Introduction to Contact Investigation Process

1

Learning Objectives

After this session, participants will be able to

1. Explain the purpose of a TB contact investigation
2. Describe core concepts and skills that are required to conduct a TB contact investigation
3. Determine when to initiate a TB contact investigation
4. Describe the systematic approach to conducting a TB contact investigation

2

Priority TB Control Activities

1. Identify and treat persons who have active TB disease
2. Find and evaluate persons who have been in contact with TB cases and provide appropriate latent TB infection (LTBI) or TB disease treatment as needed
3. Use targeted testing strategies to identify and treat persons with LTBI at risk for developing TB disease
4. Identify settings at high risk for transmission of *M. tuberculosis* and apply effective infection-control measures

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Contact Investigations: A Priority TB Control Activity

- Conducting contact investigations (CIs) is one of the highest priorities for TB programs in the United States
  - Second in importance only to detection and treatment of TB disease

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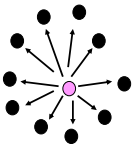
What is a Contact Investigation?

A systematic process to:

- Identify persons (contacts) exposed to cases of infectious TB disease
- Assess contacts for infection with *M. tuberculosis* and TB disease
- Provide appropriate treatment for contacts with LTBI or TB disease



Case

Contact

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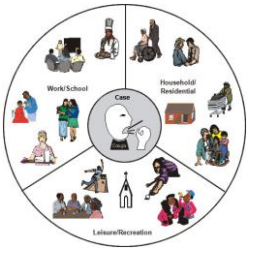
Who are TB Contacts?

Contacts are persons who have shared airspace with a person with infectious TB disease. This might include

- Household members
- Friends
- Co-workers
- Others (e.g., cellmates, shelter residents)



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Why is it Important to Conduct TB Contact Investigations? (1)

CIs help to:

- Interrupt spread of TB
- Prevent outbreaks of TB
- Ensure appropriate treatment for LTBI or TB disease

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Why is it Important to Conduct TB Contact Investigations? (2)

- On average, 10 contacts are identified for each case
  - 20% to 30% of household contacts have LTBI
  - 1% of contacts have TB disease

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Who is Responsible for TB Contact Investigations?

- State and local health departments have legal responsibility to
  - Investigate TB cases reported in their jurisdiction
  - Evaluate effectiveness of TB investigations
- Although the health department maintains legal responsibility, some CI steps may be delegated
  - For example, with worksite exposures, occupational health offices are often involved

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Group Discussion

- Share a few examples from your CI experience when you successfully identified active TB cases.
- What are some barriers to conducting CIs in your area?

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Core Concepts and Skills Required for Conducting TB Contact Investigations

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What Core Concepts and Skills are Required to Conduct TB Contact Investigations?

- Knowledge of TB transmission
- Knowledge of TB pathogenesis
  - Difference between LTBI and TB disease
  - Risk factors for progressing to TB disease
- Effective interviewing skills
- Data management and analysis skills

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Contact Investigation Core Concepts

TB Transmission

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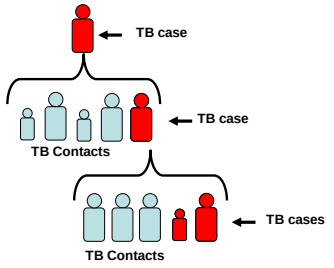
Remember: TB is Transmitted Person to Person!

Every TB case Began as a TB contact



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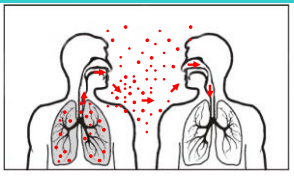
TB Transmission



The dots in the air represent droplet nuclei

- When a person with infectious TB disease coughs, sneezes, speaks, or sings, tiny particles containing *M. tuberculosis* (droplet nuclei) may be expelled into the air.
- If another person inhales droplet nuclei, transmission may occur; however, not everyone who is exposed to TB becomes infected with TB.

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What Factors Influence TB Transmission?

