Decision to Initiate a TB Contact Investigation

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HEARTLAND NATIONAL TB CENTER, 4.15.2021

OBJECTIVES

- Define a TB contact investigation and its purpose.
- State the goals of a TB contact investigation.
- Determine when a TB contact investigation should be initiated.
- Identify the infectious period.
- Describe the process of a TB contact investigation.
- Describe the prioritization of contacts.
- Determine when a TB contact investigation is completed.

TB Statistics 2020

- **10M** worldwide
- **7,163** in USA
- **Up to 13 million** people in the United States living with LTBI
- If not treated for LTBI, they are at risk for developing active TB disease
- An average of **10 contacts** are identified for each TB case
- Approximately **20-30%** of all TB contacts are **infected with LTBI**
- Approximately **1%** of all TB contacts have **active TB disease**

Every TB patient started as a TB contact

What is the Purpose of a TB Contact Investigation?

Systematic evaluation:

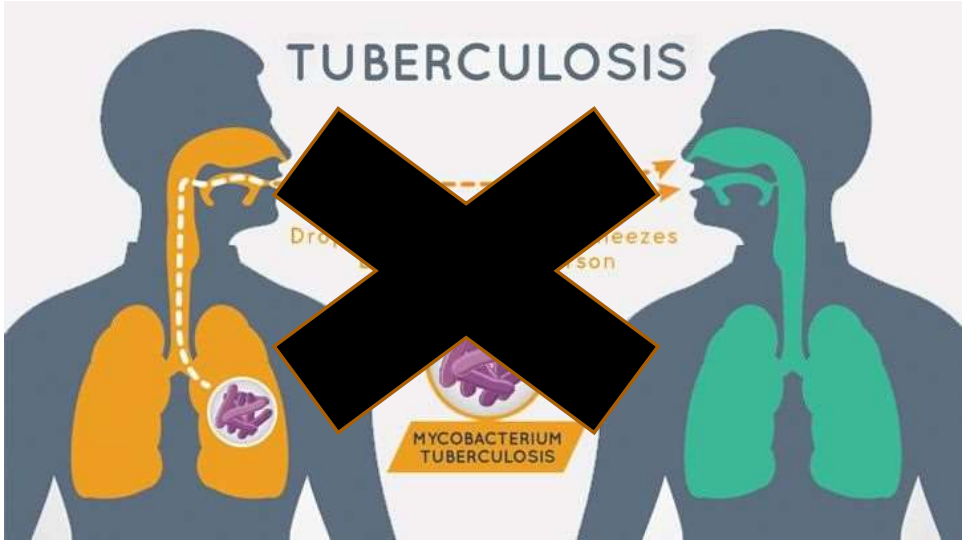
- **Identify** contacts to an infectious TB case.
- **Find** those contacts.
- **Assess** contacts for either latent TB infection (LTBI) or active TB disease.
- **Treat** LTBI or active TB disease.

Conducting CI's is priority for TB control activities

Why are TB Contact Investigations so Important?

Active case-finding strategy (goals) to:

- stop TB transmission
- prevent future cases and outbreaks
- increase case detection



Timing of TB Contact Investigation Initiation

- As soon as suspected* or confirmed infectious TB case comes to public health attention (state, regional or local health department [HD]).
- **Within 1 working day after TB case reported to HD**
  - Review medical information
  - Interview TB case

*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 CI process.

Gathering and Reviewing Records

- Gather records from referring provider, hospital, PCP, jail, lab, etc.
- Review records prior to meeting patient.
  - IGRA / TST
  - CXR
  - Sputums
  - S&S
  - H&P
  - DC Summary
  - Office visit notes

Initial Interview with TB Case

Meet with TB patient within 1 day

Review and discuss:

- Demographics
- Medical history: HIV? Diabetic? On biologics?
- TB history
- Social history: Drugs? Alcohol? Jail? Homeless? Travel?
- Contact information - persons who have shared airspace w/ TB patient

Questions Needing Answers

First questions needing answers through medical records review and initial interview:

- Is my patient contagious?
- How do I know if my patient is contagious?
- If my patient is contagious, how contagious is he/she?
- How do I know when my patient first became contagious?
- How do I know how long my patient has been contagious?

Determining Infectiousness

Clinically

- Site of disease (typically pulmonary, pleural or laryngeal)
- Symptoms (fever, cough, hemoptysis, night sweats, weight loss)

Radiologically

- Abnormal CXR (cavities, infiltrates, ground-glass opacities, lymphadenopathy)

Microbiologically

- Positive sputum (AFB smears, NAAT/PCR, culture)

