VIII. Contact Investigation

A. For complete guidelines on structuring a contact investigation see the Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis. MMWR 2005:54(No.RR-14).
https://www.cdc.gov/tb/publications/guidelines/contactinvestigations.htm

B. The goals of a contact investigation are as follows:
1. Rapid identification of individuals who are high priority contacts to a known or suspected case of pulmonary, laryngeal or pleural TB;
2. Timely initiation of appropriate treatment for those determined to be recently infected or exposed with a significant risk for progression to disease; and
3. Identification and treatment of additional individuals found to have suspected TB disease in order to prevent further spread of disease.

C. Prioritization of contacts is based on the characteristics of the case, the individual risk factors of the contacts, and the environment in which the exposure occurred.

D. Case Characteristics:
1. High-priority cases/suspects have pulmonary, laryngeal, or pleural TB with a positive smear and/or cavitary disease.
2. Medium priority cases/suspects have smear negative pulmonary, laryngeal, or pleural TB with AFB negative sputum smear and/or a non-cavitary chest X-ray that is consistent with TB.
3. Low priority cases/suspects include all extrapulmonary cases for whom pulmonary disease has been ruled out. In general a contact investigation is not necessary for these cases as they are not contagious, but a source case evaluation (to look for a possible infectious case that transmitted TB to the individual with extrapulmonary TB) may be indicated in some circumstances.

E. Contact risk factors:
1. High-priority contacts include
   - HIV+.
   - Household contacts.
   - Contacts living in congregate settings.
   - Contacts < 5 years old.
   - Contacts exposed during certain medical procedures, e.g., bronchoscopy.
   - Contacts with medical risk factors that increase the likelihood of progression to disease, e.g. silicosis, diabetes mellitus, a history of gastrectomy or jejunoileal bypass surgery.
2. Medium-priority contacts include
   - Contacts 5 through 14 years of age.
3. Low-priority contacts are those who do not meet high- or medium-priority criteria.

F. Environment in which the exposure occurred

- High Priority Contacts
  - ≥ eight hours in a small poorly ventilated space.
  - ≥ 16 hours in a small well ventilated space.
  - ≥ 24 hours in a classroom size space.
  - ≥ 100 hours in a large open area.
- Medium Priority Contacts
  - four to 7 hours in a small poorly ventilated space.
  - eight to 15 hours in a small well ventilated space.
  - 12 to 23 hours in a classroom size space.
  - 50 to 99 hours in a classroom size space.

G. Structuring a Contact Investigation

1. Initiate investigation within one business day. This should be a face-to-face interview whenever possible.
2. If a contact is determined to be high or medium priority, complete an evaluation. This includes completing a symptom screen, reviewing risk factors for progression to disease, placing a TST or obtaining an IGRA, and getting a chest X-ray if the TST/IGRA is positive or the contact has symptoms concerning for tuberculosis. If the first TST or IGRA is negative, and a second TST or IGRA is indicated, obtain a second one 8 weeks after the exposure ends.
3. Evaluate high-priority contacts to laryngeal, pulmonary, and pleural tuberculosis within seven days of notification.
4. Evaluate medium-priority contacts to laryngeal, pulmonary, and pleural tuberculosis within 14 days of notification.
5. Low priority contacts should not be tested unless objectives for high and medium priority contacts are being met. If a decision has been made to do testing on a low priority contacts, the initial skin test may be delayed until eight weeks after the most recent exposure.
6. Complete initial investigation of contacts within 30 days and enter this information into NCEDSS using the contact summary wizard. Every data element of the contact summary must be completed.
7. Infants and children < 5 years old and HIV-positive individuals have the highest priority for immediate evaluation and initiation of treatment for LTBI when indicated.
8. Provide HIV counseling, testing and referral on all contacts.
9. Establish relative risk of tuberculosis transmission: See Figure 1
   a. Infectiousness of the case
      - Acid fast bacilli (AFB) on sputum smear
      - Presence of cavitation on the chest X-ray
      - TB laryngitis
      - Productive Cough
      - No therapy or just started therapy
   b. Characteristics of the environment
      - Volume of air space common to the case and contacts.
      - Adequacy of ventilation, e.g. any fresh air.

- Degree of recirculation of shared air.

c. Determining the infectious period

Below see Table 2 from the NTCA and CDC Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis, December 2005.

