

Tuberculosis: Suspect, Case, Reporting

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2012



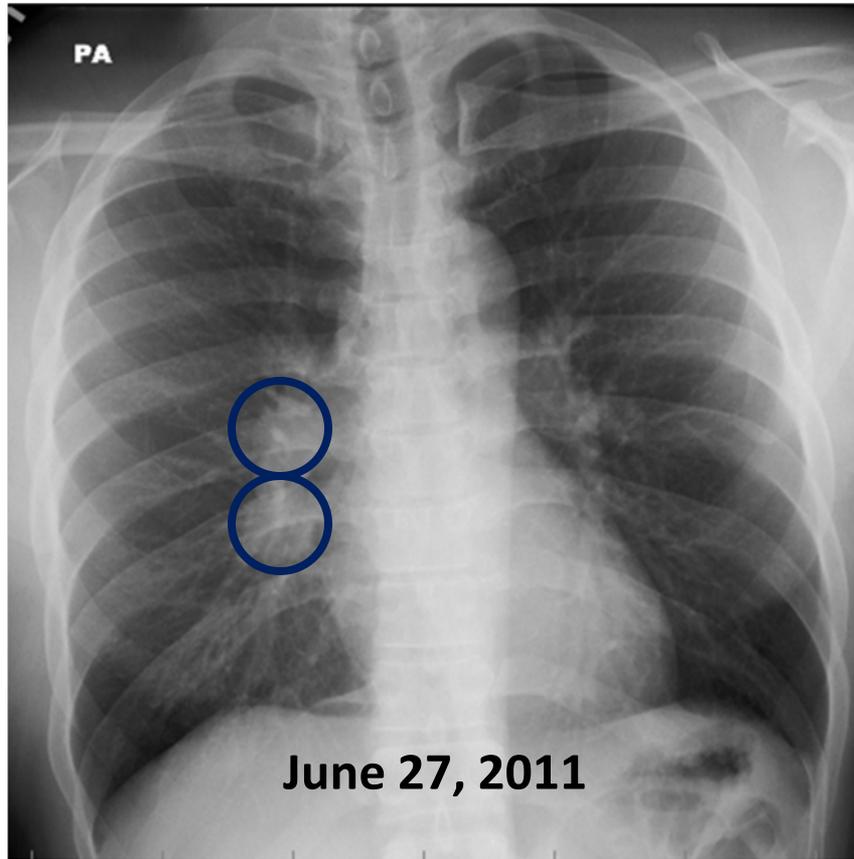
Understanding This Presentation

- These are real cases that are meant to demonstrate pit-falls in diagnosing TB
- The quotes are from the radiologists' reports
 - Note how often TB is missed
- We hope to improve the diagnosis, initial management, & reporting of
 - TB suspects
 - TB cases, laboratory confirmed
 - TB clinical cases
 - TB provider diagnosed

Case 1

37 Year Old AA Man, Cough for 2 Months

- Urgent Care – amoxicillin (no chest x-ray)
- 6/27/2011 ED Local Hospital
 - Signed out as “bronchitis & abnormal chest x-ray”
 - No antibiotic prescribed
 - Fluoroquinolones are anti-tuberculosis medications that
 - Make people with TB feel better.
 - Can turn TB cultures negative, making it difficult to identify the organism & obtain drug susceptibility
 - May promote drug resistance used alone



“Bilateral **hilar enlargement** right more than left. Finding could be **vascular** in nature, however the possibility of **neoplastic** processes such as lymphoma, or **sarcoidosis** cannot be completely excluded. **Clinical correlation** is recommended to determine need for further evaluation by means of a nonemergent enhanced **scan of the thorax.**”



“Enlarged pulmonary hila, unchanged. No active parenchymal disease.”

TB?

Who is at risk for exposure to or infection with TB?

