

TB & Infection Control

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Beaumont

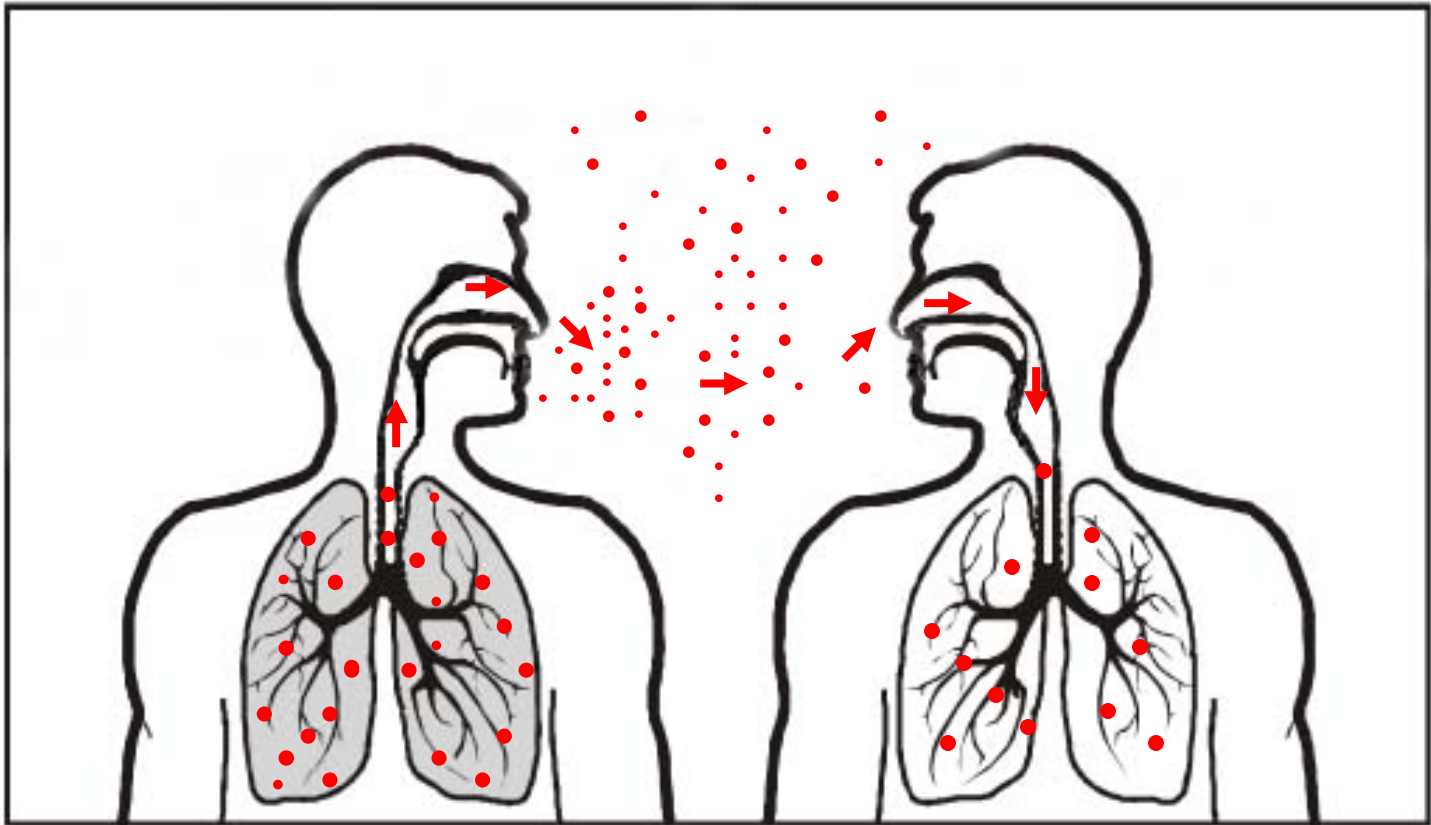
Objectives

- When to place a patient  isolation
- When to remove a patient  isolation
- How to best  you and your staff from TB infection
- How to **REDUCE** the duration of isolation

Terminology.....