TABLE 2. Guidelines for estimating the beginning of the period of infectiousness of persons with tuberculosis (TB), by index case characteristic

Characteristic			
TB symptoms	AFB* sputum smear positive	Cavitary chest radiograph	Recommended minimum beginning of likely period of infectiousness
Yes	No	No	3 months before symptom onset or first positive finding (e.g., abnormal chest radiograph) consistent with TB disease, whichever is longer
Yes	Yes	Yes	3 months before symptom onset or first 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 first positive finding consistent with TB

SOURCE: California Department of Health Services Tuberculosis Control Branch; California Tuberculosis Controllers Association. Contact investigation guidelines. Berkeley, CA: California Department of Health Services; 1998.
* Acid-fast bacilli.

Figure 1.

<table>
<tr><th colspan="4">Initiating A Contact Investigation</th></tr>
<tr><th>Case Characteristics</th><th colspan="3">Priority Level of the Contact</th></tr>
<tr><td></td><td>High Priority</td><td>Medium Priority</td><td>Low Priority</td></tr>
<tr>
<td>TB case is AFB Sputum Smear Positive, and/or has a cavity on chest X-ray (not CT scan)</td>
<td>1. Household contacts
2. Children under 5 years of age
3. Contact has a medical risk factor: HIV infection, IV drug use, diabetes, silicosis, drug induced immunosuppression, head or neck cancer, hematological and reticuloendothelial diseases, end stage renal disease, intestinal bypass or gastrectomy, chronic malabsorption syndrome, or low body weight.
4. Contact was exposed during a medical procedure, such as, a bronchoscopy, sputum induction, or autopsy.
5. Contact was exposed in a congregate setting, such as a jail, long term care setting, homeless shelter, or prison.
6. Contact exceeds environmental limits for a high priority contact:
<table>
<tr><td>Cumulative hours exposed</td><td>Type of Space</td></tr>
<tr><td>≥ 8 hours</td><td>Small poorly ventilated</td></tr>
<tr><td>≥ 16 hours</td><td>Small well ventilated</td></tr>
<tr><td>≥ 24 hours</td><td>Classroom size</td></tr>
<tr><td>≥ 100 hours</td><td>Large open area</td></tr>
</table>
</td>
<td>1. Children aged 5-14
2. Exceeds environmental limits for a medium priority contact:
<table>
<tr><td>Cumulative hours exposed</td><td>Type of Space</td></tr>
<tr><td>4 to 7 hours</td><td>Small poorly ventilated</td></tr>
<tr><td>8 to 15 hours</td><td>Small well ventilated</td></tr>
<tr><td>12 to 23 hours</td><td>Classroom size</td></tr>
<tr><td>50 to 99 hours</td><td>Large open area</td></tr>
</table>
</td>
<td>Anyone not listed under high or medium priority is considered a low priority. Only expand the contact investigation to include low priority contacts when data indicates that contacts with the greatest exposure have an infection rate greater than would be expected in the community.</td>
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<table>
<tr>
<td>TB case is AFB sputum smear negative, and has a chest X-ray consistent with TB disease, but no cavity.</td>
<td>1. Children under 5 years of age
2. Contact has a medical risk factor: HIV infection, IV drug use, diabetes, silicosis, drug induced immunosuppression, head or neck cancer, hematological and reticuloendothelial diseases, end stage renal disease, intestinal bypass or gastrectomy, chronic malabsorption syndrome, or low body weight.
3. Contact was exposed during a medical procedure, such as, a bronchoscopy, sputum induction, or autopsy.</td>
<td>1. Household contact
2. Contact was exposed in a congregate setting, such as a jail, long term care setting, homeless shelter, or prison.
3. Contact exceeds the environmental limits for a medium priority contact:
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<tr><th>Cumulative hours exposed</th><th>Type of Space</th></tr>
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<td></td>
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10. List contacts and rank them according to relative risk of tuberculosis exposure (high, medium, or low priority).

11. Expand the investigation, if indicated, based on:
    a. Identification of additional contacts.
    b. Evidence of recent transmission as evidenced by high numbers of positive TSTs or IGRAs (10 percent or at least twice the rate of a similar population without recent exposure, whichever is greater).
    c. Re-interview of case and high priority contacts.

12. Repeat TST or IGRA on high-priority contacts eight weeks after exposure has ended.

13. Repeat TST or IGRA on medium priority contacts to smear negative, non-cavitary cases only if the initial investigation reveals evidence of recent transmission.

H. Evaluating the contact

1. For all contacts:
    a. A chest X-ray must be obtained to rule out active pulmonary TB before initiating treatment for latent TB infection (TLTBI).
    b. A chest X-ray is not needed for asymptomatic contacts who have had a previous positive TST/IGRA and a previous negative chest X-ray unless there is an extremely high risk for developing TB disease, e.g., HIV/AIDS or immunosuppressive drug use, such as, long-term corticosteroids or anti-tumor necrosis factor drugs.

c. Symptomatic contacts of any age should receive a TST or IGRA, chest X-ray, and have three sputum specimens collected for AFB smear and culture. The collection of the first specimen should be observed by the nurse.
d. Symptomatic contacts should be isolated until sputum smear AFB results are negative for two consecutive specimens.
e. Asymptomatic contacts can be managed by the health department TB staff under signed standing orders if they are in place.