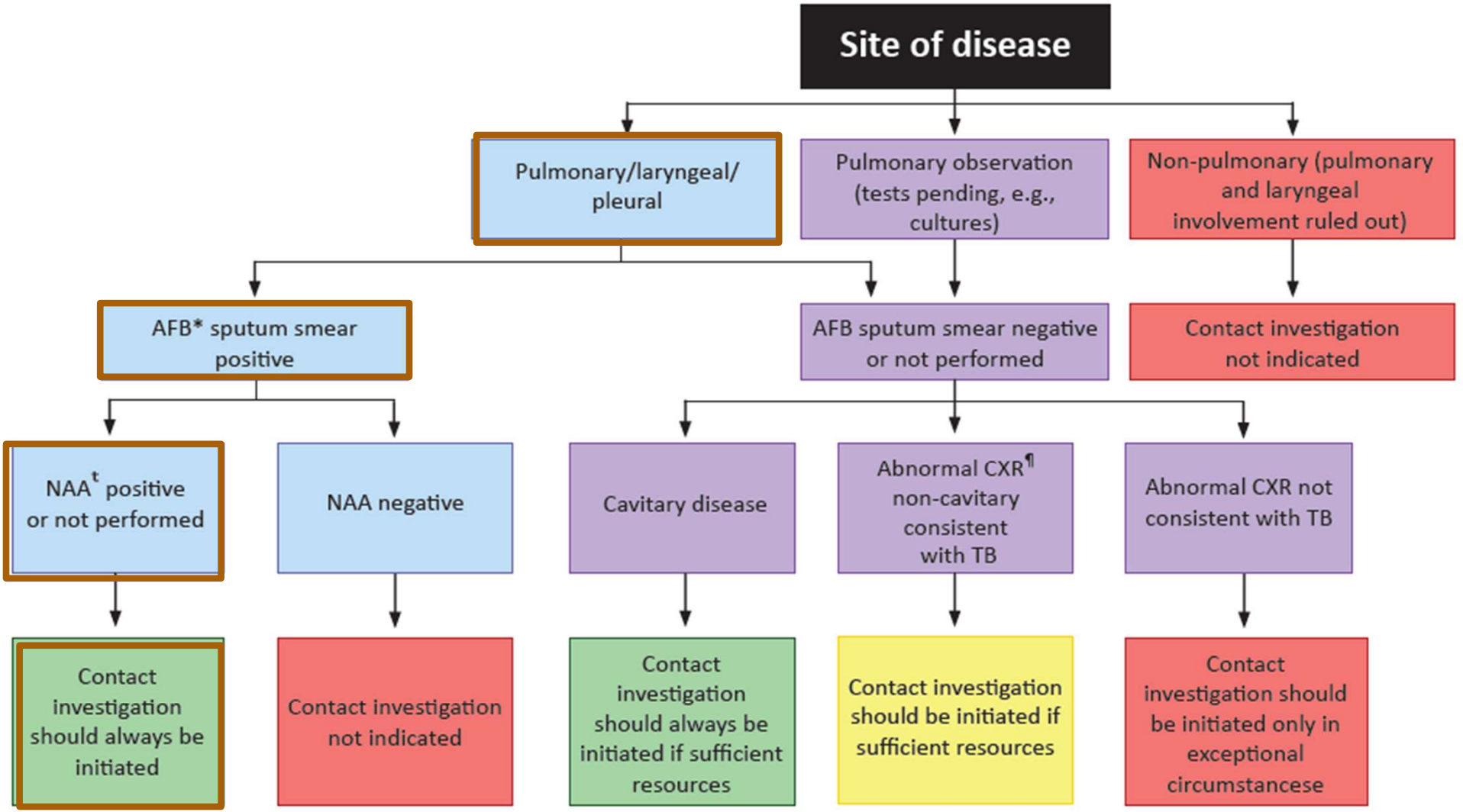
Factors Associated with Infectiousness

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

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**

Smear Classification Results

Decision to Initiate a Tuberculosis (TB) Contact Investigation



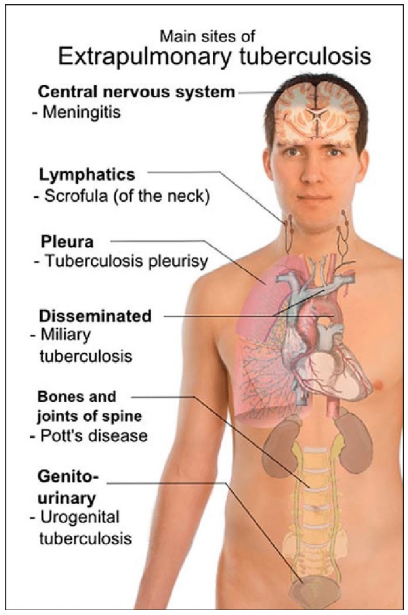
* Acid-fast bacilli.

† Nuclear acid assay.

§ According to CDC guidelines.

¶ Chest radiographic

CDC MMWR Guidelines for The Investigation of Contacts of Persons with Infectious Tuberculosis (2005), p. 5, Figure 1.



When is a Contact Investigation Not Necessary?

- LTBI
- Positive sputum smears, negative NAAT
- Extrapulmonary TB
- Child under 10 years old
  - If case less than 5 years old, source case investigation should be initiated

What is the Infectious Period?

Time during which TB case is likely to transmit TB.

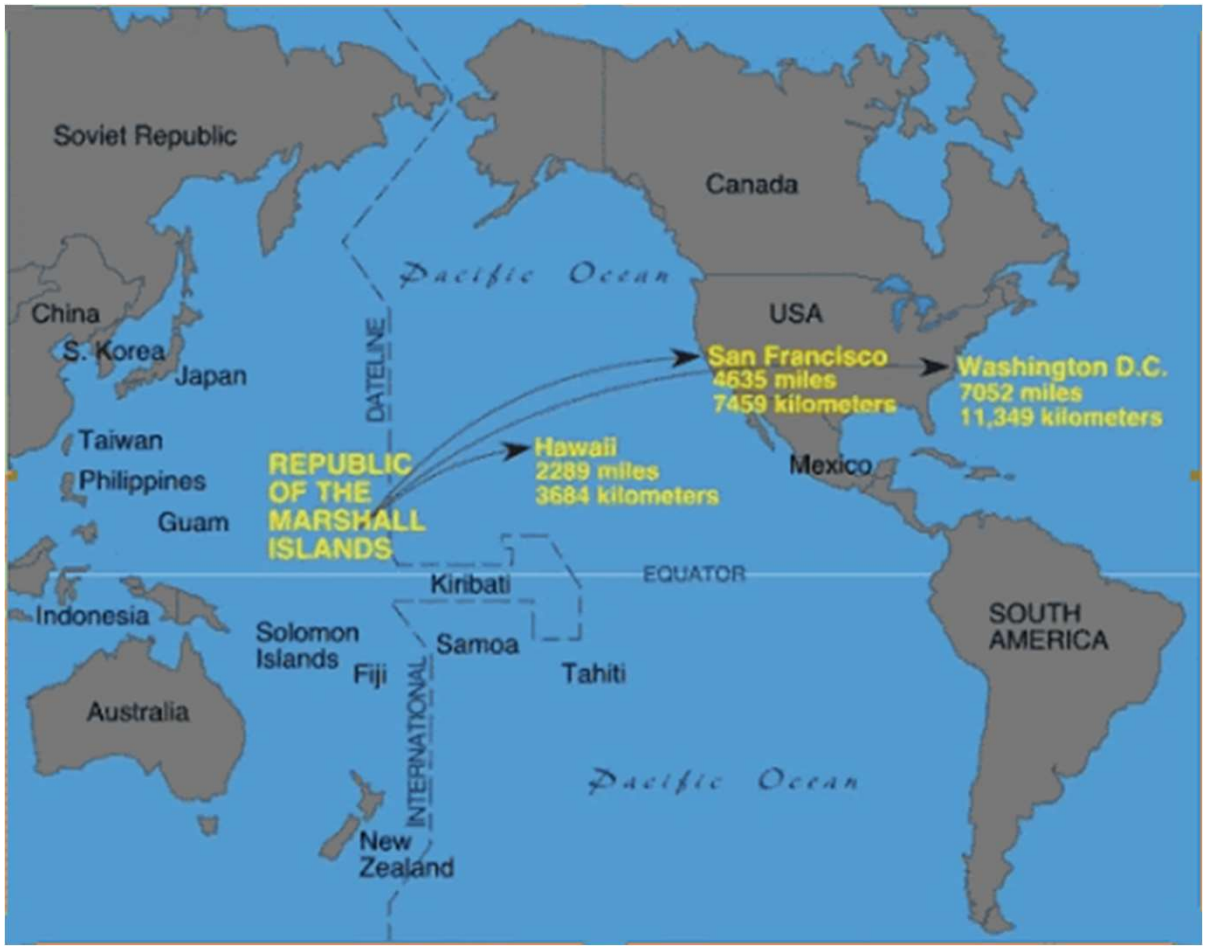
Why is determining infectious period so important?

