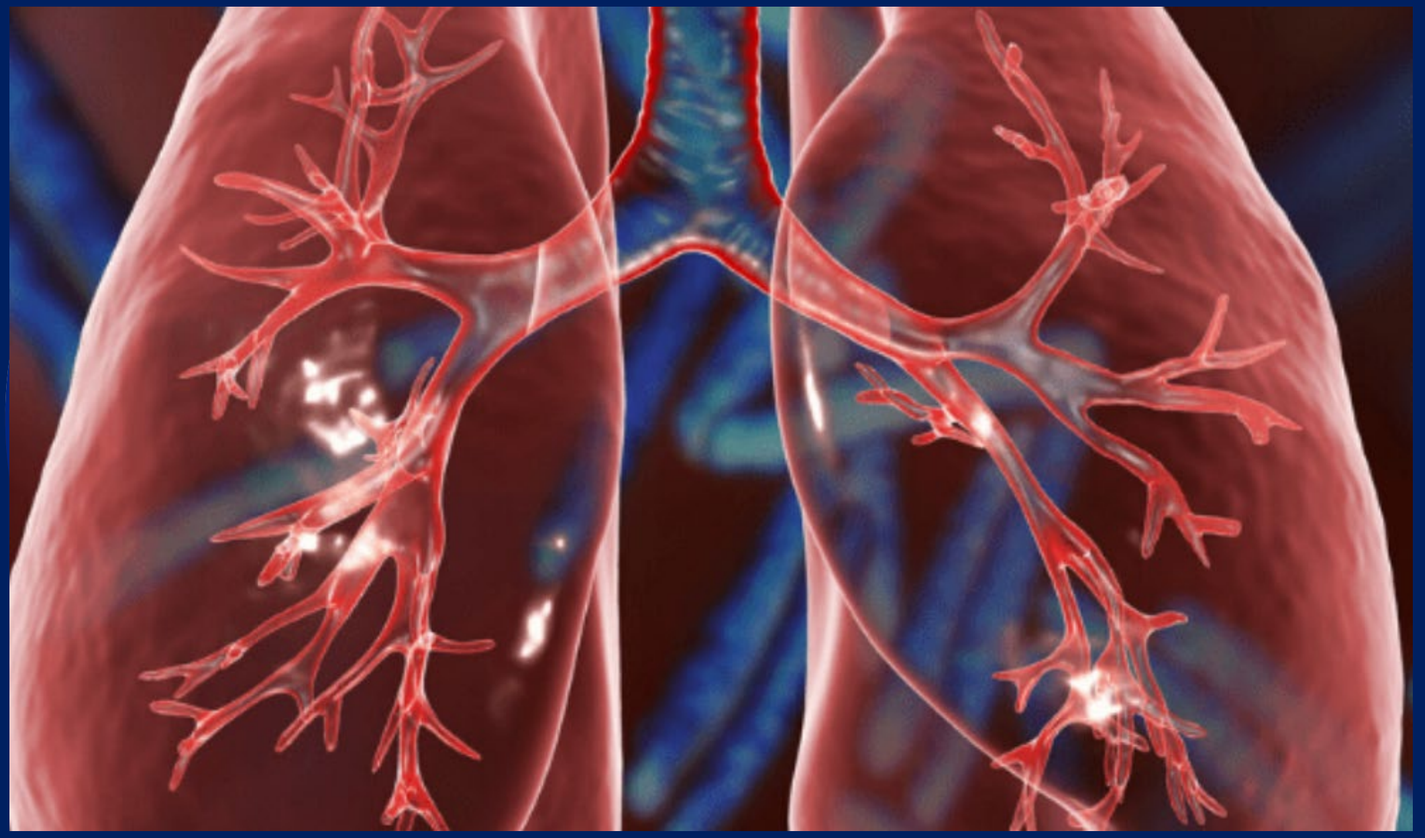
Infectious vs Non-Infectious TB

Heartland National TB Center

Intro to Nurse Case Management



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May 9, 2023

Williamson County and Cities Health District
TB Management Program

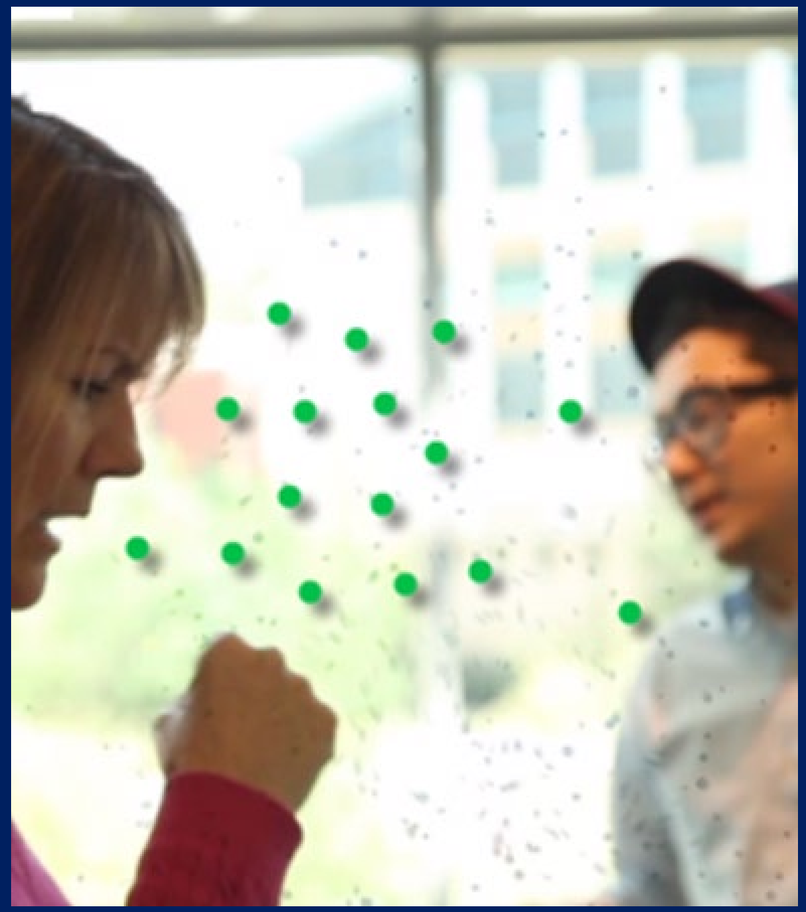
Objectives

Identify if a TB patient is infectious, and if so, when a TB patient is considered non-infectious:

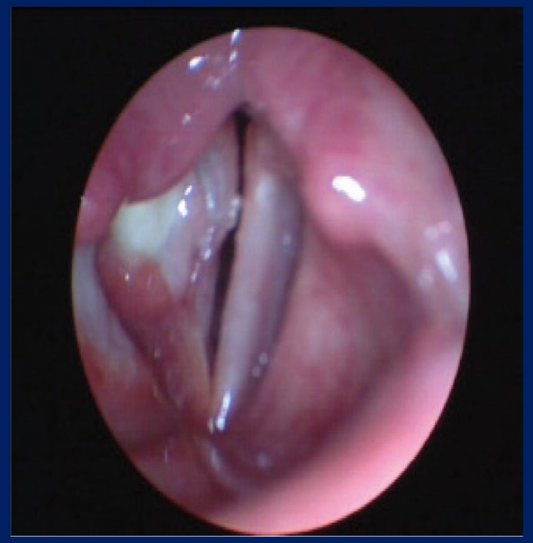
- How to determine risk of infectiousness
- When to place your patient on isolation precautions
- How to know when it is safe to allow your patient to return to work/ school/community activities
- Stigma & Isolation: patient-centered care

TB Spreads Person to Person via Shared Air

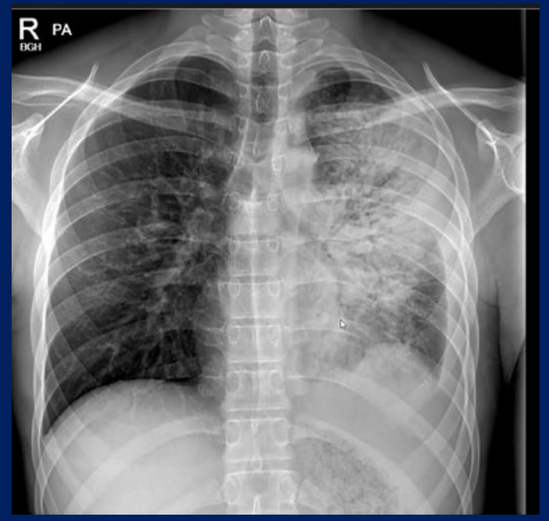
- Do they have TB disease?
- Does the site of disease provide opportunity for airborne spread?