2. Asymptomatic contacts < 5 years of age.
   a. Initial TST is 0-4mm or the IGRA is negative, obtain chest X-ray (PA & lateral views).
   b. If chest X-ray is normal, treat for LTBI until the evaluation is complete (window period prophylaxis). If for any reason the family refuses to start window period prophylaxis contact your regional TB nurse consultant.
   c. If the chest X-ray is abnormal, consult physician. Active TB must be ruled out.
   d. Repeat TST or IGRA in eight weeks.
      - If the repeat TST is 0 – 4 mm, or the IGRA is negative, and exposure has ended, and the child is 6 months of age or older, stop treatment (window period prophylaxis).
      - If the repeat TST is 0-4 mm or the IGRA is negative in a child less than 6 months old, continue latent TB treatment and repeat the TST/IGRA once the child reaches the age of 6 months.
      - If the repeat TST is $\geq$ 5 mm, repeat the chest X-ray; if the X-ray is still negative for TB disease, complete treatment for LTBI. If the X-ray has changed to abnormal the child needs to be worked up for active TB disease.

   f. Initial TST is $\geq$ 5mm, obtain chest X-ray (PA & lateral views)

      - If chest X-ray is normal, treat for LTBI.
      - If chest X-ray is abnormal; consult physician. Active TB must be ruled out.

3. Asymptomatic contacts 5 years of age or older that are immunosuppressed, e.g., HIV/AIDS or those taking immunosuppressive drugs (for example, biologics such as infliximab, long-term corticosteroids, transplant medications) should begin treatment of LTBI even if the TST is < 5 mm or IGRA is negative.
   - If window period prophylaxis treatment is to be initiated, obtain chest X-ray:
     - If chest X-ray is normal, treat for LTBI during the window period.
     - If chest X-ray is abnormal, consult physician. Active TB must be ruled out.
   - Repeat TST in eight weeks:
     - If the repeat TST is 0 – 4 mm, or the IGRA is negative, and exposure has ended, stop treatment (window period prophylaxis)
     - If the repeat TST is ≥ 5 mm or the IGRA is positive, repeat the chest X-ray; if the X-ray is still negative for TB disease, complete treatment

for LTBI. If the X-ray has changed to abnormal; consult physician; active TB disease must be ruled out.
    - If HIV positive or severely immunocompromised, continue treatment of LTBI regardless of TST result.
    - If repeat TST is 0-4mm and exposure has ended, stop treatment, if initiated. Evaluation is complete.

- Initial TST is ≥ 5mm, obtain chest X-ray:
    - If chest X-ray is normal, treat for LTBI
    - If chest X-ray is abnormal, consult physician. Active TB must be ruled out.

4. Asymptomatic contacts 5 years of age or older that are immunocompetent:
    a. If initial TST is < 5 mm (negative) or IGRA is negative,
        - repeat TST or IGRA in 8 weeks.
    b. If initial TST is ≥ 5 mm (positive) or IGRA is positive
        - Obtain chest X-ray to rule out active TB
        - If chest X-ray is normal start treatment of LTBI
        - If chest X-ray is abnormal consult physician. Active TB disease must be ruled out.
    c. If repeat TST is < 5 mm (negative) or IGRA is negative and exposure has ended, evaluation is complete.
    d. If repeat TST is ≥ 5mm (positive) or IGRA is positive obtain chest X-ray to rule out active TB.
        - If chest X-ray is normal start treatment of LTBI
        - If chest X-ray is abnormal, consult physician. Active TB disease must be ruled out.

5. Contact has a previously documented positive TST or IGRA and no previous TLTBI.
    a. If asymptomatic and is willing to take TLTBI and the documented negative chest X-ray was obtained less than 24 months ago, begin TLTBI.
    b. If the chest X-ray was obtained greater than 24 months ago or if the patient is immunocompromised repeat the chest X-ray.
        - If the chest X-ray is normal begin TLTBI
        - If the chest X-ray is abnormal, consult physician. Active TB must be ruled out.

6. If contact has a previously documented positive TST or IGRA and documented treatment of LTBI, is asymptomatic, HIV negative, and not otherwise immunosuppressed, no further follow-up is needed.