- Focuses investigation on contacts most likely to be at risk of infection.
- Identifies timeframe for testing contacts (i.e., when repeat TST or IGRA is due).

Estimating Start of Infectious Period

Recommendations for Estimating the Start of the Infectious Period

Characteristic of Case			Recommended Minimum Beginning of the Infectious Period
Respiratory TB Symptoms	Sputum Smear Positive	Pulmonary Cavity on 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



Marshall Islands TB Incidence Rate 2019 = 434/100,000 vs. US = 2.7/100,000

Case Study

- 45-year-old male from Marshall Islands
- Seen at local community clinic in January 2015
- Complains of productive cough, fever, chills and chest pain x 3 months
- Diabetic
- TST = 11mm
- CXR = infiltrates and cavity in RUL
- Referred to local HD

Case Study , continued

- Seen at local health department (LHD) in early January 2015
- Obtained 3 consecutive sputums – 1/3, 1/4, 1/5
- Placed in respiratory isolation
- RIPE initiated on 1/5/2015, as active TB was suspected
- Sputums resulted AFB 1+ smear positive x 3

Breakout #1!

LET'S PUT OUR KNOWLEDGE INTO PRACTICE

1ST DEBRIEF
CATALINA'S GROUP PRESENTS

Is this patient infectious?

Should a contact investigation be initiated?

Calculate the infectious period.

Developing a TB Contact Investigation Plan

- ☑ Gather case records and review information about case
- ☑ Initial TB case interview
- ☑ Determine infectious period
- ☐ Develop CI Plan, including, but not always in this order:
  - Prioritize contacts for assessment
  - Prioritize places to conduct field visits
  - Conduct contact assessments
  - Determine whether to expand or conclude investigation
  - Determine timeline for accomplishing tasks
  - Schedule regular case/care plan conferences
  - Evaluate CI activities

How Many Interviews of the TB Case are Recommended?

Minimum of 2 interview are recommended:

1st interview – Within 1 day of reporting infectious case

- Conducted in person (home, hospital, TB clinic)
- Provides patient with TB information and to learn how treatment and specific care will be provided.
- Identification of initial contacts

2nd interview – 1-2 weeks later

- Build on previous information
- Gives patient time to think about any other contacts he/she may've forgotten/left out.

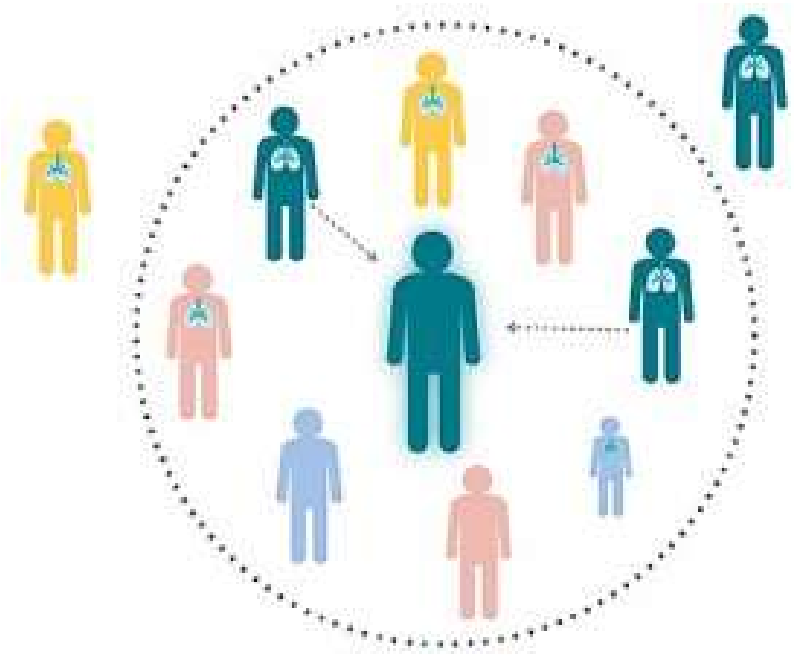
Additional interviews may be necessary as new information becomes available.