Which sites of disease can be potentially infectious?



Laryngeal TB



Pulmonary TB with or without cavitation

What about Pleural TB?

Which risk factors increase the risk of infectiousness?

Increased Risk	Decreased Risk
• Cavity • Sputum smear positive • Laryngeal TB • Coughing (3+ weeks?) • Cough inducing procedures • Aerosolizing procedures • Small enclosed space • Poor ventilation • *Increased airspace sharing time (duration/frequency during infectious period)*	• Good cough hygiene (cover your cough!) • Sputum smear negative • Appropriate and adequate treatment (2 weeks? appropriate DOT doses?)

Higher Smear = Higher Risk

Table 4.3
Smear Classification Results

Smear Result (Number of AFB observed at 1000X magnification)	Smear Interpretation	Infectiousness of Patient
4+ (>9/field)	Strongly positive	Probably very infectious
3+ (1-9/field)	Strongly positive	Probably very infectious
2+ (1-9/10 fields)	Moderately positive	Probably infectious
1+ (1-9/100 fields)	Moderately positive	Probably infectious
+/- (1-2/300 fields)*	Weakly positive†	Probably infectious
No acid-fast bacilli seen	Negative	Probably not infectious**

* There are variations on labeling for this result, and include listing the number of AFB counted.

† Laboratories may report these smear results as "doubtful" or "inconclusive" based on CDC guidelines.

** The criteria for determining whether a patient may be considered noninfectious are discussed in Chapter 7 on TB Infection Control.

www.cdc.gov/tb/education/corecurr/pdf/chapter4.pdf

TB Disease In Kids

Typically, Paucibacillary TB. Usually can't produce sputum.

Unless Adult Type presentation (cavity, smear **positive**), usually not considered to be infectious

While small children aren't usually considered infectious, you want to perform a source case investigation, if unknown:

- How did they get exposed to TB?
- Is there an accompanying adult with them that has infectious, untreated TB?

How do you determine the Infectious Period?

Starts

- **3 months** before 1st respiratory symptom or 1st diagnostic finding
- *If smear negative, asymptomatic (non cavitary):* ***1 month***

Ends

- When off Isolation
- De facto: If following isolation precautions, then exposure ends with start of isolation period. Be aware of possible exceptions.

Table 8.1—Recommendations for Estimating the Start of the Infectious Period by Case Characteristics

Case with Respiratory TB Symptoms	Case with Positive Sputum Smear	Case with Pulmonary Cavity on Chest X-ray	Recommended Minimum Beginning of the Infectious Period
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

https://www.cdc.gov/tb/education/ssmodules/pdfs/Modules8-508.pdf

Texas tool: TB 425

Table 2. Estimating the Beginning of the Infectious Period

A. Criteria			B. Estimated Start of Infectious Period *Select any of the following based on criteria met by client in Column A*	C. Infectious Period Start Date *Select earliest date of symptom onset listed in Table 1*
TB Symptoms	Acid Fast Bacilli (AFB) Sputum Smear Positive	Cavitary CXR		
Yes ___	Yes ___	Yes ___	Three (3) months before symptom onset or first positive finding consistent with TB disease (e.g. abnormal chest radiograph) whichever is longer.	
Yes ___	Yes ___	No ___		
Yes ___	No ___	No ___		
No ___	Yes ___	Yes ___	Three (3) months before first positive finding consistent with TB	
No ___	No ___	No ___	Four (4) weeks before date of suspected diagnosis	

Source: Adapted from MMWR. 2005; 54 (No. RR-15)

https://www.dshs.texas.gov/tuberculosis-tb/texas-dshs-tb-program-tb-forms-resources

When can Airborne (infection) Isolation (AII) be discontinued?