- Administrative controls
- Airborne Infection Isolation (AII)
- Cough-inducing procedures
- Environmental controls
- Fit test
- HEPA Filter
- Negative pressure
- Personal respirator N95
- Surgical mask
- UV light

TB Transmission (4)



Dots in air represent droplet nuclei containing
M. tuberculosis

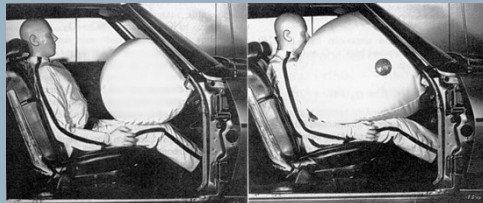
Hierarchy of Automobile Safety



Watching the Road Ahead



Brakes



Air Bags

Hierarchy of Infection Control



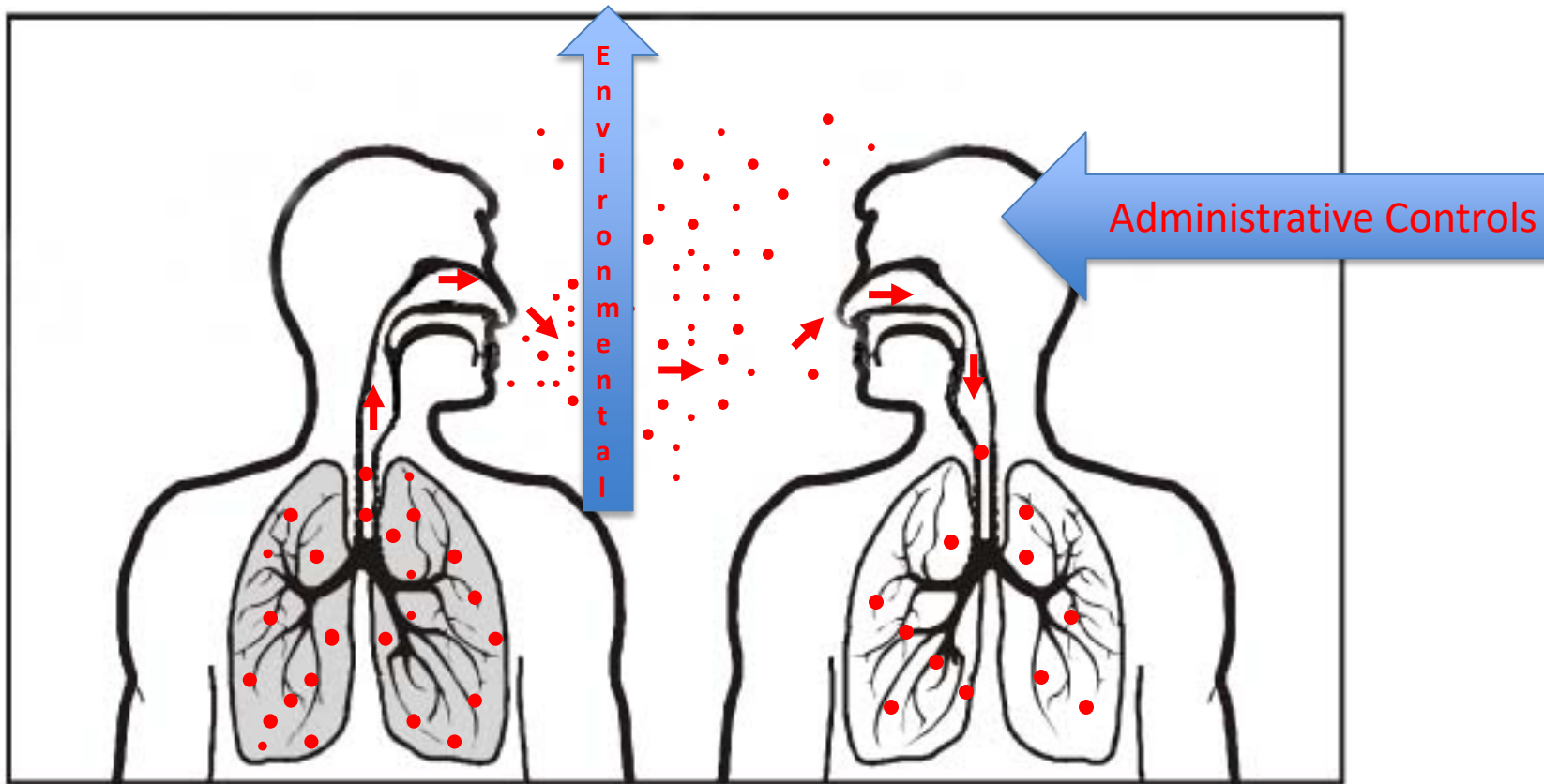
Administrative Controls



Environmental Controls



Respiratory Protection



Administrative controls are the first and most important level of the hierarchy.

Environmental controls reduce airborne aerosols.