7. If the contact is HIV positive or severely immunosuppressed (e.g. biologic therapy such as infliximab, transplant) re-treat for LTBI after obtaining chest X-ray to rule out active TB disease even if there is documentation of completing TLTBI in the past.

I. Contacts to Extrapulmonary TB

1. An investigation should be carried out only on extrapulmonary cases who are under 5 years of age. The purpose of the investigation is to find the source case who may have exposed the child, so technically this investigation is termed a source case investigation rather than a contact investigation.
2. A contact investigation is not indicated for extrapulmonary cases 5 years of age or older.
3. Administer TST/IGRA; interpret TST according to individual risk factors and treat according to guidelines.

J. Infant Born in Household where Mother or Family Member has Pulmonary TB Disease

If mother or family member is considered infectious, separate newborn from mother or family member until TB case is considered non-infectious.

Evaluation of newborn infant :

1. Initial TST is 0-4mm, obtain chest X-ray (PA & lateral views):

   - If chest X-ray is normal, treat for LTBI until the evaluation is complete and repeat TST in eight weeks.
   - If chest X-ray is abnormal, consult physician and notify nurse consultant.
   - If repeat TST is 0-4 mm and the infant is > 1 year of age at the time of repeat testing, and exposure has ended, stop treatment.
   - For infants < 1 year of age, consult with the nurse consultant before stopping LTBI treatment. If the mother was the source of potential exposure of if the infant had significant contact with the source, and LTBI cannot be reliably excluded due to the age of the infant at the time of the repeat TST, consider continuation of a full course of treatment.
   - If repeat TST is $\geq$ 5mm, obtain chest X-ray and re-evaluate for TB disease; If no disease, continue TLTBI.

2. Initial TST is $\geq$ 5mm, obtain chest X-ray:

   - Evaluate for TB disease; if no disease, treat for LTBI.

K. Infant Born to Mother with Hematogenous Spread of Tuberculosis Disease

1. Consultation with a pediatric infectious diseases specialist is strongly encouraged
2. TST newborn, obtain chest X-ray and perform other appropriate tests to rule out congenital tuberculosis (including review of the placental pathology).
3. TST is usually negative in a newborn; empiric multi-drug therapy for active TB is indicated until TB disease is ruled out.

4. If congenital tuberculosis is ruled out, repeat TST in eight weeks. Consultation with a pediatric infectious diseases specialist is recommended at this point to determine whether additional therapy is indicated.
5. Evaluate all other close contacts in newborn's environment before infant discharged from hospital.

L. Contacts to INH Resistant TB Disease

1. Rifampin is the drug of choice when treating a newly infected contact to an INH resistant case of TB disease
2. **Rifampin must be administered on a daily basis and <u>may not</u> be given on a twice weekly schedule. DOPT for these contacts is strongly encouraged.**

M. Contacts to INH and RIF Resistant TB Disease (MDR or XDR-TB)

1. All contacts to a case of MDR or XDR TB should be closely monitored for at least two years after exposure regardless of treatment.
2. "None of the potential regimens for persons likely to be infected with MDR-TB have been tested fully for efficacy and those regimens are often poorly tolerated. For these reasons, consultation with a physician who specializes in care and treatment of tuberculosis is recommended for selecting and managing the care of contacts" MMWR *Guidelines for the investigation of contacts of persons with infectious TB* December 16, 2005. Consult with the State TB Control Physicians for an appropriate regimen for treating contacts to an MDR case. DOPT for these contacts is strongly encouraged.

N. Correctional Facilities

When an infectious TB patient is identified in a prison or jail it can be difficult to determine a contacts priority level since it is often difficult to determine how much exposure may have occurred. Unless there are specific tracking records that can indicate that a contact has had only brief exposure, these contacts should be assigned high priority. For more information about conducting contact investigations in a correctional facility refer to Prevention and Control of Tuberculosis in Correctional Facilities: Recommendations from CDC MMWR 2006;55(No. RR-9) https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5509a1.htm

O. Contact Investigation by Other Health Care Facilities

Local health departments should monitor other health care facilities to:

1. Assist in identifying high and medium-priority contacts.
2. Ensure complete and accurate data.
3. Collect and evaluate TST data.
4. Provide standardized forms.
5. Provide medication if indicated.

6. Ensure monthly monitoring of those on TLTBI if providing medication.
7. Provide expert guidance for treatment and management issues.

P. Documentation

All contact investigation data must be recorded in the medical record of the TB case for epidemiological and surveillance purposes.

All contacts must be entered into NCEDSS by completing a contact summary wizard within 30 days on the contact being identified.

Contact information (e.g. names, TST results) should not be released to another health care provider or to the patient without obtaining consent of the contacts named.