The probability that TB will be transmitted depends on the following factors:

1. **Infectiousness of person with TB disease**
2. **Duration and frequency of exposure**
3. **Environment in which exposure occurred**

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1. Infectiousness of Person with TB Disease

Characteristics associated with infectiousness:

- **TB of the lungs, airway, or larynx**
- **Presence of cough**
- **Positive sputum smear**
- **Cavity on chest x-ray**
- **Positive cultures**
- **Not covering mouth when coughing**
- **Not receiving adequate treatment**
- **Undergoing cough inducing procedures**

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2. Duration and Frequency of Exposure

Contacts at higher risk for TB infection are those who:

- **Frequently spend a lot of time* with the case**
- **Have been physically close to the case**

*** "A lot of time" is difficult to define, but may be determined locally based on experience**

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3. Environment in Which Exposure Occurred

Environmental characteristics that increase chances of TB transmission:

- Small or crowded rooms
- Areas that are poorly ventilated
- Rooms without air-filtering systems

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STOP the Chain of Transmission

The BEST way to stop transmission is to

- Identify and isolate infectious persons
- Start infectious persons on effective treatment for TB disease

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Contact Investigation Core Concepts

TB Pathogenesis

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What Happens Once Someone is Exposed To TB?

- Not every person who is exposed to TB becomes infected
- Persons who become infected will generally have a positive
  - Tuberculin skin test (TST)

  Or
  - Blood test (interferon gamma release assay [IGRA])
- Persons who become infected can have either:
  - LTBI
  - Active TB disease

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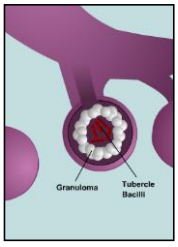
Latent TB Infection (LTBI)



- LTBI - immune system keeps tubercle bacilli under control
- LTBI characteristics
  - Usually positive TST or IGRA
  - Not infectious
  - No symptoms
  - Normal chest x-ray
  - Sputum smears and cultures are negative
- Not a "case" of TB

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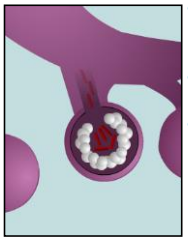
Active TB Disease



- TB disease - immune system cannot stop tubercle bacilli from multiplying leading to active TB disease
- Usually affects lungs, but can affect other areas of the body
- Characteristics *usually* include:
  - Positive TST or IGRA
  - Infectious (before treatment)
  - Symptoms
  - Abnormal chest x-ray
  - Positive sputum smear and culture
- Considered a "case" of TB

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What are Symptoms of TB Disease?

- Cough lasting 3 or more weeks
- Coughing up sputum or blood
- Fever
- Chills
- Night sweats
- Weight loss
- Appetite loss
- Fatigue
- Malaise
- Chest pain

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LTBI vs. TB Disease

LTBI	TB Disease (in the lungs)
Inactive **tubercle bacilli in the body**	Active **tubercle bacilli in the body**
TST or IGRA usually positive	**TST or IGRA usually positive**
Chest x-ray usually normal	**Chest x-ray usually** abnormal
Sputum smears and cultures negative	**Sputum smears and cultures** usually positive
No symptoms	Symptoms **such as cough, fever, weight loss**
Not infectious	Often infectious **before treatment**
Not a case **of TB**	A case **of TB**

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Conditions that Increase Risk of Progressing to TB Disease

- Children younger than 5 years of age
- Weakened immune systems
  - Infection with HIV
  - Diabetes mellitus
  - Organ transplant
  - Silicosis
  - Severe kidney disease
  - Certain types of cancer
  - Certain intestinal conditions
  - Prolonged therapy with corticosteroids and other immunosuppressive therapy, such as prednisone and tumor necrosis factor-alpha [TNF-α] antagonists
- Chest x-ray findings suggestive of previous TB
- Low body weight
- Cigarette smokers and persons who abuse drugs and/or alcohol
- Recent TB infection (within past 2 years)

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LTBI Progressing to TB Disease

- Risk of developing TB disease is highest in the first 2 years after infection (or, if foreign-born, first 2 years after immigration)
- People with LTBI can be treated to prevent development of TB disease
- Detecting LTBI early and providing treatment helps prevent new cases of TB disease