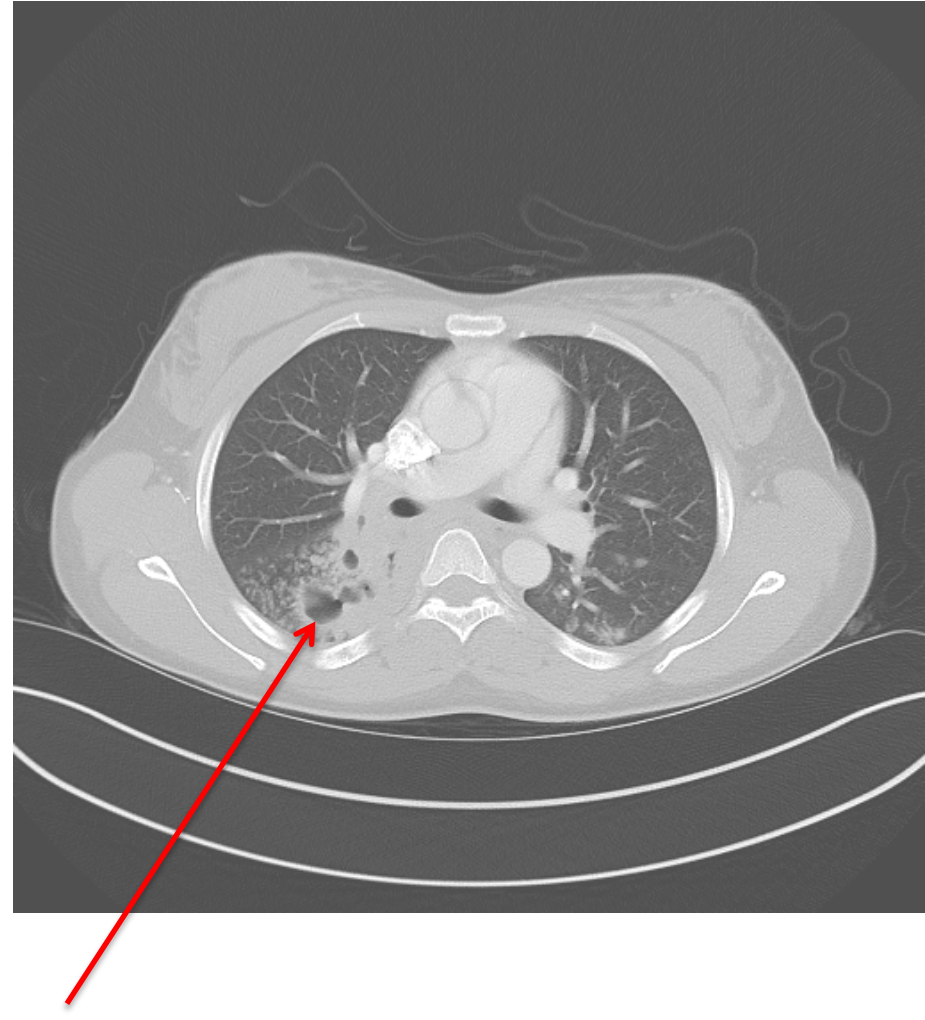
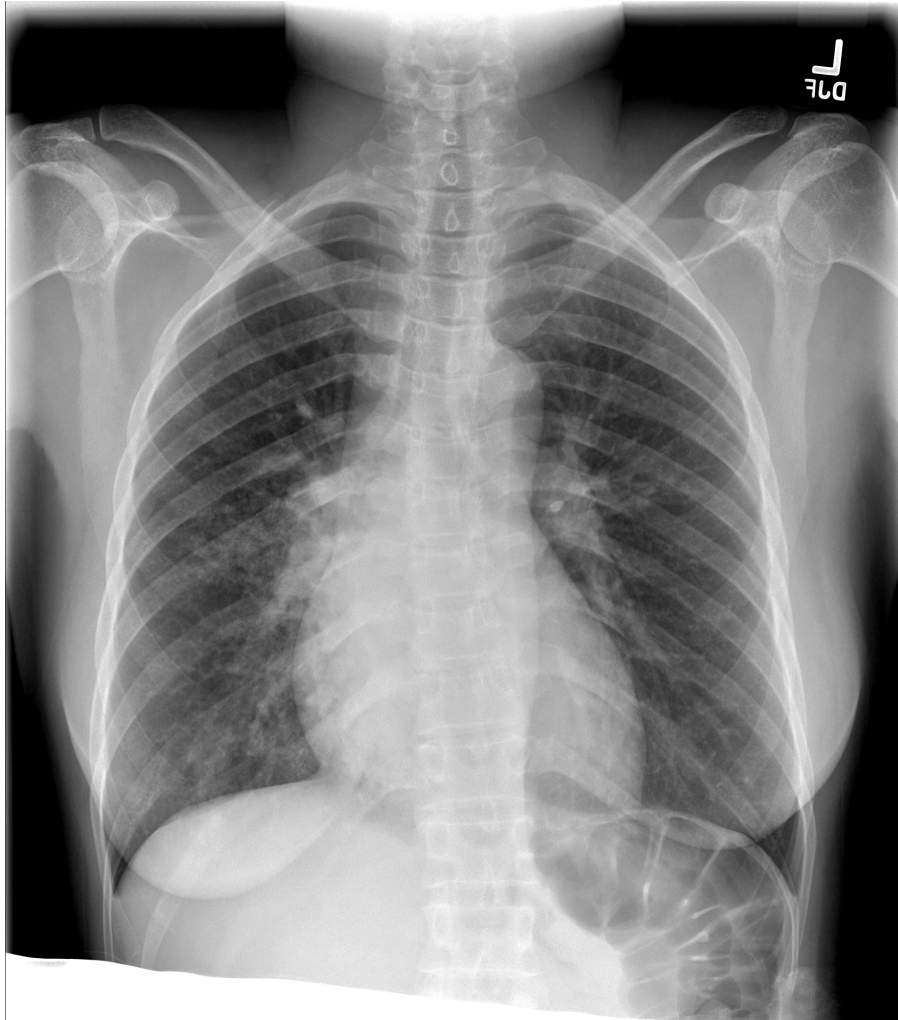
Suspect TB if...

- Cough > 2-3 weeks
- Gross hemoptysis
- Exposure to TB?
- +PPD or IGRA?
- From endemic country?
- Substance abuse or HIV?