What is the general rule of thumb for sputum smear positive TB?

What about when sputums are smear negative?

Guidance on Release from Hospital Tuberculosis Isolation[a]

Diagnostics:	Clinical Impression:	Under Airborne Isolation (AII) and discharging to:	Patient must meet all criteria:
Sputum **AFB Smear Positive** ***AND*** **NAAT Positive**	Active TB Disease	**Home—No** high risk individuals or individuals without prior exposure	• Follow-up plan has been made with local TB program and DOT has been arranged[b] • Started on standard TB treatment • All household members, who are not immunocompromised, have been previously exposed to the person with TB • Patient is willing to not travel outside the home until negative sputum smear results are received • No infants or children younger than 5 years of age or persons with immunocompromising conditions are present in the household who have not been evaluated and started on appropriate treatment
		Home—WITH high risk individuals OR **High-Risk/Congregate Setting**	Patients with infectious TB should NOT be allowed to return to a setting with high risk individuals. The patient can be *discharged* and is considered non-infectious if: ✓ Three consecutive negative sputum smears from sputum collected in 8 - 24 hour intervals (at least one early morning specimen) ***AND*** ✓ Started on drug regimen and tolerating for AT LEAST 2 weeks or longer ***AND*** ✓ Symptoms have improved
Sputum **AFB Smear Negative** (or No Sputum AFB Smear Done) ***AND*** **NAAT Positive**	High likelihood of TB	**Home**—with/without high risk individuals OR **High-Risk/Congregate Setting**	• Three consecutive negative sputum smears from sputum collected in 8 to 24 hour intervals (at least one early morning specimen) • Started on standard TB treatment and tolerating for AT LEAST 5 days • A plan has been made to follow-up on culture results • No infants or children younger than 5 years of age or persons with immunocompromising conditions are present in the household who have not been evaluated and started on appropriate treatment
Sputum **AFB Smear Negative** ***AND*** **NAAT Negative**	High likelihood of TB	**Home**—with/without high risk individuals OR **High-Risk/Congregate Setting**	

AFB - Acid-fast bacilli *AII - airborne infection isolation* *DOT - Directly Observed Therapy* *DST - Drug Susceptibility Testing* *MDDR - Molecular Detection of Drug Resistance* *MDR - Multi-drug resistant* *NAAT - Nucleic Acid Amplification Test* *TB - Tuberculosis* *XDR - Extensively-drug resistant*

[a]Pulmonary Tuberculosis

[b]The hospital and/or treating clinician should contact the local health department prior to release of a patient with confirmed active TB disease.

https://www.heartlandntbc.org/wp-content/uploads/2021/12/guidelines_home_hospital_infectious_patients.pdf

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Texas tool: TB 425

Table 3. Estimating the End of the Infectious Period (Release from Respiratory Isolation) for clients with drug susceptible TB

A. Criteria		B. Check (√) when criteria is met	C. Infectious Period End Date *Type the date the selected criteria in Column A was met.*
When patient has POSITIVE AFB sputum smear at diagnosis	1. Three (3) consecutive negative AFB sputum smears, collected in 8 to 24 hour intervals (one should be an early morning specimen)		
	2. Symptomatic improvement		
	3. Effective multi-drug therapy for tuberculosis **for at least the equivalent of two weeks** given as directly observed therapy (DOT)		
	4. Completely adherent with DOT		
	5. Drug resistance is not suspected or confirmed		
When patient has three consecutive NEGATIVE AFB sputum smears at diagnosis and has never had a positive sputum specimen	1. Three (3) consecutive negative AFB sputum smears, collected in 8 to 24 hour intervals (one should be an early morning specimen)		
	2. Symptomatic improvement		
	3. Multi-drug therapy for tuberculosis for **at least 5 days** given as DOT		
	4. Completely adherent with DOT		
	5. Drug resistance is not suspected or confirmed		

Source: Adapted from MMWR. 2005; 54 (No. RR-12)

https://www.dshs.texas.gov/tuberculosis-tb/texas-dshs-tb-program-tb-forms-resources

What are your policies regarding discharge from hospital to the home?

