing the Infectious Period

- The infectious period (IP) is closed when further transmission of tuberculosis is unlikely

- **General criteria** for closing IP include:
  - Effective treatment for ≥ 2 weeks
  - Diminished symptoms
  - Mycobacteriologic response
Who is considered a “contact”?

- Must have shared same airspace as the index case during the infectious period
- Important to determine for each contact (or group of contacts):
  - When did exposure occur (in relation to index case diagnosis)?
  - How frequent and what duration was the exposure?
  - What was the date of last exposure?

Exercise #2:

Determining the Infectious Period
Step 4

Examine Sites of Transmission (Field Investigation)

- Visit the sites where the patient spent time during infectious period

- Components include:
  - Assess physical conditions of the setting
  - Interview, arrange for evaluation and provide TB information to contacts
  - Identify additional contacts
Assessing the Environment

<table>
<thead>
<tr>
<th>ENVIRONMENTAL FACTOR</th>
<th>LIKELIHOOD OF DISEASE TRANSMISSION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HIGH</td>
</tr>
<tr>
<td>Volume of shared air space</td>
<td>Low (small)</td>
</tr>
<tr>
<td>Adequacy of ventilation</td>
<td>Poor</td>
</tr>
<tr>
<td>Re-circularized air</td>
<td>Yes</td>
</tr>
<tr>
<td>Upper room ultraviolet light</td>
<td>Not present</td>
</tr>
</tbody>
</table>

Step 5

Prioritize Contacts
Assign Priority Level to each Contact

- High Priority
  - 3-5 business days (from listing to initial encounter)
- Medium Priority
  - 14 business days
- Low Priority
- Non-contact

How to Prioritize Contacts

- Consider both:
  - Factors associated with transmission
  - Factors associated with increased risk for progression to TB disease (vulnerability)
High Priority Contacts

**High Priority Contacts** are:

1. Most likely to be infected (exposure)
2. Most likely to progress to disease if infected
3. Most likely to suffer increased morbidity or mortality from TB disease

When assigning priority, consider:

- Infectiousness of the TB case
- Circumstances of the exposure
  - Environment where transmission likely occurred
  - Frequency & duration of exposure
- Susceptibility/vulnerability factors of the contact
  - Age, immune suppressed, other medical risk factors
- Any contact with TB symptoms = High priority
Assessing Exposure Circumstances

- Determine when exposure occurred in relation to TB case’s infectious period including date of last contact (*contact break date*)
  - Close to date of diagnosis
  - Toward beginning of infectious period

- Evaluate how often (*frequency*) the TB case and contact shared air space and how long (*duration*) each exposure lasted (e.g., number of hours)

Susceptibility/Vulnerability Factors–Contact Risk Assessment

Is the contact at high risk for rapid progression to active TB?

- Under five years of age?
- HIV infected?
- Other immune suppressed?
Susceptibility/Vulnerability Factors – Contact Risk Assessment (2)

**Children**
- TB disease is more likely to occur once infected
- Incubation or latency period is briefer
- If <5 years of age, assign “high priority”

Susceptibility/Vulnerability Factors – Contact Risk Assessment (3)

**Immune Status - HIV Infection**

“...results in the progression of *M. tuberculosis* infection to TB disease more frequently and more rapidly than any other known factor”

CDC 2005
Susceptibility/Vulnerability Factors – Contact Risk Assessment (4)

Immune Status – Other

Immunosuppressive treatment that increases the likelihood of progression to TB disease after infection:

- Corticosteroids - >15 mg daily for >4 weeks
- Multiple cancer chemotherapy agents
- Anti-rejection drugs for organ transplants
- Tumor necrosis factor alpha antagonists

Susceptibility/Vulnerability Factors – Contact Risk Assessment (5)

Medical conditions that increase the likelihood of progression to TB disease after infection:

- Silicosis
- Diabetes mellitus
- Status post gastrectomy or jejunoileal bypass surgery
Prioritizing Contacts - Guidelines

- CDC CI guidelines propose various algorithms to guide the priority classification process (handout 1.3a)

- CDPH/CTCA revised CI guidelines include additional detail and criteria, particularly for classifying high and medium priority (handout 1.3b)

Exercise #3:

Examine Site(s) of Transmission and Prioritize Contacts
Step 6

Locate and Evaluate Contacts

Locating Contacts

Consider:
- Social networks
- Re-interviews
- Jails, shelters
- DMV; Postal service
- CDPH Patient Locating Service
Evaluation of Contacts

1. Medical and TB history
2. TB symptom evaluation
3. TST or IGRA; if initial test is negative, then repeat 8 - 10 weeks post contact

If symptomatic or positive TB test:
- Obtain chest X-ray and medical evaluation
- Consider sputum for AFB smear and culture if indicated

Important information for Evaluating the TB Contact

- Prior TB test history:
  - Employment or immigration health record
  - Primary care provider medical record
  - School / immunization health record
  - Cure-TB, TBNet, other program record (e.g., foster care)

- Country of birth, year of arrival in US, and travel history
- Other medical conditions
Timeframes: Initial Contact Evaluation