My hospital ER August 2018

- *“Blood in vomit, x 1 day, pt reports 30 weeks pregnant, some abdominal cramping, denies vaginal bleeding. pt states blood tinged sputum with cough also; pt does report dx pneumonia 1 month pta and hospitalization at st joe's”*

- ER physician notes gross hemoptysis 2 tablespoons.
- Notes patient from Guinea in 2016
- Airborne Infection Isolation ordered before
X-rays



What was the most important component for Infection Control?

- **Administrative component**
- Cognitive awareness on the part of ER physician
- Isolate 10 patients to discover 1 case of active TB!

7 factors that affect the infectiousness of a TB patient.

- Presence of a cough
- Chest x-ray showing cavity in lung
- Positive acid-fast bacilli sputum smear result
- TB of lungs, airway, or larynx
- Patient not covering mouth or nose when coughing
- Not receiving adequate treatment
- Undergoing cough-inducing procedures

Airborne Infection Isolation (AII)

- Private room
- Negative pressure with 6-12 air exchanges per hour
- Signage
- N95 respirators

AIRBORNE ISOLATION

العزل الهوائي



يجب على جميع الزوار التوجه الى مكتب التمريض قبل الدخول

غرفة الضغط السلبي مغلقة الأبواب.



قناع N95 للعاملين الصحيين.



نقل محدود للمريض.



قناع عمليات للمريض المنقول والزوار.



معقم لليدين.



الصحة

Ventilation Technologies (6)

Mechanical Ventilation

- AII rooms are designed to prevent spread of droplet nuclei expelled by patient
 - Negative pressure
 - Clean air flows from corridors into AII room
- Air cannot escape AII room
 - Exhausted outdoors or passed through filter

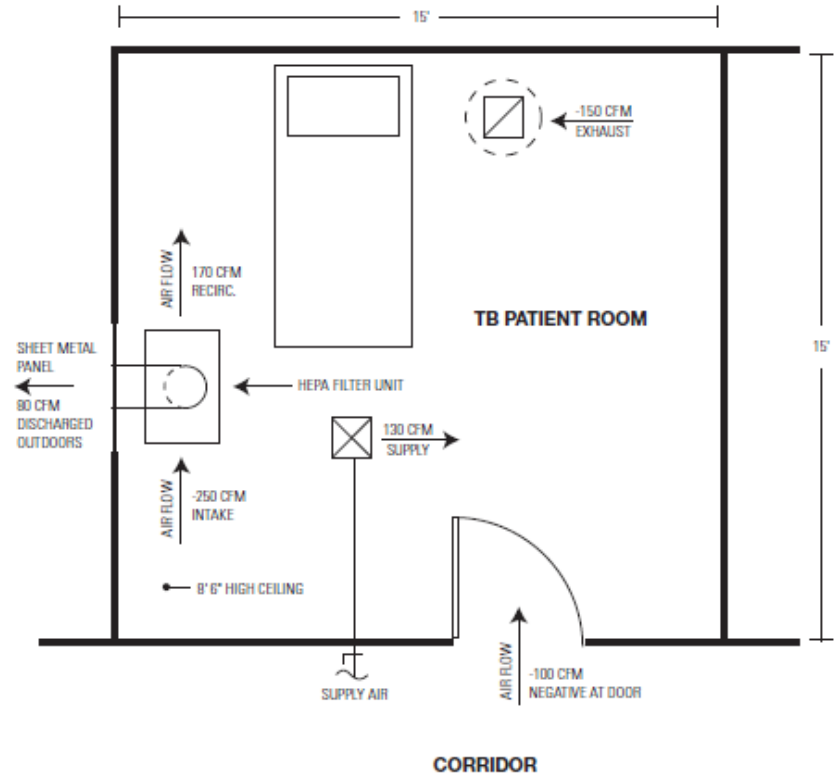


Image credit: Francis J. Curry National TB Center

Respirator for Health-Care Workers

- Health-care worker wearing a respirator



- Respirators
 - Designed to filter out droplet nuclei from being inhaled by the health-care worker and other individuals
 - Should properly fit different face sizes and features
 - Should NOT be worn by the patient



Surgical Mask for Persons with Infectious TB Disease

- Infectious TB patient wearing a surgical mask
- Surgical masks
 - Designed to stop droplet nuclei from being spread (exhaled) by the patient
 - Should NOT be worn by the health-care worker



What is a placebo mask?