- Not all TB patients need to be hospitalized.
- If still on AII, what are your rules and policies for discharge home?

Patient Centered Care: Home Based Isolation

Discharge Home on Isolation can be done if:	Reasons to hold discharge:
• Follow-up plan has been made with local TB program and DOT has been arranged • All household members, who are not immunocompromised, have been previously exposed to the person with TB • Patient is willing to not travel outside the home until negative sputum smear results are received • No infants or children younger than 5 years of age or persons with immunocompromising conditions are present in the household who have not been evaluated and started on appropriate treatment	• Going to congregate setting that doesn't have a negative pressure room: alternative arrangements may be needed. • Cannot be discharged to safe environment: need to find safe location while on Isolation. (Safe for patient and safe for community.) • Unable to be discharged with enough meds to continue care. May need to hold for arranging procurement of meds.

Use Non-Stigmatizing Language:
Isolation ≠ Segregation

Isolation is the separation of ill persons who have a communicable disease from those who are healthy and restriction of their movement to stop the spread of that disease or illness.

Segregation is a system that keeps different groups separate from each other, either through physical dividers or using social pressures and laws.

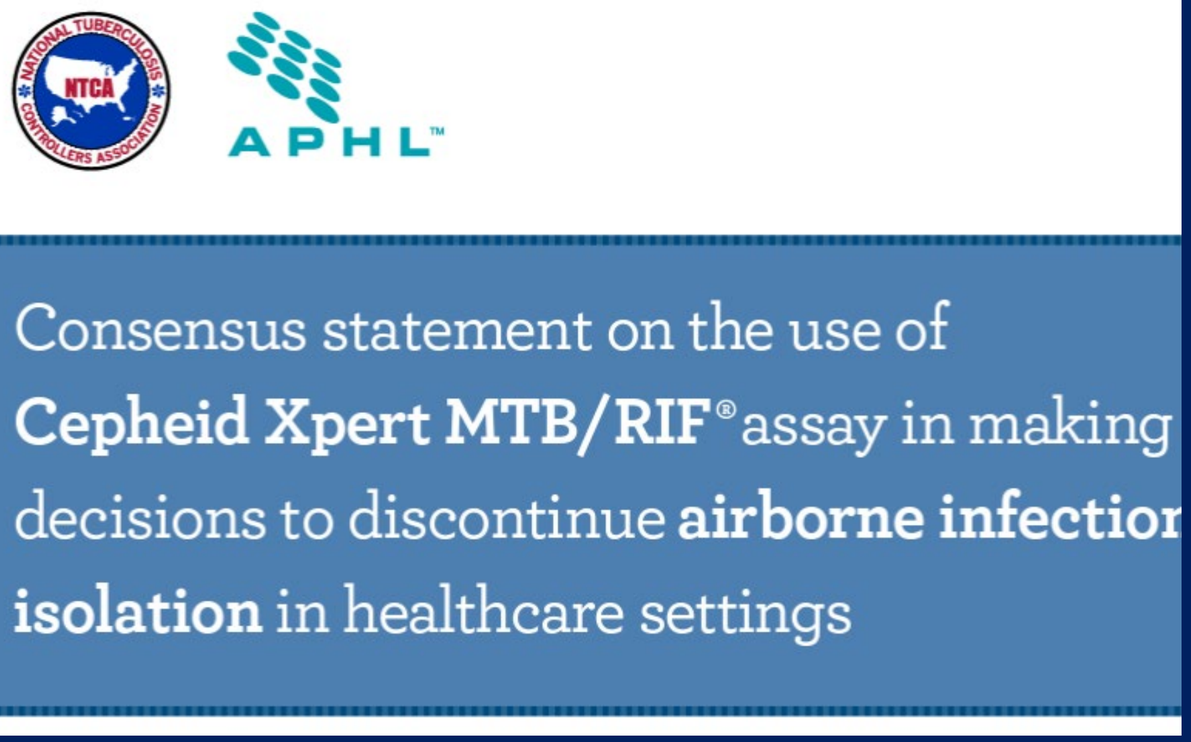
Patient Centered Care: Tips

- Goal: no sharing of airspace with non-household members.
- Use sunlight and ventilation: Outside is safe!
- Patient wears a surgical mask, not a N-95, when needed.
- If patient can’t work, can the family pay their bills? May need linkages to social services.
- If patient lives alone, how will meals be arranged?
- Isolation impacts mental health.
- Some patients culture convert before their smears become negative.
- Support Group: https://www.wearetb.com/