Remember, every time you meet with your patient, it's an opportunity to learn more about his/her contacts.

Who are TB Contacts?

Persons who have shared airspace with an infectious TB patient (index case).

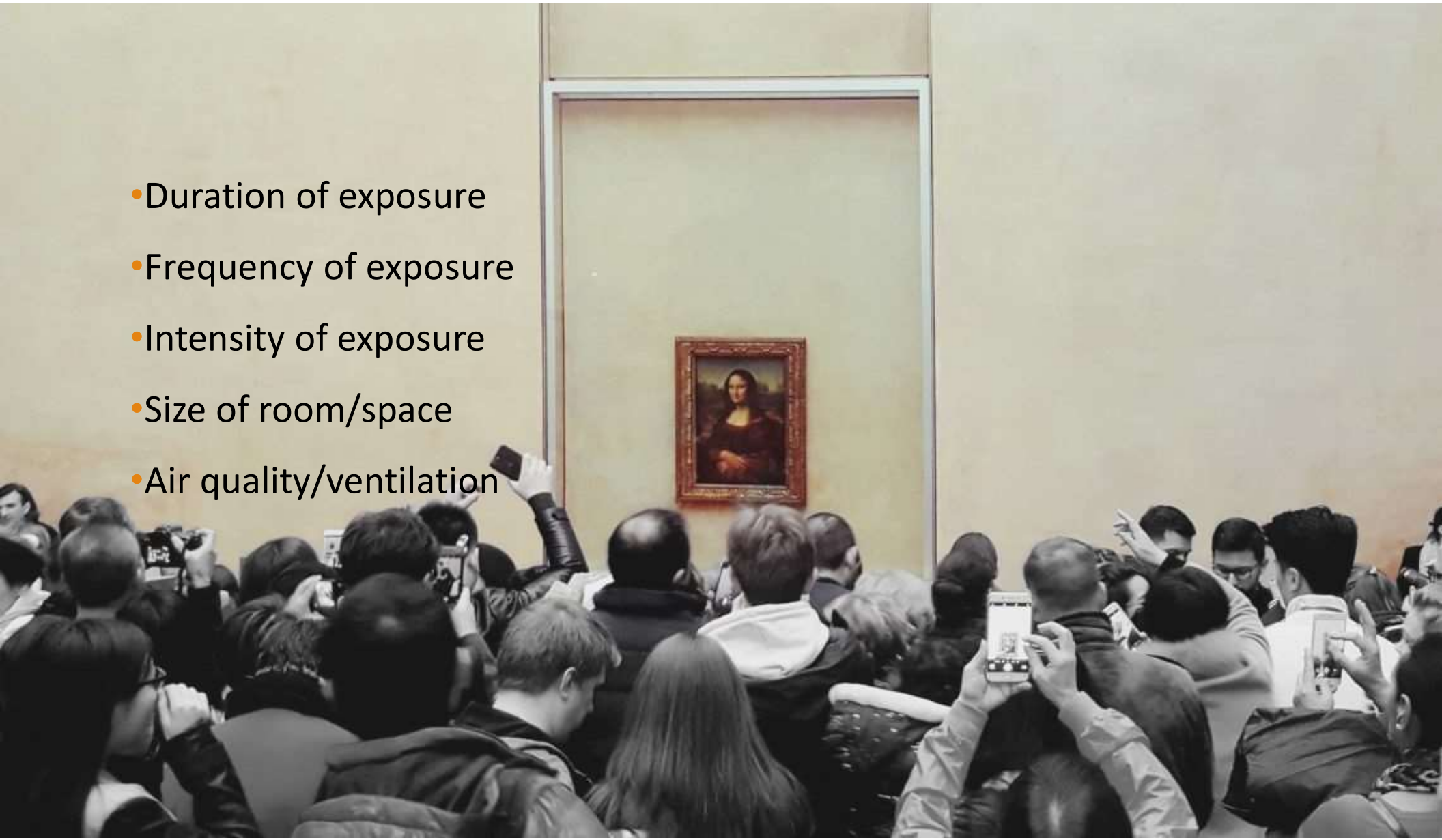
- Family members
- Friends
- Coworkers
- Church-family
- Club members
- Classmates



Eliciting Contact Information

Ask TB case, "During infectious period…":

- Who do you live with?
- Where do you work?
- Do you sit/work in close proximity with any of your coworkers?
- Do you have any close friends? How much time do you spend with them? Where?
- Do you belong to any clubs? What hobbies do you have? Do you go to church?
- What are the settings in which you're meeting these people, i.e. outside, in car, well-ventilated auditorium, cubicles at work, etc?


•Duration of exposure
•Frequency of exposure
•Intensity of exposure
•Size of room/space
•Air quality/ventilation

Environmental Factors to Disease Transmission

ENVIRONMENTAL FACTOR	LIKELIHOOD OF DISEASE TRANSMISSION	
	HIGH	LOW
Volume of shared air space	Low (small)	High (large)
Adequacy of ventilation	Poor	Good
Re-circularized air	Yes	No
Upper room ultraviolet light	Not present	Present

Prioritizing Contacts

If we're trying to eradicate TB, why don't we just assess all TB contacts, no matter how much time, frequency or intensity of the exposure?

- Balancing / allocating scarce resources
- Likelihood of infection

Highest Priority Contacts

- **Contacts most likely to be infected:**
  - People with close regular and prolonged contact with TB patient
  - Contact in small, poor ventilated places

- **Contacts at high risk of developing disease if infected (vulnerability):**
  - **Age** – children <5yrs of age
  - **Immune status** - HIV infected, on high doses of steroids
  - **Immunosuppressed** - certain types of cancer, on biologics
  - **Other medical conditions** – diabetes, silicosis, status after gastrectomy
  - **Injection of Illicit drugs**
  - **Low body weight** - 10% or more below ideal

Priority should be given to contacts exhibiting symptoms of active TB disease.