- Only 1 strap, instead of 2
- Held to face with a hand
- Facial hair interferes with seal



The pregnant TB patient is moved from ER to an Isolation Room on the Medical Floor.....

- When can the ER room be used again?
- 46 minutes to remove 99% of airborne contaminants
- **60 minutes** is considered adequate.
- MMWR Dec. 30, 2005

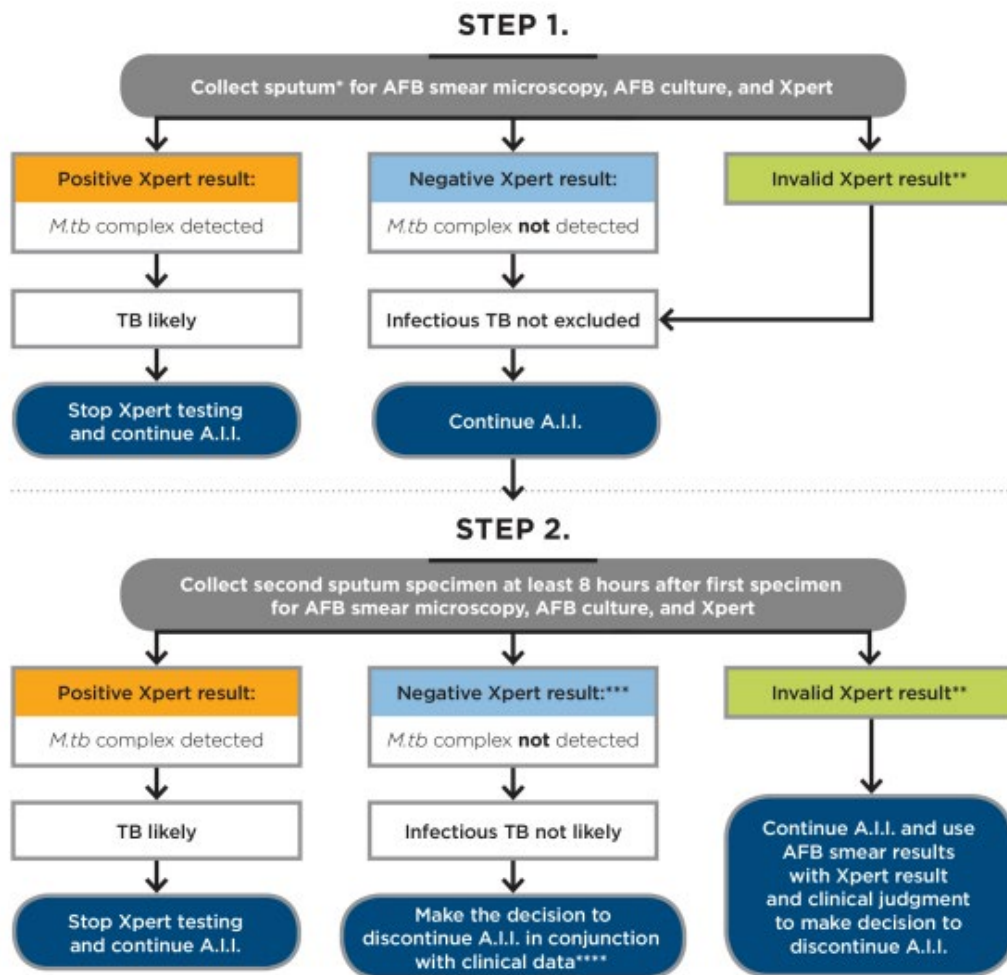
>90% of Isolation patients don't have TB. How do we get them released quickly?