Scenario 1

- 64 year old, US born, white male. Smoker. History of foreign travel while serving in the military, including deployments in Asia. Hospitalized with chronic cough, hemoptysis. Sputum 3+ on smear. What should the hospital do?
  - Follow Airborne Isolation (if not already implemented)
  - Order NAAT to see if it's due to MTB
- Results: NAAT did NOT detect MTB
- Can they release patient from Airborne Isolation?

NAAT: Xpert and Release from Isolation



Recommendations: (see also Flow Charts, Appendix III)

1. **Positive Xpert Result:** *M. tuberculosis* complex detected. **Diagnosis of TB is highly likely.** Continue A.I.I. until deemed non-infectious during hospital stay or until discharged to home isolation.
2. **Negative First and Second Xpert Results:** If the first Xpert result is **negative** (*M. tuberculosis* complex **not** detected), a second specimen collected at least eight hours after the first specimen should be tested if TB still is clinically suspected. **If the second Xpert result is negative, infectious TB is not likely.** Consider release from A.I.I. if infectious TB is no longer a significant clinical consideration.
3. **Negative Xpert Results with Positive or Discordant AFB Sputum Smears:** Two negative Xpert results with positive AFB sputum smears likely indicate presence of nontuberculous mycobacteria (NTM); Appendix IIIb. One negative Xpert result in a patient with positive AFB sputum smears is suspicious for NTM, and collection of sputum for a second Xpert test is recommended. **If the second Xpert result is still negative, infectious TB is not likely.** If smears are discordant (i.e., 1 AFB positive, 1 AFB negative), decisions should be based on clinical suspicion.
4. **Invalid Xpert Result:** An Invalid result represents a failure of the assay; this is a rare event, estimated to occur with 1-2% of specimen-runs. If an invalid result is reported, the laboratory likely has repeated the test on leftover specimen[10] and the presence or absence of *Mycobacterium tuberculosis* complex cannot be determined. **If an Invalid result is reported with the initial specimen and TB still is clinically suspected, repeat the test using a new specimen (go to**

www.tbcontrollers.org/docs/resources/NTCA_APHL_GeneXpert_Consensus_Statement_Final.pdf

Scenario 2

- 28 year old from India. Works in IT. Is still 3+ on sputum smear after 2 weeks of standard TB treatment. NAAT+, no RIF mutation.
- He is asking when he can go back to work.
  - If he can work 100% remotely, there are no public health restrictions.
- His mom wants him to come back home for a wedding. Can he fly back to India?
  - Not until he is off isolation.

