Mayo Clinic Center for Tuberculosis

Case Management and Contact Investigation of TB Patients

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Disclosures

• No Relevant Financial Relationships
• No Off-Label or Investigational Uses
Objectives

• Identify key components of TB case management

• Describe the roles of public health and the private provider in TB case management and contact investigation

• Determine when a TB contact investigation should be conducted

• List characteristics of high priority contacts
Case Management

• Definition: system of healthcare in which a treatment plan for a patient is developed by a multidisciplinary team to achieve established patient care outcomes.

• Team may include:
  • Nurse Case Manager
  • Physician
  • DOT Worker
  • Contact Investigator
  • Social services
  • Other caregivers
Goals of TB Case Management

- Treat TB patient according to CDC Guidelines
- Complete treatment in appropriate time frames
- Prevent progression of TB and drug resistance
- Prevent transmission of TB by means of effective Contact Investigation
- Educate patient, family and community about TB
Elements of TB Nurse Case Management

- Case Finding- 24 hours to conduct 1st in person interview. Also obtain name of lab with specimens
- Assessment- interview pt, demographics, psychosocial, past medical hx, evaluate pt knowledge of TB, medical eval, establish priorities for CI,
- Problem Identification
- Develop a Plan
Elements of TB Nurse Case Management (2)

- Implement Plan- treatment/monitoring, referrals, DOT, pt/family education
- Variance Analysis- red flags: Missed DOT doses, non-adherence to isolation orders, non-adherence to physician orders
- Evaluation-
- Documentation-
What is a TB Contact Investigation?

• Epidemiological investigation to identify persons exposed to infectious TB

• Evaluation of exposed persons for latent infection (LTBI) and active disease (TB)

• Treatment of exposed persons for LTBI or TB

• Essential component of tuberculosis control.
Contact Investigation Objectives

To identify:
• persons who have been exposed
• contacts infected with TB and treat
• the source of TB disease transmission (when possible)

To refer: (additional suspect cases)
• for evaluation, treatment, and follow-up

To prevent:
• TB infection in contacts not already infected
Scenario #1
PART 696 CONTROL OF TUBERCULOSIS CODE
SECTION 696.160 DIAGNOSIS AND MANAGEMENT OF PERSONS WITH SUSPECTED OR CONFIRMED ACTIVE TUBERCULOSIS DISEASE

2) Patients with suspected or confirmed active TB disease shall be treated in accordance with Treatment of Tuberculosis (CDC Guideline).

- A) Persons with suspected or confirmed active TB disease shall be treated with a multi-drug regimen in accordance with Treatment of Tuberculosis.
- B) Health care providers shall use strategies such as directly observed therapy (DOT) and patient-centered case management to assure successful completion of treatment.
- C) Patients shall be monitored for response to treatment in accordance with Treatment of Tuberculosis.
- D) Patients shall be monitored for adverse medication reactions in accordance with Treatment of Tuberculosis.
Legal Responsibility

• c)1) Contact Investigation. The local TB control authority is responsible for assuring that a contact investigation, including identification, prioritization and evaluation of contacts, is completed for each case of active TB disease of the respiratory tract. Contacts shall obtain an evaluation, including screening for signs and symptoms of active TB disease and a TB screening test, to identify latent TB infection. Contacts shall be retested eight to 10 weeks after the last exposure if their reaction to the first TB screening test was negative....
Contact Investigation - Reporting

PART 696 CONTROL OF TUBERCULOSIS CODE
SECTION 696.170 REPORTING

2) Reports of Follow-up Information. The Department shall be notified of the status of drug susceptibility test results, contact investigation information, case completion of therapy and other relevant information.
Definitions

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

Contact:

Someone who has been exposed to M. tuberculosis infection by sharing air space with a person with infectious TB
Definitions

Infectious Period

The timeframe during which an individual with TB disease is capable of transmitting infection

Exposure Period

Coincident period when a contact shared the same air space as a person with TB during the infectious period

REMINDER: a person exposed to \textit{M. tuberculosis} does not necessarily become infected.
Definitions

TB Outbreak

Occurrence of more TB cases than expected within a geographic area or population during a particular time period and there is evidence of recent transmission of *Mycobacterium tuberculosis* among those cases

Congregate setting

Examples: LTC facilities, homeless shelters, substance abuse treatment facilities, correctional facilities, dormitories
Definitions

Window period treatment for LTBI

The practice of starting treatment of LTBI for susceptible & vulnerable contacts, whose initial TST is negative - - until the result of the follow-up TST is available

*Active disease must be ruled out prior to starting the LTBI treatment*
Should a Contact Investigation be Conducted?
When to Conduct a TB Contact Investigation