- Sputum quality critical
- Induce with nebulizer if needed
- AFB smear
- Plus NAAT (PCR) regardless whether AFB smear is positive or negative.



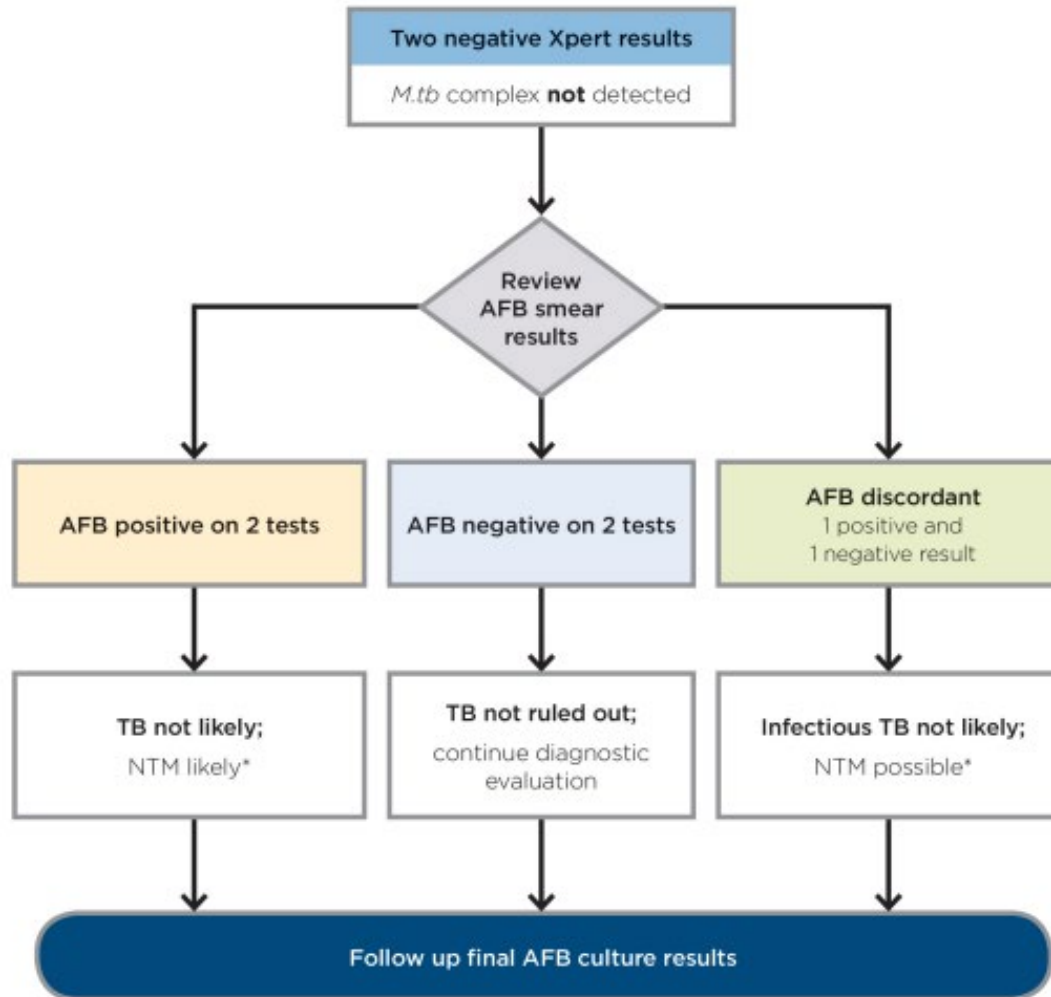
Consensus statement on the use of
Cepheid Xpert MTB/RIF[®] assay in making
decisions to discontinue **airborne infection
isolation** in healthcare settings

Use of GeneXpert in Discontinuing Airborne Infection Isolation



M. tb: *Mycobacterium tuberculosis* A.I.I.: Airborne infection isolation

Application of AFB Sputum Smear Microscopy to Negative Xpert Results



Remove from Isolation?