Timing of First Contact With Prioritized Contacts

High priority contacts are most likely to:

- Be infected
- Progress to TB disease
- Suffer increased morbidity or mortality from TB disease

High Priority
- 3-5 business days from initial encounter w/ index case

Medium Priority
- 14 business days

Low Priority
- Do we really need to assess?

Goals of Prioritizing Contacts

- Distinguish all recently infected contacts from those who are not infected.
- Identify likelihood of infection and the potential risks to the individual contact if infected.
- Prevent TB disease by treating those infected with LTBI or active TB disease.

Field/Site Visits

- Visiting TB patient's residence and other places where index case spent time while infectious.
- Follow infection control precautions at all locations.
- View and assess site characteristics, i.e. size of room, ventilation, crowding, etc.
- Look for signs of other contacts not yet identified, i.e. children's shoes on floor, yet no children have been listed as contacts.

Case Study - Initial Interview

- 40-year-old wife
- 2 daughters, 14 and 20 years old
- All live in same small freestanding home
- Immigrated to US in 2005
- Works as independent landscaper
- Attends weekly church services where 50 people attend service, and he is a deacon
- Spends all holidays and celebrations with extended family – approximately 20 people

Breakout #2!

LET'S PUT OUR KNOWLEDGE INTO PRACTICE

2ND DEBRIEF
IRIS'S GROUP PRESENTS

Identify potential contacts/exposure locations.
Identify high priority contacts.

Findings from CI Site Visits

PATIENT'S HOME:
- 3 household members (2 daughters & wife)
- Small house
- No central AC

Referring Physician's office:
- Respiratory station was used
- Patient was masked upon arrival
- 10 min of direct contact with the physician

CXR Technician:
- Respiratory station was used
- Patient was masked upon arrival
- < 5 min of direct contact

Church:
- Large building with high ceilings
- Good ventilation
- Services held once a week x 1 hour

Extended family members:
- Family holidays - gathered outside on sunny days

Priority should be given to locating and assessing contacts who:

1. Are exhibiting symptoms of TB disease
2. Are at risk for rapid development of TB disease (e.g., contacts < 5 years of age and contacts with weakened immune systems)
3. Had repeated or extended exposure to the case
4. Were exposed in an environment where transmission was likely, such as a small, crowded, or poorly ventilated room or vehicle
5. Were exposed during medical procedures that can release substantial numbers of *M. tuberculosis* into the air (e.g., bronchoscopy)

Developing a TB Contact Investigation Plan

- ☑ Gather case records and review information about case
- ☑ Initial TB case interview
- ☑ Determine infectious period
- ☑ Develop CI Plan, including, but not always in this order:
  - ☑ Prioritize contacts for assessment
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  - Schedule regular case/care plan conferences
  - Evaluate CI activities

Activities of Contact Assessment

Meet with contact

- Assure and maintain confidentiality
- Educate on purpose and process of TB testing and treatment
- Collect and confirm information

Conduct medical evaluation

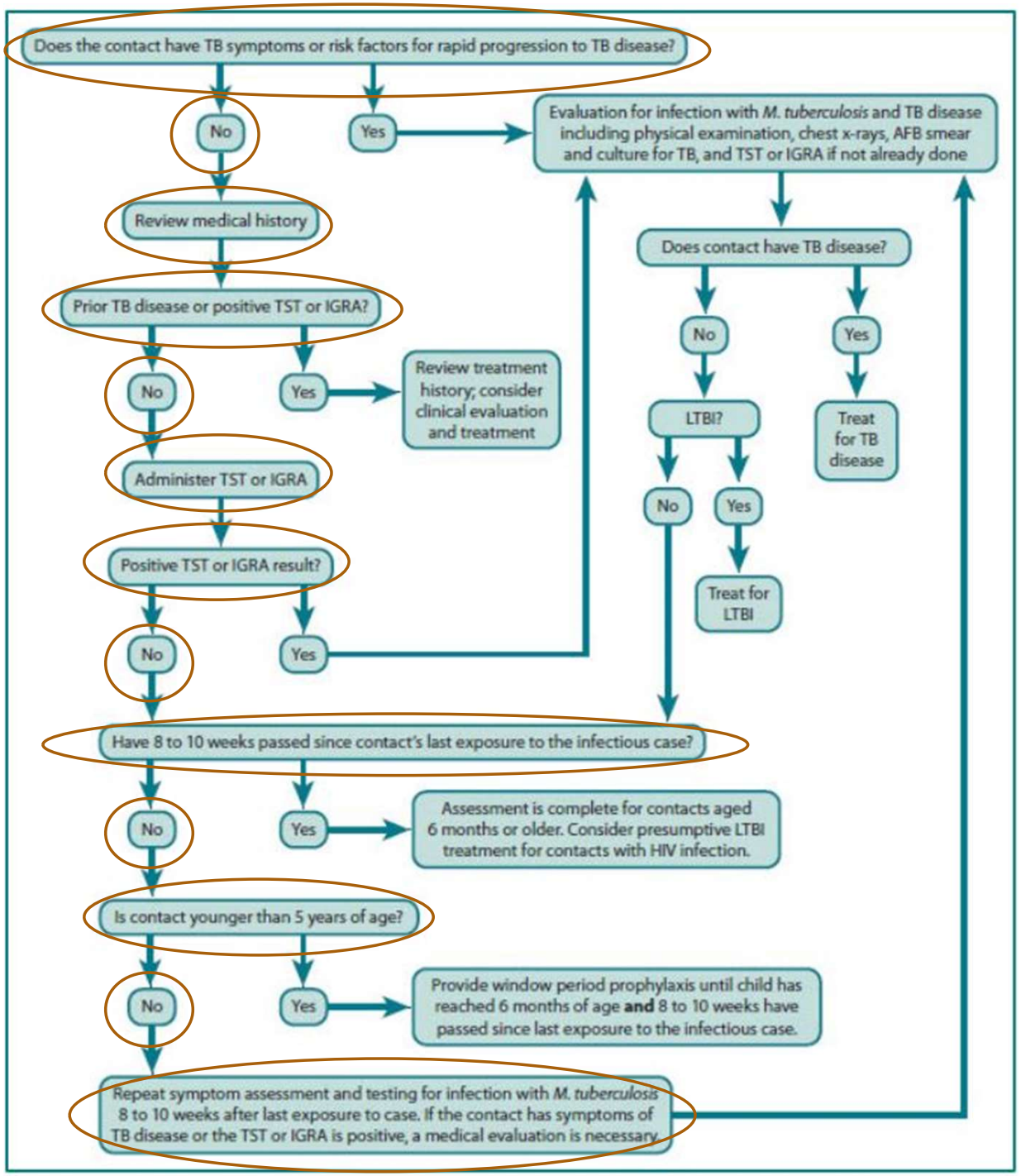
- Medical history
- TB history
- TB risk factors
- TB symptom review
- TST or IGRA – TST of ≥5mm = positive
- HIV test
- Children <5 years of age should receive CXR and be placed on window treatment if 1st round TB test is negative, once TB disease has been excluded