• For all suspected/confirmed cases of pulmonary or laryngeal TB
  • respiratory tract disease with involvement of the larynx (substantially infectious);
  • Persons with pleural TB might also have concurrent unsuspected pulmonary or laryngeal TB disease. These patients should be considered contagious until infectious TB disease is excluded.
When to Conduct a TB Contact Investigation

• Extrapulmonary TB is not infectious
  • Must rule out concurrent pulmonary TB

• Young children with active TB are rarely contagious; each pediatric case should be carefully assessed for infectiousness
  • *A source case investigation is conducted for pediatric cases*
Decision to Initiate a TB Contact Investigation

- Acid-fast bacilli
- Nucleic acid assay
- Approved indication for NAA
- Chest radiograph
Contact Investigation Priorities
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
- Administration of effective 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
Contact Investigation Priorities
Contact Investigation Priorities

**High Priority**
- Acid-Fast Bacilli (AFB) sputum smear positive and culture positive
- AFB sputum smear positive and PCR positive with culture pending

**Lower Priority**
- AFB sputum smear negative and culture positive
- Extrapulmonary TB, Pulmonary TB not ruled out
- AFB sputum smear – with culture pending
- AFB sputum smear – and culture – (Clinical case)
Steps in Conducting a Contact Investigation

• Gather background information on index case
• Estimate likely infectious period
• Conduct index case interview
• Provide education, evaluation, referral
• Identify contacts
• Prioritize the contact follow-up
Infectious Period

• Focuses investigation on contacts most likely to be at risk of infection
• Sets time frame for evaluating contacts
• Based on
  • Symptom onset date
  • Bacteriologic results
  • Extent of disease
Estimating the Beginning of the Infectious Period

<table>
<thead>
<tr>
<th>Characteristic of Index Case</th>
<th>Likely period of infectiousness</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB symptoms</td>
<td>AFB sputum smear positive</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Infectious Period
Infectious Period

- Must be estimated
- Begins
  - 3 months prior to symptom onset or diagnosis (some exceptions)
- Ends
  - Effective treatment for ≥ 2 weeks
  - Clinical improvement
  - Bacteriologic response
    - 3 consecutive negative sputum smears
Exposure

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

• Exposures include
  • Household
  • Car pool or public transportation
  • Work/school/day care settings
  • Recreational settings

• Threshold for “significant” exposure determined by preliminary results of contact evaluation

• Threshold for “significant” exposure may be determined locally based on local experience
  • California uses 120 hrs exposure to a non-cavitary case as threshold for investigation
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
Confidentiality and Consent

TB control programs should address the following confidentiality and consent issues before initiation of contact investigations:

- Contact investigation policies and training
- Informed consent
- Site investigations
- Other medical conditions besides TB
TB Interview

• Involves careful/methodical approach

• Requires strong communication skills
  
  *Exchange of information*
  *Elicit necessary information*
  *Educate about the disease*

• Builds/maintains positive interactions
TB Interview Objectives

- Establish rapport
- Assess beliefs/knowledge
- Provide education
- Refine infectious period
- Discuss treatment plan
- Review transmission settings
- Identify contacts
TB Interview

• In patient’s primary language
• With cultural sensitivity
• 1\textsuperscript{st} interview within 1 working day for infectious patient
• Multiple interviews usually required
• Visit residence within 3 working days
• Visit potential transmission sites within 5 working days
Contact Investigation Plan

- Information from interviews
- Information from site visits
- List of contacts
  - Assign priorities
  - Where contacts will be evaluated
  - Out of jurisdiction referrals if needed
- Coordination with other jurisdictions if needed
- Timeline
- Documentation
### Time Frames for Initial Follow-up of Contacts Exposed to TB

<table>
<thead>
<tr>
<th>Type of Contact</th>
<th>Business days from listing of a contact to initial encounter*</th>
<th>Business days from initial encounter to completion of medical evaluation†</th>
</tr>
</thead>
<tbody>
<tr>
<td>High priority contact: index case AFB sputum smear positive or cavitary disease on chest x-ray</td>
<td>7 (3days?)</td>
<td>5</td>
</tr>
<tr>
<td>High priority contact: index case AFB sputum smear negative§</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Medium priority contact: regardless of AFB sputum smear or culture result</td>
<td>14</td>
<td>10</td>
</tr>
</tbody>
</table>

*A face-to-face meeting that allows the health care 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

Assigning Priorities to Contacts

- Directs resources to contacts at highest risk of infection or disease
  - Secondary case of TB disease
  - Recent infection – most likely to benefit from treatment
  - Most likely to develop TB disease in infected
  - Most likely to experience severe morbidity if develop disease
Assigning Priorities to Contacts