Returning to Work, School, & Community Activities

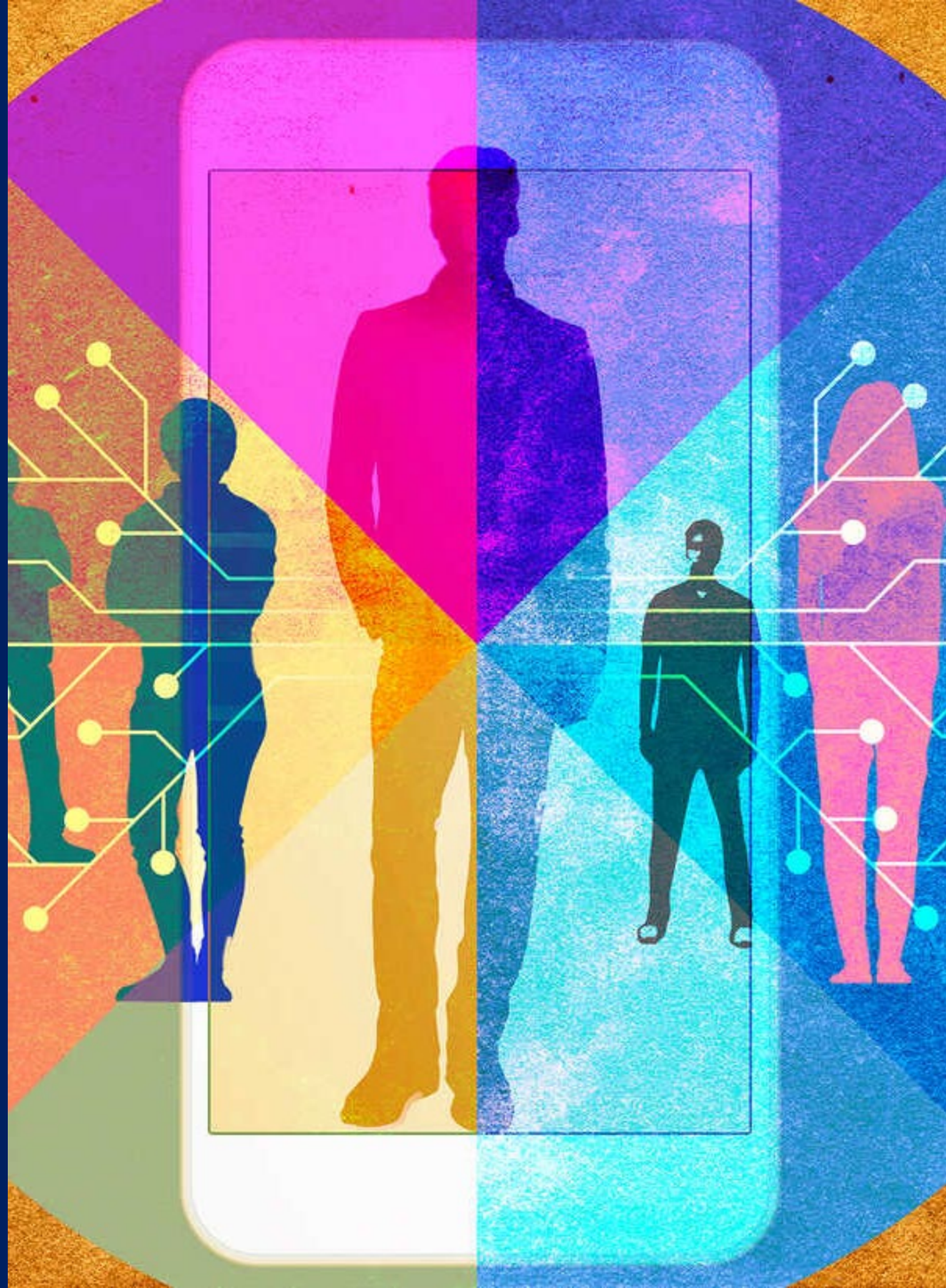
Able to return to work or school and take public transportation when off isolation.

Will need to continue TB medication to cure.

Mask is no longer necessary.

Contacts will need to be retested 8-10 weeks after break in contact.

- *Note that household contacts who continued to live with patient should be tested 8 weeks after end of Infectious Period. That might be the culture conversion date if that is earlier than sputum smear conversion.*



Scenario 3

- 38-year-old US born female health care worker with a history of working in medical settings in Africa. You have just received a lab report that an intestinal biopsy sample has been identified to have MTB. Can she continue to work at the hospital?
  - Pulmonary involvement needs to be ruled out.
- Chest xray shows an infiltrate in the RUL. Sputums are smear negative x 3, NAAT detected MTB with no RIF mutation. What other details would you want to know before determining when she can return to work?
  - Current treatment and response to treatment.
  - Nature of work and if patient population is high risk (immuno-compromised or young children).

Final Question: How do you know if someone is infectious?

Answer:
Through the Nursing and Contact Investigation data.

Overall Important Points of Note…

01 It’s important to determine your patient’s risk of infectiousness.

02 Become familiar with guidelines on when it is safe to allow your patient to return to work/school/community activities.

03 Be mindful of providing patient-centered care, especially while helping them through their infectious period.

Questions?

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