- Close contacts of person known or suspected to have active TB
- Foreign-born persons from areas where TB is common
- Persons who visit TB-prevalent countries
- Residents & employees of high-risk congregate settings
- Health care workers (HCWs) who serve high-risk clients

TB skin test 5 mm is +

TB In Detroit 2010*

• Cases	51
• Incidence	5.6 per 100,000 population
• Alcohol abuse	25.4%
• Injection drug use	7.8%
• Non-injection drug	31.3%
• HIV +	7.8%
• Homeless	15.6%
• Unemployed	41.1%
• Black	90.2%
• US Born	88.2%

**Children, adolescents
exposed to high risk adults.**

•DDHWP jurisdiction

Who is at risk for TB after exposure or infection?

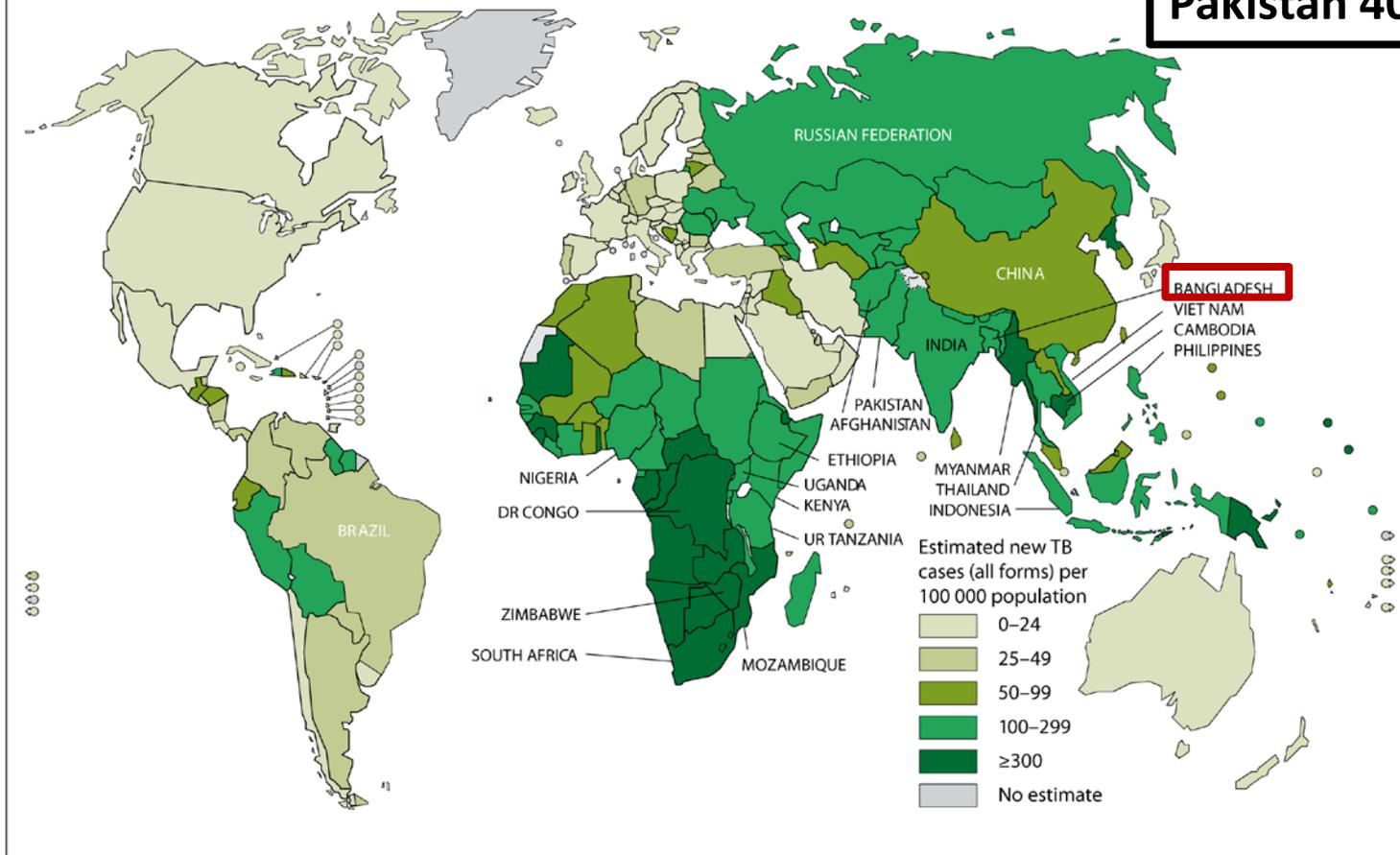
- Immune suppression
 - HIV
 - Organ transplants
 - Prednisone >15 mg/day \geq 1 month
 - TNF- α antagonists (infliximab, etanercept, adalimumab)
- Stable chest x-ray consistent with old healed TB
- Children <4 years old
- Silicosis, **Diabetes**, ESRD, underweight, low dose corticosteroids, cancer head & neck