1st Round Testing of Contacts

- Test as soon as identified as contact
- Test with either TST or IGRA (depends on preference, availability, resources)
- If previously treated for TB or LTBI and/or if previously positive TB test, attempt to obtain documentation
- If you can't get the documentation, test again
- TST ≥ 5mm = positive for contacts to active TB case
- CXR on all positive TB tests and those with symptoms and children <5 years old (2-view on children/PA & lateral)
- Consider sputums if indicated
- After ruling out TB disease, contacts <5 years of age should start treatment for LTBI (window tx) even if they have a negative initial TST or IGRA result
  - LBTI treatment can be stopped if 2nd round testing (8-10 weeks after last exposure) = negative
  - If contact <6 months of age, LTBI treatment should be continued until contact reaches 6 months of age and a second TST/IGRA is negative

2nd Round Testing of Contacts

- If 1st round testing (initial test) is negative, perform 2nd round testing 8-10 weeks from last exposure to infectious case.
- Persons who live with TB case should undergo 2nd round testing 8-10 weeks from when TB case is deemed no longer contagious.
- If at 1st round testing, more than 8-10 weeks has passed since contact has had exposure to active TB case, no 2nd round testing is necessary.



Assessment and Management of TB Contacts

End of Infectious Period

Infectious period is closed when further transmission of TB is unlikely.

HOW LONG WILL IT TAKE

Criteria for Patients to Be Considered Noninfectious

Criteria
Patients can be considered noninfectious when they meet all of the following three criteria: 1. They have three consecutive negative AFB sputum smears collected in 8- to 24-hour intervals (at least one being an early morning specimen); 2. Their symptoms have improved clinically (for example, they are coughing less and they **no longer** have a fever); **and** 3. They are compliant with an adequate treatment regimen for 2 weeks or longer.

https://www.cdc.gov/tb/education/corecurr/pdf/chapter7.pdf

Case Study - High Priority Contacts

- HD identified wife and 2 children as high priority contacts
- Contact evaluation was initiated
- Results of family CI
  - No s/s of TB
  - No significant past medical history
  - No comorbids
  - First round testing
    - Wife = 00mm
    - 14-year-old = 00mm
    - 20-year-old = 00mm

Case Study - Status of Index Case

- Continued RIPE therapy
- Improved cough and resolution of all other symptoms at 2 weeks post treatment initiation
- Weekly sputum evaluation
- At 3 weeks post treatment initiation, sputums resulted AFB smear negative x 3
- Tolerating treatment without adverse effects

Breakout #3!

LET'S PUT OUR KNOWLEDGE INTO PRACTICE

3RD DEBRIEF
MARYBEL'S GROUP PRESENTS

Determine the end of the infectious period.

Determine the date for 2nd round testing

3RD DEBRIEF
MARYBEL'S GROUP PRESENTS

Determine the end of the infectious period.

Determine the date for 2nd round testing

2015

January

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

End of infectious period

February

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

March

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

April

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

CASE STUDY
Marybel present conclusion

Second round testing was performed April 6, 2015. The index case's wife and two daughters were tested and resulted TST 00 mm. The contact investigation was not expanded because there was no evidence of recent transmission. The index patient continued to complete 9 months of anti-tuberculosis treatment.