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Contact Investigation Core Concepts

Effective Interviewing Skills

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Effective Interviewing

- Effective interviewing skills are essential for eliciting information from cases and their contacts
- Interview skills can be taught
- Interview skills improve with practice

The focus of this course is on building these skills

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Contact Investigation Core Concepts

Data Management and Analysis Skills

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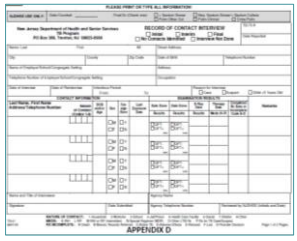
Use of Data in TB Contact Investigations (1)

Collecting and analyzing data in a systematic way helps determine the effectiveness of CI efforts



Appendix D: Sample CI Form

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Use of Data in TB Contact Investigations (2)

Data can be used for

- **Case and contact follow-up and management**
- **Analysis of findings to help assess CI strategy**
  - **Contacts identified**
  - **Contacts evaluated who have TB disease**
  - **Contacts evaluated who have LTBI**
    - **Number who started and completed LTBI treatment**

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Decision to Initiate a Contact Investigation

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When is a TB Contact Investigation Necessary? (1)

Confirmed TB Cases

A full CI is required for all confirmed cases that have <u>infectious forms of TB disease</u>

- **Generally, TB of lungs, airway, or larynx**

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When is a TB Contact Investigation Necessary? (2)

Suspect TB Cases

- **A CI should be started for persons suspected of having infectious TB disease if they have**
  - **Positive sputum smears***
  - **Cavities on chest x-ray**
- **Assessment of priority contacts can begin before case is confirmed**
  - **If case is eventually confirmed, continue with full CI**
  - **If person is found to NOT have infectious TB disease, stop the CI process**

* Provided nucleic acid amplification (NAA) test, if conducted, is also positive

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When is a TB Contact Investigation Necessary? (3)

Suspect TB Cases

- For all other suspect cases, collect preliminary information about contacts (name, locations, and TB risk factors)
- Assess contacts at high-risk for progressing to TB disease without waiting for case confirmation
  - If case is eventually confirmed, continue with full CI
  - If person is found to NOT have infectious TB disease, stop the CI process

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When is a TB Contact Investigation NOT Necessary?

TB CI is generally NOT necessary if a case

- Has positive sputum smears and a negative nucleic acid amplification (NAA) test
- Has a noninfectious form of TB disease (extrapulmonary disease) with no pulmonary involvement
- Is a child under 10 years of age
  - However, if case less than 5 years of age, a source case investigation may be necessary

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Prioritizing Among Contact Investigations

- If faced with multiple TB cases, health departments may have to decide which cases should be a higher priority for conducting CIs
- Decision will be influenced by:
  - Likelihood of transmission (e.g., sputum smear positive*, cavity on chest x-ray, cough, and exposure environment)
  - Risk of contacts rapidly progressing to TB disease (e.g., contacts in daycare, HIV care-settings, and dialysis centers)
  - Resources available

* Transmission is still possible for cases with negative sputum smears

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Why is it Important to Promptly Start a Contact Investigation?

- Some contacts may develop TB disease soon after exposure and infection, especially
  - Infants and children younger than 5 years of age
  - HIV-infected or other persons with weakened immune systems
- All contacts need to be found and evaluated promptly
  - As time increases, some contacts might be more difficult to locate (e.g., homeless or transient persons)
- There could be ongoing transmission of *M.tuberculosis*

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Exercise: Decision to Initiate a Contact Investigation

Refer to Appendix E

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Systematic Approach to TB Contact Investigations

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How Do You Conduct a Contact Investigation?