TB skin test 5 mm is +

8.8 Million New Cases
128/100,000
38% from India & China

India 2.25 million
China 1.05 million
S Africa 495,000
Indonesia 455,000
Pakistan 405,000

Estimated TB incidence rates, 2010



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

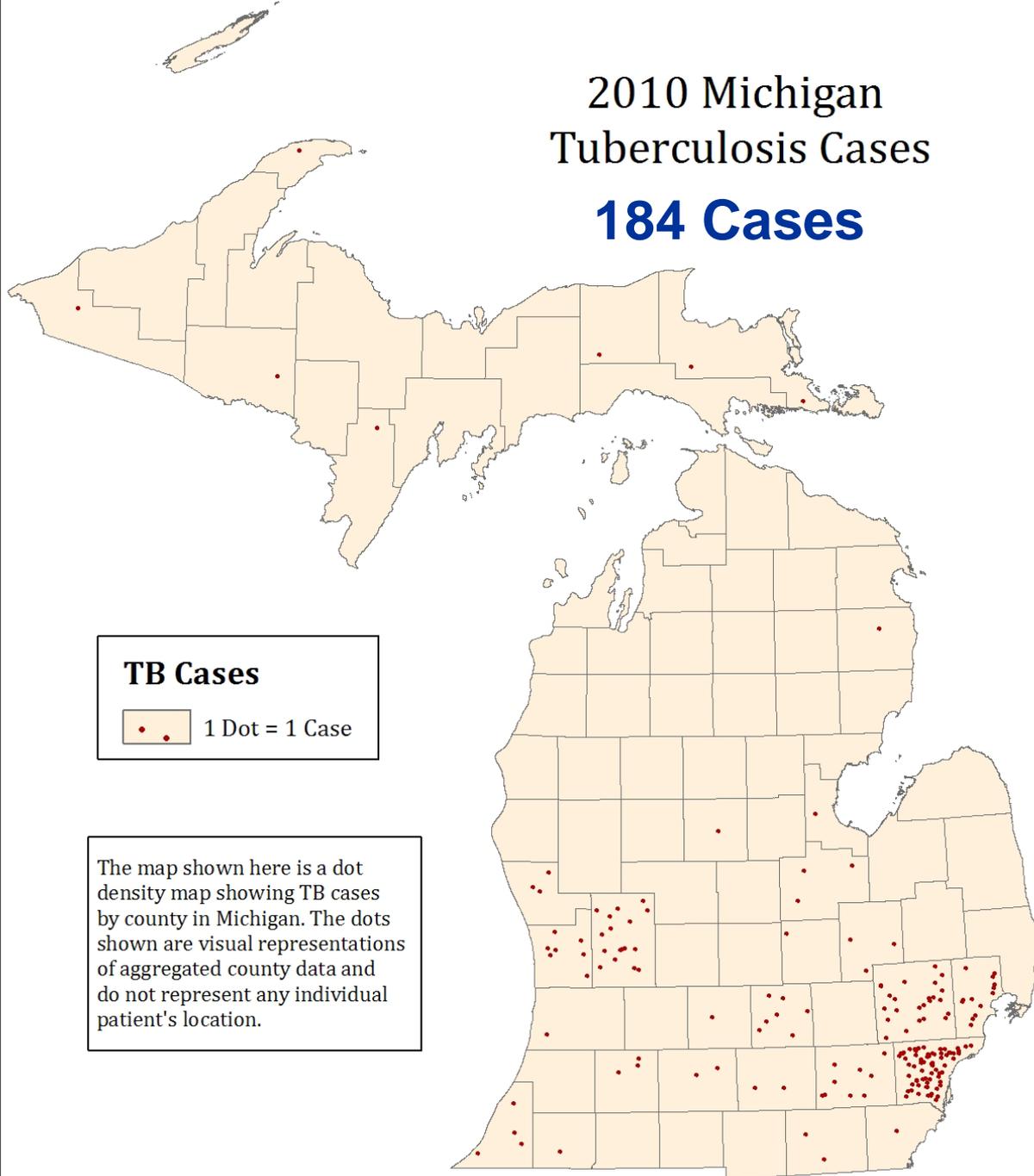
Source: *Global Tuberculosis Control 2011*. WHO, 2011.