• Based on
  • Characteristics of index patient
    • Infectiousness
  • Characteristics of contact
    • Vulnerability/susceptibility
  • Frequency, duration and environment of exposure
Prioritization of Contacts
## Prioritization of Contacts (1)

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

<table>
<thead>
<tr>
<th>Contact Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household contact</td>
<td>High</td>
</tr>
<tr>
<td>Contact &lt;5 years of age</td>
<td>High</td>
</tr>
<tr>
<td>Contact with medical risk factor (HIV or other medical risk factor)</td>
<td>High</td>
</tr>
<tr>
<td>Contact with exposure during medical procedure (bronchoscopy, sputum induction, or autopsy)</td>
<td>High</td>
</tr>
<tr>
<td>Contact in a congregate setting</td>
<td>High</td>
</tr>
<tr>
<td>Contact exceeds duration/environment limits (limits per unit time established by the health department for high-priority contacts)</td>
<td>High</td>
</tr>
<tr>
<td>Contact is ≥ 5 years and ≤ 15 years of age</td>
<td>Medium</td>
</tr>
<tr>
<td>Contact exceeds duration/environment limits (limits per unit time established by the health department for medium-priority contacts)</td>
<td>Medium</td>
</tr>
</tbody>
</table>

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

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

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

<table>
<thead>
<tr>
<th>Contact Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household contact</td>
<td>Medium</td>
</tr>
<tr>
<td>Contact &lt;5 years of age</td>
<td>Medium</td>
</tr>
<tr>
<td>Contact with medical risk factor (e.g., HIV infection or other immunocompromising condition)</td>
<td>Medium</td>
</tr>
<tr>
<td>Contact with exposure during medical procedure (bronchoscopy, sputum induction, or autopsy)</td>
<td>Medium</td>
</tr>
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</table>

Any contact not classified as high or medium priority is assigned a low priority.
Determining When to Expand a Contact Investigation

Consideration of the following factors recommended

- Achievement of program objectives with high- and medium-priority contacts
- Extent of recent transmission
  - Unexpectedly high rate of infection or TB disease in high-priority contacts
  - Evidence of second-generation transmission
  - TB disease in any contacts who had been assigned low priority
  - Infection in any contacts aged <5 years
  - Contacts with change in TST or IGRA from negative to positive
Strategy for Expanding a Contact Investigation

• Should be based on the investigation data
• Results should be reviewed weekly
• In absence of recent transmission, investigation should not be expanded to lower-priority groups
Possible Situations for News Coverage

• Investigations with potential for media attention
  • Involving numerous contacts (especially children)
  • Occurring in public settings
  • Occurring in workplaces
  • Associated with TB fatalities
  • Associated with drug-resistant TB
Reasons for Participating in News Media Coverage (1)

• Educates the public regarding the nature of TB
• Reminds public of continued presence of TB
• Provides a complementary method to alert exposed contacts of the need for seeking medical evaluation
• Relieves unfounded public fears regarding TB
Reasons for Participating in News Media Coverage (2)

- Illustrates the TB program’s leadership in communicable disease control
- Illustrates collaboration between TB program and community providers
- Ensures that constructive public inquiries are directed to appropriate program/provider
- Validates the need for public resources to be directed to disease control
Potential Drawbacks to News Coverage

• Increased public anxiety
• Cause unexposed person to seek unnecessary medical care
• Contribute to unfavorable views of the TB program/health department
• Contribute to spread of misinformation
• Trigger unconstructive public inquiries
• Unintended disclosure of confidential information
Strategy for News Coverage

• Anticipatory preparation of clear media messages is recommended
• Develop communication objectives
• Issue news release in advance of any other media coverage
• Collaborate with partners outside of the TB program/health department
Information for media

• Appropriate information about case while maintaining confidentiality
  • Potential exposure including location and/or community needing to be screened for TB infection
• Basic facts about TB
  • Local epi, transmission, infection vs disease, treatment
  • Information tailored to community impacted by the investigation
• TB is not a public health emergency
• Role of TB program/health department in the investigation
• Collaboration with community partners
• Current actions taken to
  • Halt transmission
  • Identify and evaluate contacts
  • Ensure adequate resources for evaluation and treatment
• Contact information for TB program/health department
• Additional resources
Special Circumstances

• TB Outbreaks
• Congregate settings
• Interjurisdictional investigations
• Source case investigations
• Social network analysis
Develop Outbreak Strategy Based on Risk Factors

• Contagious TB undiagnosed or untreated for extended period, or an extremely contagious case
• Source patient visiting multiple sites
• Patient and contacts in close or prolonged company
• Environment promoting transmission
• Contacts very susceptible to disease after *M. tuberculosis* infection
• Gaps in contact investigations and follow-up
• Extra-virulent strain of *M.tuberculosis*
Congregate Settings – Designating Priorities