- TB programs should use a systematic approach to conduct CIs
- Using a systematic approach helps to ensure the CI is carried out effectively and efficiently

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Systematic Approach to Contact Investigations (1)

The systematic approach includes 10 steps:

1. Review existing information about the case
2. Determine an initial estimate for the infectious period and estimate the degree of infectiousness
3. Interview the case
4. Review information and develop a plan for the investigation
5. Refine the infectious period and degree of infectiousness

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Systematic Approach to Contact Investigations (2)

6. Prioritize contacts
7. Conduct field visits
8. Conduct contact assessments
9. Determine whether to expand or conclude an investigation
10. Evaluate the CI activities

These steps may not always be done in sequential order

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Systematic Approach to TB Contact Investigations

1. Review Existing Information about the Case

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Review Existing Information

- The process of reviewing existing information is sometimes called the pre-interview phase
- Reviewing information before the initial interview can ensure the right questions are being asked

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Information to Collect and Review Before the Initial Interview (1)

Become familiar with the case's social history

- Case name(s), aliases, date of birth, gender, all known addresses, telephone number(s), preferred language
- Substance abuse, mental illness, or other issues that could affect the interview or contact investigation
- Social, or behavioral risk factors increasing the risk of TB
- Known contact names, particularly children or persons with weakened immune systems
- History of jail or homelessness
- History of immigration or travel

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Information to Collect and Review Before the Initial Interview (2)

Become familiar with case's medical history

- Current site(s) of TB disease
- Current TB treatment regimen
- TB symptoms and estimated onset date
- Chest x-rays and/or other diagnostic imaging dates and results
- TST or IGRA dates and results
- Sputum smear and culture dates and results
- NAA test dates and results
- Genotype results (if available)

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Information to Collect and Review Before the Initial Interview (3)

Become familiar with case's medical history (cont.)

- HIV test dates and results
- Details about prior diagnosis with LTBI or TB disease, and any treatment
- Medical risk factors that could have increased the case's risk for infection with *M. tuberculosis* or development of TB disease

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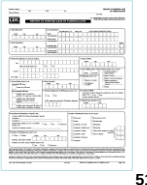
Sources of Information for TB Case

- Medical records
- Public health records
  - Cross-check case name with local TB registries and databases to determine if previous diagnosis of LTBI or TB
  - Cross-check with STD and HIV registries, if possible
- Case's clinician
- Report of Verified Case of Tuberculosis (RVCT)
- TB Genotyping Information Management System (TB GIMS)



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Systematic Approach to TB Contact Investigations

2. Determine an Initial Estimate for the Infectious Period and Estimate the Degree of Infectiousness

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Estimating the Degree of Infectiousness

Factors Associated with Infectiousness	Factors Associated with Noninfectiousness
Presence of a cough	No cough
Cavity in the lung	No cavity in the lung
Acid-fast bacilli on sputum smear	No acid-fast bacilli on sputum smear
TB of the lungs, airway, or larynx	Most extrapulmonary (non-respiratory) TB
Patient not covering mouth or nose when coughing	Patient covering mouth or nose when coughing
Not receiving adequate treatment	Receiving adequate treatment for 2 weeks or longer
Undergoing cough-inducing procedures	Not undergoing cough-inducing procedures
Positive sputum cultures	Negative sputum cultures

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What is the Infectious Period?

The time period during which a TB case is able to transmit *M. tuberculosis*

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Why is it Important to Estimate the Infectious Period?

- Focuses investigation on contacts most at risk for exposure
  - Especially important if the investigation involves congregate settings
- Sets the time frame for contact assessment
  - Contacts with an initial negative test will need a 2nd TST or IGRA at least 8 weeks after date of last exposure

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Estimating the Start of the Infectious Period

Characteristic of Case			Likely Period of Infectiousness
TB symptoms	AFB sputum smear positive	Cavitary chest x-ray	
Yes	No	No	3 months before symptom onset or first finding consistent with TB disease, whichever is longer
Yes	Yes	Yes	3 months before symptom onset or first finding consistent with TB disease, whichever is longer
No	No	No	1 month (4 weeks) before date of suspected diagnosis
No	Yes	Yes	3 months before finding consistent with TB disease

Ending the Infectious Period

Biologically, a case's infectious period ends with:

1) **Effective treatment for 2 weeks or more,**
2) **Diminished symptoms, and**
3) **Mycobacteriologic response***

*A case returning to a congregate setting should have 3 or more consecutive negative sputum smears

However, for CI purposes effective isolation can also end the infectious period since the case is not likely to be in contact with additional persons

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Exercise: Determining the Infectious Period

Refer to Appendix F

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Systematic Approach to TB Contact Investigations

3. Interview the Case

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What is the Main Goal of a TB Interview?