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2010 Michigan Tuberculosis Cases

184 Cases



TB Cases

1 Dot = 1 Case

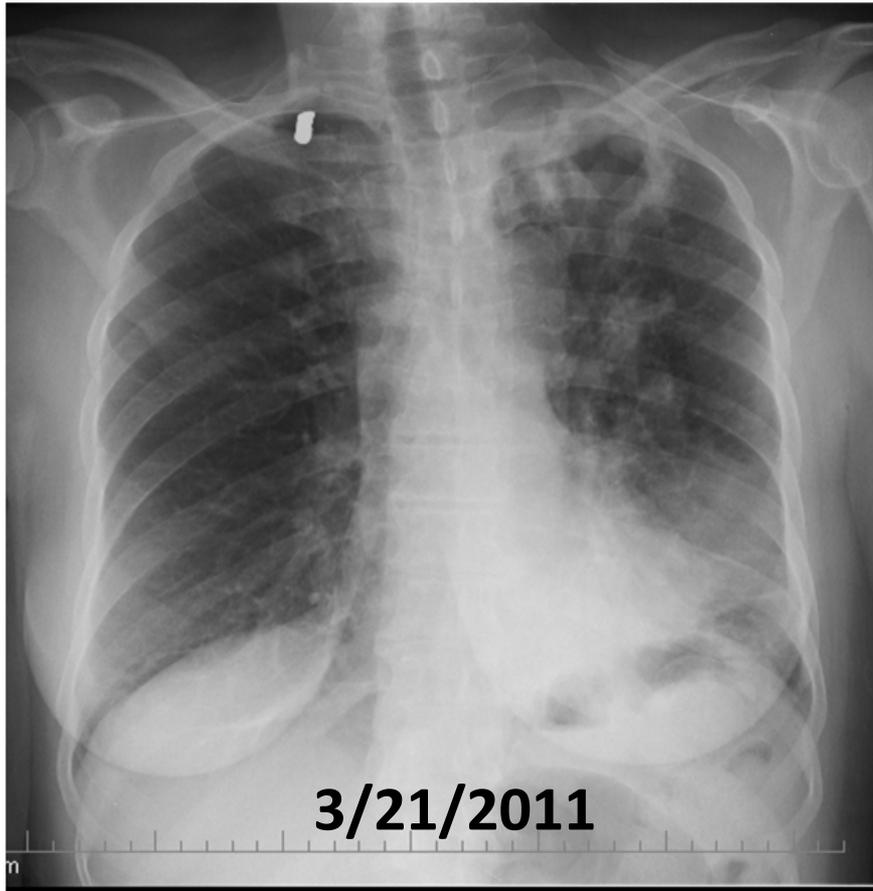
The map shown here is a dot density map showing TB cases by county in Michigan. The dots shown are visual representations of aggregated county data and do not represent any individual patient's location.