- Airborne precautions can be discontinued when infectious TB disease is considered unlikely and either
 - Another diagnosis is made that explains the clinical syndrome,
 - The patient has three negative AFB sputum smear results, or
 - The patient has a sputum specimen that has a negative NAA test result and two additional sputum specimens that are AFB-smear negative.*
- or*
- GeneXpert[®] neg x 1 (or 2) - *Good* Sputum samples!**

Duration of Isolation after TB treatment started ?

- Patients rapidly become noninfectious after effective multiple-drug chemotherapy instituted.
- Rapid elimination of viable MTB from sputum, and reduction in cough frequency.
- But no ideal test exists to assess the infective potential of a TB patient.

Once TB treatment started, sputum smears may remain positive....

	AFB SMEAR	NAAT	AFB CULTURE
Before treatment	+++	++	Positive
14 days	++	<i>Do not repeat</i>	Positive
28 days	+	<i>Do not repeat</i>	Negative
60 days	--	<i>Do not repeat</i>	Negative

Start INH, RIF, PZA, EMB

- 90% reduction in viable MTB in 48 hours
- 99% reduction by 14-21 days of treatment.

- Is patient going home, or remaining in hospital?

Going Home

- No minimum number of days of anti-TB treatment before going home if:
 - On treatment, likely to be susceptible
 - Showing clinical improvement
 - DOT arranged
 - Home Isolation agreement
 - Does not need negative AFB smears

Home Isolation

- Capable of self care
- Cooperative
- Not sharing room with immunocompromised persons or children (TST or IGRA negative)
- DOT agreement

Criteria for determining when during therapy a patient with pulmonary TB has become noninfectious (MMWR Nov. 4, 2005)

- Negligible risk of MDR TB
- Received standard TB treatment 14-21 days
- Complete adherence by DOT
- Clinical improvement
- Close contacts identified and evaluated.
- AFB smears show reduced or negative organisms

Returning to work or school

- 14 days treatment
- Clinical improvement
- Number of AFB decreasing
- Appropriate worksite
- Outdoor work or solitary work may return earlier

Questions?

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Interactive Question #1

- Question: A nurse has been treated in 2015 for latent TB infection. Is this nurse required to wear an N95 mask to care for a TB suspect in Airborne Infection Isolation?
- Yes?
- No?

Answer #1

- Question: A nurse has been treated in 2015 for latent TB infection. Is this nurse required to wear an N95 mask for Airborne Isolation patient?
- **Yes?** *Prior TB infection does not confer immunity. Reinfection can occur. N95 mask necessary*

Interactive Question #2

- Question: A confirmed TB patient is discharged home at 2PM. His room can be occupied by a new patient at:
- 2:30 PM
- 3:30 PM
- 9:00 PM
- 8:00 AM the following day

Answer #2

- Question: A confirmed TB patient is discharged home at 2PM. His room can be occupied by a new patient at:
- **3:30 PM** *A minimum of 60 minutes is needed for ventilation systems to remove 99% of aerosols from a room.*

Interactive Question #3

- **Question:** Drug-susceptible pulmonary TB is confirmed, and my patient has been on DOT for 6 weeks. He feels much improved, cough is resolved. AFB on smear has reduced from 4+ to 1+. Does this mean treatment is failing, or drug resistance has occurred?
- Yes?
- No?

Answer #3

- **Question:** Drug-susceptible pulmonary TB is confirmed, and my patient has been on DOT for 6 weeks. He feels much improved, cough is resolved. AFB smear has dropped from 4+ to 1+. Does this mean treatment is failing, or drug resistance has occurred?
- *No. The overall clinical picture is showing improvement, and AFB smears are showing reduced organisms. Dead AFB may remain visible on smears for several weeks. Consult your TB physician for guidance.*