Developing a TB Contact Investigation Plan

- ☑ Gather case records and review information about case
- ☑ Interview case
- ☑ Determine infectious period
- ☑ Develop CI Plan, including, but not always in this order:
  - ☑ Prioritize contacts for assessment
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  - Determine whether to expand or conclude investigation
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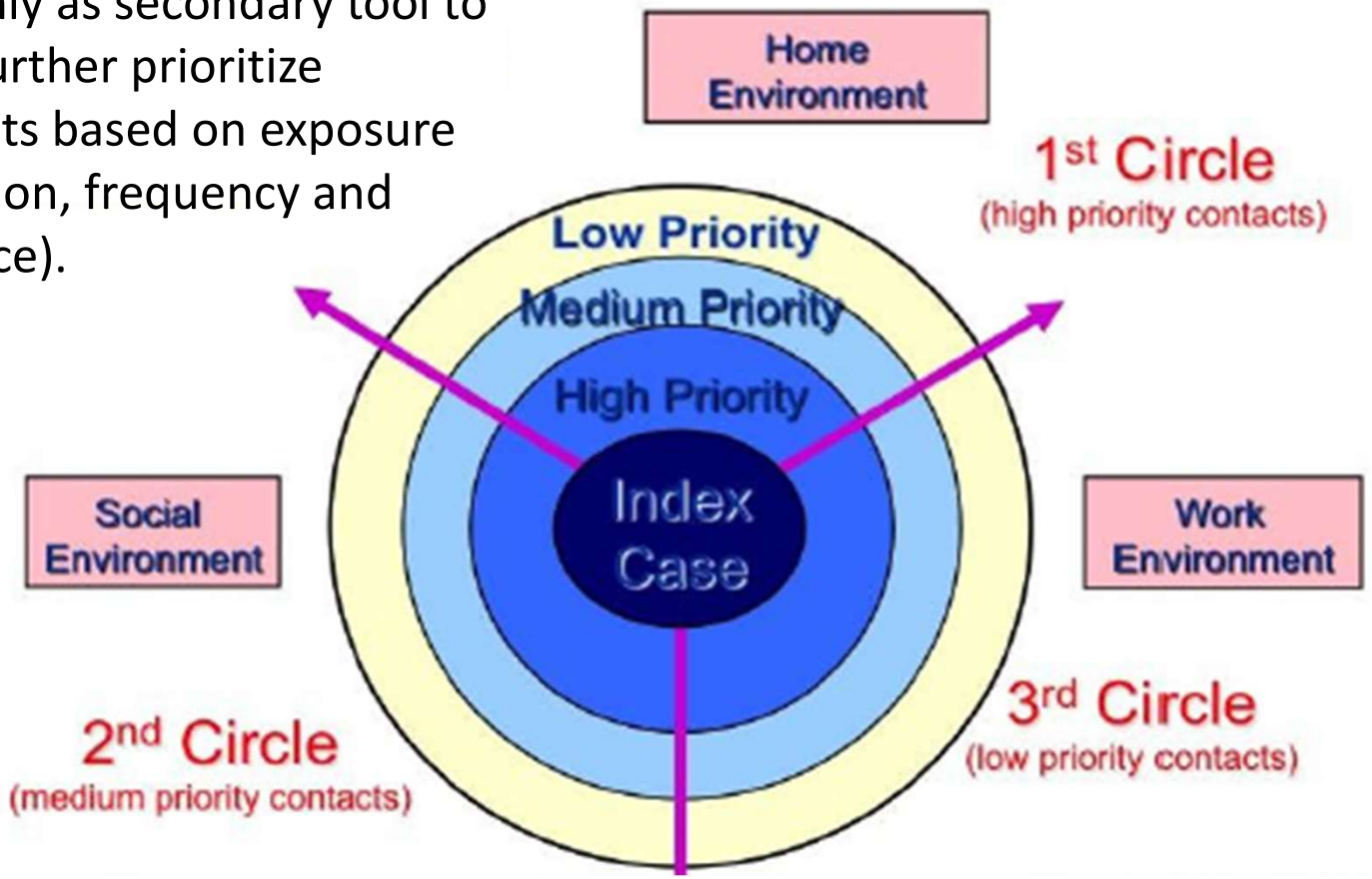
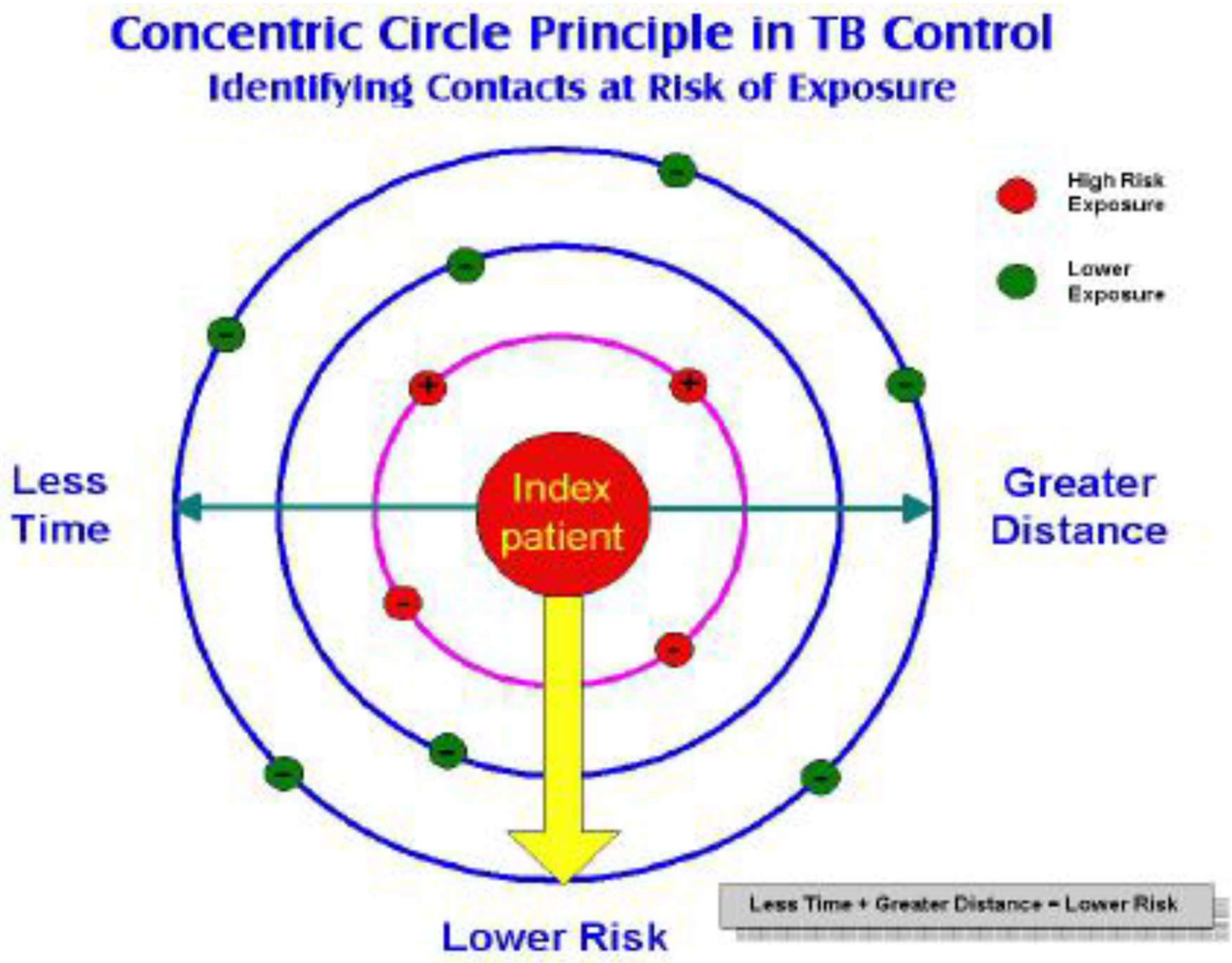
  - Schedule regular case/care plan conferences
  - Evaluate CI activities