**>58 % cases in
Detroit Metro
Area, (Wayne,
Oakland, Macomb
counties)**

Case 2: 55 Year Old Woman

- **Bi-Polar**
- **Substance abuse**
- **Attends methadone clinic**
- Fever, chills, cough, sputum X 1 month
 - Outpatient antibiotics by primary care doctor

Diagnosis Pneumonia: Rx Doxycycline in the ED

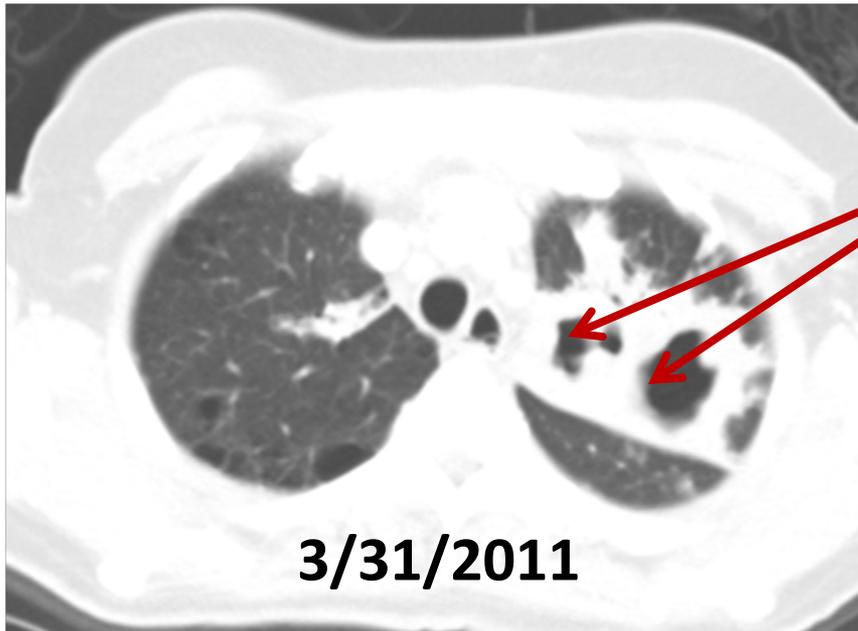


“New infiltrate with atelectasis is identified in the left lower lobe. Ill-defined parenchymal density is also present in the left upper lobe with a focal **central area of lucency which may represent cavitation**. Cardiac size is normal. A metallic bullet fragment projects in the right apex. The right lung is clear except for streak atelectasis. Multilevel spurring is present in the dorsal spine.

CONCLUSION:

Left upper and lower lobe infiltrates with atelectasis.”

A Prolonged Pneumonia, Sepsis Failed Outpatient Treatment



1. **Cavitary pneumonia** of the left upper lobe.
2. Left lower lobe pneumonia with small pleural effusion.
3. **Fibrosis and honeycombing** of the right lung apex and base.
4. Bullet in the right posterior thoracic wall”

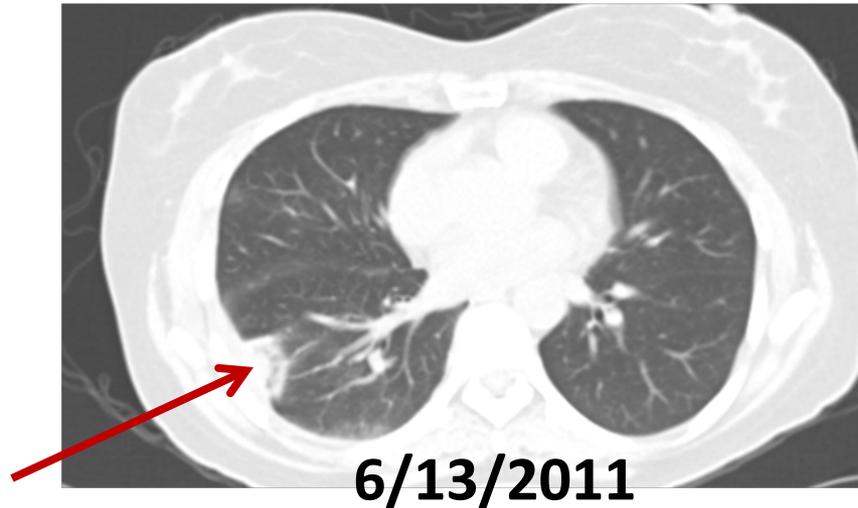
Admitted, no isolation, Rx Cefepime & Vancomycin, Erythromycin, Ceftriaxone, “breathing treatments”