The main goal of a TB interview is to identify contacts.

Why?

So you can assess them for TB disease and infection and start them on appropriate treatment.

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How Do You Identify Contacts?

Ask the case about the following during their infectious period:

- Places WHERE they spent time
- Persons with WHOM they spent time
- Participation in activities and events (*WHAT* and *WHEN*)

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What are the Other Objectives of the TB Interview?*

- Establish rapport
- Educate about TB and CI process
- Discuss confidentiality
- Gather and confirm information

** These objectives will be discussed in more detail later in the course*

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How Many Interviews Should be Conducted?

- Two interviews is the <u>minimum</u> (initial interview and re-interview)
  - May need more interviews to develop rapport
  - Often need to build on previously collected information
- Additionally, every DOT encounter is an opportunity to learn about more contacts
  - Especially helpful for finding children (e.g., toys around? photos on display?)

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When Should Interviews be Conducted?

- <u>Initial interview</u> should be conducted
  - Within 1 business day of reporting for infectious cases
  - Within 3 business days for others
- <u>Second interview (re-interview)</u> conducted 1 to 2 weeks later

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Initial Interview with the TB Case

Initial case interview should be conducted:

- In-person
- At a hospital, TB clinic, case's home, or any convenient location that allows for privacy
- In case's primary language
- With cultural sensitivity
- Using appropriate infection control measures (e.g., respirators, masks, and ventilation)

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Systematic Approach to TB Contact Investigations

4. Review Information and Develop a Plan for the Investigation

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Review Information and Develop a Plan for the Investigation

- After conducting an interview with the case, the investigator should meet with his/her supervisor or the contact investigation team to
  - Review all of the information obtained thus far
  - Develop a plan on how to proceed

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Contact Investigation Team

CI team may include

- Case managers
- Public health investigators
- Surveillance coordinators
- Program managers
- DOT workers
- Disease intervention specialists (DIS)

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Developing an Investigation Plan (1)

To develop a plan for the investigation, the team should do the following activities:

- Refine the infectious period and degree of infectiousness for the case as necessary
- Prioritize identified contacts for assessment
- Prioritize identified places to conduct field visits

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Developing an Investigation Plan (2)

Additional activities that are a part of developing a plan:

- Establish a communication plan
- Clarify any jurisdictional issues
- Establish timeframes and methods for investigation activities, data collection, and management
- Identify stakeholders
- Determine potential media interest
- Establish a schedule for meetings to review challenges and progress

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Systematic Approach to TB Contact Investigations

5. Refine the Infectious Period and Degree of Infectiousness

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Refining the Infectious Period and Degree of Infectiousness

- It is often necessary to refine the infectious period
- Initial interview should
  - Provide more information to help refine estimate of infectious period
  - Help to further estimate degree of infectiousness
- Refined infectious period information can be used during the re-interview to elicit more contacts if needed

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Exercise: Refining the Infectious Period

Refer to Appendix G

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Systematic Approach to TB Contact Investigations

6. Prioritize Contacts

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Assigning Priority to Contacts

- **Once a list of contacts is obtained, the contacts should be prioritized to determine who should be immediately located and assessed for TB disease or infection.**
- **The priority assigned to individual contacts should be based on the following:**
  - **Likelihood of transmission from the case**
  - **Contact's risk for development of TB disease**

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Which Contacts Should be Given Priority for TB Assessment?