Concentric Circle

Use only as secondary tool to help further prioritize contacts based on exposure (duration, frequency and distance).





https://www.maine.gov/dhhs/mecdc/infectious-disease/documents/pdf/presentations/13_Woods.pdf

When to Expand TB Contact Investigations

Utilizing concentric circle model, ask yourself these questions:

- Does your data indicate that contacts already tested have an infection rate greater than would be expected in your community?
  - For example: unexpectedly high rate of infection/TB disease in high-priority contacts (e.g., 10% or at least twice rate of similar population without recent exposure, whichever is greater).
- Do you have large number of contacts with change in TB tests from negative to positive between 1st and 2nd round testing?
- Have you found TB disease in any contacts who had been assigned low priority or TB disease in those previously not identified as contacts?
- Did you find infection in any contacts < 5 years of age?

When to Expand TB Contact Investigations, continued

If answers to previous questions were YES:

- Expand CI until rate of positive TB tests for contacts is indistinguishable from prevalence of positive results in community.
- Advantage to this approach - contacts with less exposure are not sought until evidence of transmission exists.

If data from an investigation indicates more transmission than anticipated, more contacts might need to be included.

Case Study - 2nd Round Testing

- 2nd round testing performed on 4/8/2015
- Family TST = 00mm
- CI was not expanded as there was no evidence of recent transmission
- Index case successfully completed 9 months of anti-TB treatment

Evaluating Contact Investigation Activities

What is the purpose of evaluating our CI activities?

- Were an appropriate number of contacts identified?
- How many contacts were identified with LTBI? With TB disease?
- How many contacts accepted, started and completed treatment?
- Were there contacts you were unable to find? If so, what approaches did you take and what other ideas could you consider in the future?
- Were all timelines met?
- Did you 2nd round test all appropriate contacts?
- If the CI was expanded, was this appropriate? Helpful? Useful?
- Were any contacts lost to follow up? Why? Is there anything you could've done to successfully complete testing?

Developing a TB Contact Investigation Plan

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- Interview case
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  - Schedule regular case/care plan conferences
  - Evaluate CI activities

Reflection

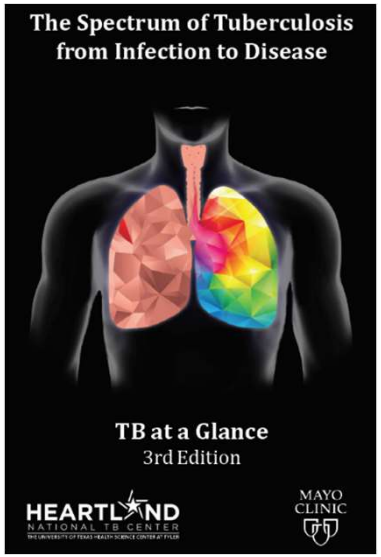
- We determined we had an infectious TB case and calculated his infectious period.
- A contact investigation was initiated.
- Contacts were identified and prioritized.
- High priority contacts were assessed and tested.
- Evaluation of the contact investigation results determined the CI did not need to be expanded.
- Review or our CI identified the strengths and weaknesses of our efforts.
- These determinations will help us better our CI efforts and results in the future.

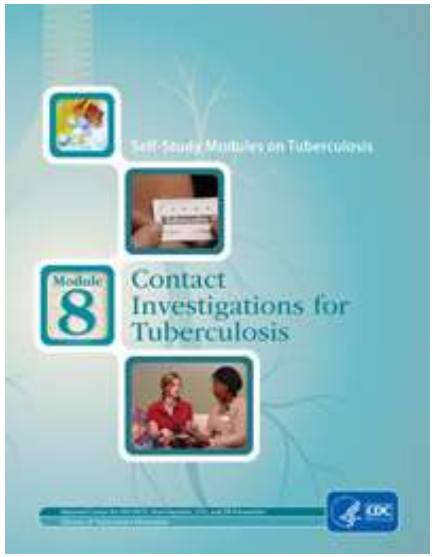
Remember…

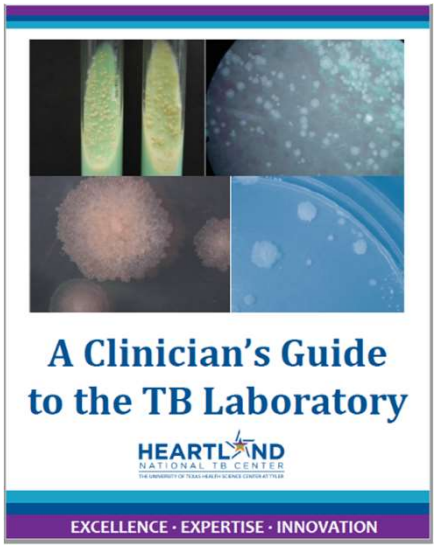
- TB is preventable, treatable and curable.
- A decision to test is a decision to treat.
- All TB patients were once TB contacts.

Contact investigations are an essential component to TB control and prevention.

Thank you!







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Course survey and CEU Instructions

To receive your CEUs, please complete this survey and follow the **9 Simple Steps** for obtaining your CEUs.

Survey Link: https://www.surveymonkey.com/r/ICSCIApril15