<table>
<thead>
<tr>
<th>Case TB Classification</th>
<th>Business days from listing as a contact to initial encounter</th>
<th>Business days from initial encounter to completion of medical evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB3 or TB5 High pulmonary, laryngeal or pleural TB with: • AFB S+ respiratory spec., OR • Cavitary CXR, OR • TB symptoms</td>
<td>High priority contact 3 - 5</td>
<td>High priority contact 5</td>
</tr>
<tr>
<td></td>
<td>Medium priority contact 14</td>
<td>Medium priority contact 10</td>
</tr>
<tr>
<td>TB3 or TB5 High pulmonary, laryngeal or pleural TB with: • Negative AFB smears, AND • CXR abnormal, not cavitary AND • No TB symptoms</td>
<td>High priority contact 7</td>
<td>High priority contact 10</td>
</tr>
<tr>
<td></td>
<td>Medium priority contact 14</td>
<td>Medium priority contact 10</td>
</tr>
</tbody>
</table>

Source: Adapted from Addendum 6; 2011 CDPH/CTCA Joint Addenda to the 2005 CDC TB CI guidelines

Evaluation: Special Contact Groups

- **Child < 5 y/o or immunocompromised:**
  - Medical history
  - Physical exam
  - Chest X-ray (PA & lateral views)
  - Tuberculin skin test

- **Documented prior positive TST or IGRA:**
  - Obtain medical and exposure history
  - Obtain prior treatment history
  - If treatment for LTBI is indicated, obtain CXR prior to treatment initiation
Step 7

Treat and Follow Up Contacts

Treatment and Follow-up

- Prioritize efforts with contacts who are most in need of treatment
- Monitor throughout treatment (monthly face-to-face)
- “Window-period” prophylaxis
  - TST-negative high-risk contacts
  - during the period following last contact until the follow-up TST (8-10 weeks after last contact)
- MDR-TB exposure – seek expert consultation; follow-up 2 years post exposure
Exercise #4:
Locate, Evaluate, Treat, and Follow Up Contacts

Step 8
Evaluate Contact Investigation Activities
When to Evaluate?

- When should you evaluate the contact investigation?

Why Evaluate?

- Will help in the management, care, and follow-up of the TB case and contacts
- Analysis of the investigation in progress will allow prioritization of program activities and resources
- Will allow you to report on how well your objectives are being met for program monitoring and planning
- Will help you determine whether or not the investigation should be expanded
Deciding Whether to Expand Testing

Evidence of Recent Transmission:
- High infection rate in high-priority contacts
- Infection in a child (< 5 y/o)
- TST converters
- Secondary case
- TB disease in any contact assigned a low priority

Exercise #5:
Decide Whether to Expand the Contact Investigation
When to Call It Quits

Before closing a contact to follow-up:

- Try different methods of contacting
- Visit or call at different times of the day
- Explore obstacles, offer incentives/enablers
- Consult your supervisor and other health team members

When to Call It Quits (2)

- Inform the contact of the risks of not completing their evaluation or treatment
- Document your efforts and strategies used and the contact’s response to each
- For certain high-risk contacts, more effort may be required
Special Settings...

- TB contact investigation steps also apply to CIs in special settings (schools, correctional facilities, healthcare facilities, etc.)
  - School CI toolkit - [http://www.cdph.ca.gov/programs/tb/Pages/ResourcesLHDsTBCB.aspx](http://www.cdph.ca.gov/programs/tb/Pages/ResourcesLHDsTBCB.aspx)
  - Corrections toolkit - [http://sntc.medicine.ufl.edu/CorrectionsToolkit.aspx#.WA__JC0rLIU](http://sntc.medicine.ufl.edu/CorrectionsToolkit.aspx#.WA__JC0rLIU)
- Identify stakeholders early and keep them informed
- Be prepared for possible media attention

Summary

- Contact investigations are an essential component to TB control and prevention
- Determining the infectious period helps to maintain focus on those most likely to have been infected
- Evaluating CI activities in real time will help maintain a focus on priorities
- Seek consultation for special situations (drug resistance, outbreak, large CI, etc.)
Purpose: To return TB patients to care by providing local health departments prompt technical and/or direct assistance with locating strategies and tools

Background
TB patients with risk factors for poor adherence are more likely to have delays in diagnosis, treatment interruptions, serious medical consequences and default. If a TB patient cannot be located or becomes lost, he/she may also pose a public health risk and continue to transmit TB to others if infectious.

TB Patient Locating Service Team
Members of the team include experienced and motivated specialists in communicable disease investigation. All members have extensive training and experience in the areas of cultural diversity, field investigation, patient interviews and social networking.

When to Request Our Services
As soon as the TB case manager has determined that a TB patient cannot be located, give us a call. The Project Coordinator will review the information thoroughly and make recommendations to assist with locating the TB patient. Please don’t wait!

Call or email:
Carol Greene, Coordinator
Phone: (510) 620-3033
Email: carol.greene@cdph.ca.gov
FAX: (510) 620-3031

Services Provided
The team’s first priority is to assist local TB programs in locating lost patients with active or suspected TB. As resources permit, the team can also assist with locating high priority contacts or high priority B notification patients.

The TB Patient Locating Service is available to assist in the following ways:
- Prompt telephone consultation to evaluate the available patient information and likelihood of finding the patient
- Offer recommendations based on common investigative strategies in locating individuals
- Using available tools and investigative methods, perform people searches, interviews and field investigations
- Provide strategies and methods to prevent patients from becoming lost
- Locating patients who have become lost when moving between jurisdiction
- Individual and group training in how to conduct patient interviews, social networking strategies and field investigations