Priority should be given to contacts who

- **Have symptoms of TB disease**
- **Are at risk for rapid development of TB disease**
- **Had repeated or extended exposure to the case**
- **Were exposed to a case in an environment where transmission was likely, such as a small, crowded, or poorly ventilated room or vehicle**
- **Were exposed to a case undergoing medical procedures that can release substantial numbers of *M. tuberculosis* into the air (e.g., bronchoscopy)**

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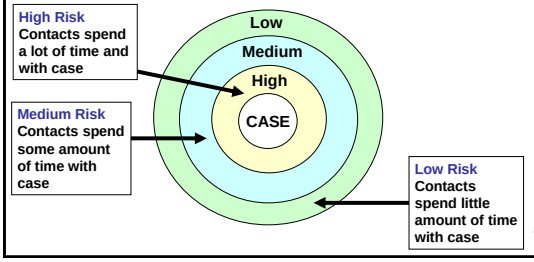
Concentric Circle Tool

The concentric circle should <u>only</u> be used as a secondary tool to help further prioritize contacts based on exposure (duration, frequency, and distance)



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Later (Re)Prioritization of Contacts

- **Re-examine priority level assigned to contacts throughout the investigation**
  - **If evidence of significant transmission has occurred in priority contacts, CI may need to be expanded to additional contacts**
- **However, investigation should not expand to additional contacts if doing so would compromise TB program's ability to assess and treat the known priority contacts**

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Exercise: Prioritization of Contacts

Refer to Appendix H

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Systematic Approach to TB Contact Investigations

7. Conduct Field Visits

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What is a Field Visit?

Field Visit

- Visiting a case's residence, congregate settings, and other places the case spent time while infectious
- Complementary to interviewing
- Information obtained can inform CI activities
- Should be made within 3 days after initial interview



Purpose of a Field Visit

Four main functions

1. Identify additional cases of TB disease
2. Identify additional contacts
3. Provide additional information about environmental characteristics of places where exposure occured
4. Lay a foundation for additional CI activities at those locations, if needed

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What to do During a Field Visit?

- Refer persons with TB symptoms for medical assessment
- Observe environmental characteristics
- Look for evidence of other contacts
- Obtain list of clients, employees, volunteers, and others who frequented location during infectious period
- Explore possibility of offering TB testing onsite at that location

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Field Visit Safety

- Have identification badge
- Work in pairs when visiting potentially dangerous areas
- Have working cell phone
- Inform coworkers of itinerary and expected return time
- Practice appropriate infection control precautions as needed

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Group Discussion

- What safety and health concerns do you have when going out into the field?
- How do you address these concerns?

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Systematic Approach to TB Contact Investigations

8. Conduct Contact Assessments

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What Happens After Contacts Have Been Identified and Prioritized?

After contacts have been identified and prioritized:

- Contacts should be located
- Contact assessments should be conducted

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Why Conduct a Contact Assessment?

Allows for

- Determination of contacts' potential TB symptoms
- Gathering of social and medical information*
- Referral or in-person testing for TB infection with a TST or IGRA
- Provision of treatment as indicated

** Key information to collect during contact assessment will be discussed later in the course*

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When and How Should a Contact Assessment be Conducted?

- The initial contact assessment should be within 3 working days of the contact having been identified
- Should be conducted in-person
- Investigator should use effective communication skills

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Initial Contact Assessment: Contacts with TB Symptoms

During the initial assessment, all contacts with symptoms of TB disease should be immediately examined by a medical professional.

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Initial Contact Assessment: Testing for TB Infection - TST or IGRA

- Contacts should receive a TST or IGRA unless a previous, documented positive result exists
- A TST induration of 5 mm or larger is positive
- A contact with a
  - Positive TST or IGRA should be medically examined for TB disease
  - Negative TST or IGRA should be re-tested 8 to 10 weeks after date of last exposure to the case

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Window Period

- The window period is the time span between the contact's last exposure to the case and when a TST or IGRA can reliably detect infection
- It takes 2 to 10 weeks after TB infection for the body to mount an immune response that is detectable by a TST*
- Therefore, it is recommended to repeat a TST or IGRA for contacts 8 to 10 weeks after date of last exposure to a TB case

* Data on the timing of IGRA conversion after a new infection are not currently available; however, it is recommended to follow TST guidelines.