• Site specific

• Customized algorithm required for each situation
  • Source-case characteristics
  • Duration and proximity of exposure
  • Environmental factors that modify transmission
  • Susceptibility of contacts
Congregate Settings - Setting-Based Investigation

• Interview and test contacts on site is optimum approach

• Alternative is evaluation at the health department with additional personnel and extended hours

• As last resort, notify contacts in writing to seek diagnostic evaluation with their own health care provider
Congregate Settings - Challenges

- Substantial number of contacts
- Incomplete information regarding contact names and locations
- Incomplete data for determining priorities
- Difficulty in maintaining confidentiality
- Collaboration with officials and administrators who are unfamiliar with TB
- Legal implications
- Media coverage
Interjurisdictional Contact Investigations

- Requires joint strategies for finding contacts, having them evaluated, treating infected contacts, and gathering data

- Health department that counts index patient is responsible for leading the investigation and notifying health departments in other jurisdictions
Child with TB Disease

- Source-case investigations considered for children <5 years of age
- May be started before diagnosis of TB confirmed
Procedures for Source-Case Investigation

• Same procedure as standard contact investigation

• Patient or guardians best informants (associates)

• Focus on associates who have symptoms of TB disease

• Should begin with closest associates
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
Combined: A Social Network with Place

- Bill
- Juan
- Ted
- Rose
- Rita
- Ali
- Moe
- Mel’s Bar
Concentric Circle Exercise
Program Evaluation

• An evaluation is the final step in completing the CI

• Evaluation of program performance is important to ensure that program resources are being used effectively on the highest priority activities.
National TB Program Objectives and Performance Targets for 2015
Contact Investigation

• Contact Elicitation
  • Increase the proportion of TB patients with positive acid-fast bacillus (AFB) sputum-smear results who have contact elicited to 100%

• Evaluation
  • Increase the proportion of contacts to sputum AFB smear-positive TB patients who are evaluated for infection and disease to 93.0%
National TB Program Objectives and Performance Targets for 2015 Contact Investigation

• **Treatment Initiation**
  • Increase the proportion of contacts to sputum AFB smear-positive TB patients with newly diagnosed latent TB infection (LTBI) who start treatment to 88.0%

• **Treatment Completion**
  • For contacts to sputum AFB smear-positive TB patients who have started treatment for newly diagnosed LTBI, increase the proportion who complete treatment to 79.0%
Why Include Evaluation of Contact Investigation

• Evaluation of CI activities is a crucial prevention strategy
  • *Every case was once a contact*

• National data
  
  • 10-20 high/medium contacts identified per infectious case
  • 20-30% of those identified have LTBI
  • 5% with LTBI will progress to TB disease in 1-2 years after converting their skin test
  • 5% with LTBI will progress to TB disease later in life
Evaluation Questions to Ask

• Was continuity of care achieved
• Was care provided in accordance with professional standards
• Was disease progression and drug resistance prevented
• Was transmission stopped/prevented
• Were the patient and contacts provided adequate and appropriate education
• Did you advocate for the patient to meet needs
• Did you identify areas for improvement
Questions to Ask

• Were an appropriate number of contacts identified?
• Were the appropriate contacts evaluated?
• Was the contact investigation performed in all settings; household or residence, work or school, and leisure or recreational environments?
• Was the contact investigation expanded properly?
• Did all identified infected contacts complete an adequate treatment regimen for LTBI?
Other Considerations

• Were field visits completed?
• Were contacts given repeat TST or IGRA when indicated?
• Were high-risk contacts given window period treatment?
• Are the right staff performing contact investigations?
TB Prevention and Control efforts should be targeted to:

- Groups at highest risk for TB infection
  - Contacts of infectious cases of TB are one such high-risk group
- Groups at highest risk for progression from TB infection to TB disease.

Effective and successful contact investigations can help prevent additional cases of TB infection and disease and reduce further transmission of *M. tuberculosis*.
References

• IL Administrative Code Title 77; Chapter I; Subchapter k; Part 696 - Control of Tuberculosis Code
  http://www.ilga.gov/commission/jcar/admincode/077/07700696sections.html

• MMWR 2005;54(No. RR-15): Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis
Effective TB Case Management and Contact Investigation requires a coordinated effort
Questions to measure objectives/check for understanding

• Elements of TB case management include assessment, planning, evaluation and problem solving  True/False
• The private provider has no role in TB contact investigation True/False
• High priority contacts to a sputum smear positive case include: (select all that apply)
  • Health care worker exposed during medical procedure such as bronchoscopy
  • Co-workers on a construction crew
  • Children under 5 years of age
  • Contact on immunosuppressive therapy
  • Persons exposed at a holiday party
  • Household members