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Calculating the Window Period (1)

- What was the date of the contact's last exposure to the case?
  - Identify the infectious period of the case
  - Identify when each contact had last exposure
- Calculate 8 to 10 weeks from last exposure
  - Administer a TST or IGRA for each contact who tested negative

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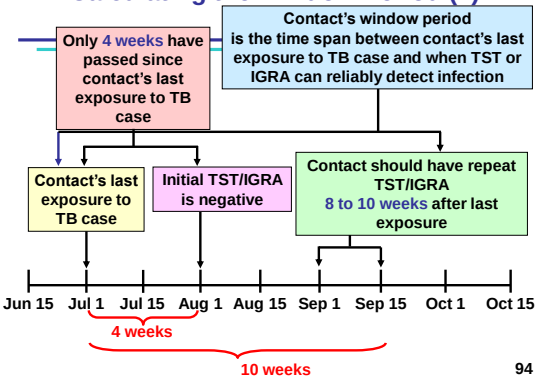
Calculating the Window Period (2)



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What if a Contact has LTBI or TB Disease?

- The decision to test a contact is a commitment to offer treatment
- If TB disease is ruled out, contacts with a positive TST or IGRA should be offered LTBI treatment
  - Regardless of whether they received BCG vaccine in the past
  - Unless there is a compelling reason not to treat
- Contacts with TB disease need to be treated under DOT

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Assessment and Management of Children

- After ruling out TB disease, contacts younger than 5 years of age should start treatment for LTBI even if they have a negative initial TST or IGRA result
- LBTI treatment can be stopped if a second TST or IGRA done 8 to 10 weeks after exposure is negative
  - However, if contact is under 6 months of age, LTBI treatment should be continued until contact reaches 6 months of age and a second TST/IGRA is negative

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Assessment and Management of Contacts with Weakened Immune Systems

- A full medical evaluation, including a chest x-ray, should be given to contacts
  - With HIV/AIDS
  - On immunosuppressive therapy for organ transplant
  - Taking anti-tumor necrosis factor alpha (TNF-α) agents
- If both initial and follow-up TST/IGRA are negative, a full course of prophylactic LTBI treatment is recommended (after TB disease is excluded)
- Expert consultation should be sought for contacts with other immunocompromising conditions

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Systematic Approach to TB Contact Investigations

9. Determine Whether to Expand or Conclude an Investigation

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When Can you Close a Contact Investigation?

A CI can be closed if

- Identified contacts have been assessed for TB in accordance with local policy
  - At some point, the TB program must decide when all reasonable investigative efforts have been exhausted
- Contacts with LTBI have completed or are close to completing treatment
- No additional active TB cases among contacts

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When Should a Contact Investigation be Expanded?

Sometimes a CI has to be expanded if there is evidence of recent transmission

- Unexpectedly high TB disease or LTBI rates among priority contacts
- Large number of contacts with change in infection status from negative to positive
- TB disease in any contacts who had been assigned low priority or TB disease in those previously not identified as contacts
- Infection in any contacts younger than 5 years of age

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Expanding a Contact Investigation

- Decision to expand CI should be based on the investigation data
  - Results should be reviewed weekly
- Decision should be made by supervisory staff
- In the absence of recent transmission, the investigation should not be expanded to lower-priority groups

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Other Important Considerations During a Contact Investigation

- If a second TB case is found during the CI, this second case needs their own CI.
- If a case is considered highly infectious and you find few contacts and/or find little evidence of transmission, you may need to go back and review your records and determine if a re-interview is needed.

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Systematic Approach to TB Contact Investigations

10. Evaluate the Contact Investigation Activities

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Evaluating Contact Investigation Activities (1)

The purpose of evaluating the activities of the CI is to determine:

- **If an appropriate number of contacts were identified**
- **How many contacts were identified with LTBI**
- **How many contacts with LTBI completed treatment**
- **How many additional cases of TB disease were identified**

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Evaluating Contact Investigation Activities (2)

- **How many contacts were not located**
- **How many contacts were located but did not complete assessment**
- **Timeliness of identifying and assessing contacts, and starting them on treatment**
- **If the CI was performed in all necessary settings**
- **If the CI was expanded appropriately**
- **If secondary cases completed treatment for TB disease**

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Review

What are the 10 steps of the systematic approach to conducting a CI?

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