Case 3: 46 Year Old **Foreign Born*** Woman with Multiple Medical Problems

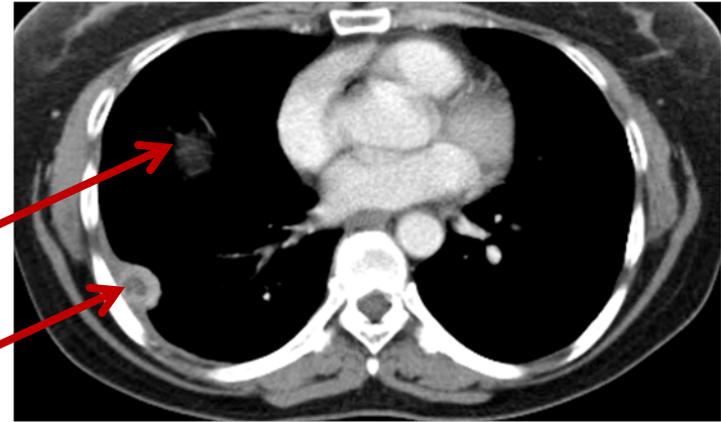
- In USA for 20 years
- Never-smoker
- **Diabetes**, hypercholesterolemia
- Multiple admissions since 2004
 - 2004 – Endometriosis, Exploratory lap
 - 2007 – Cholecystectomy
 - 2008 – Craniotomy, subarachnoid bleed (other hospital)
 - Degenerative joint disease, headaches
- Cough starting about April, 2011

*** High TB Burden Country**

CT Scans 6/13, 6/28, 7/5, 8/18



“2.5 cm rounded pleural based **heterogeneous** soft tissue **mass** as discussed. Unless indicated sooner on a clinical basis, recommend **3-month follow-up** enhanced chest CT to further characterize. An alternative to obtain in the same **added specificity would be to obtain PET/CT** imaging at this time, if clinical suspicion for aggressive etiology is present.”



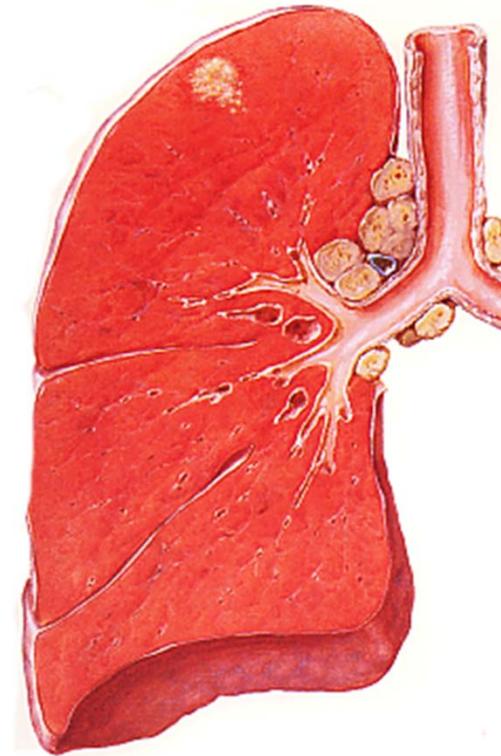
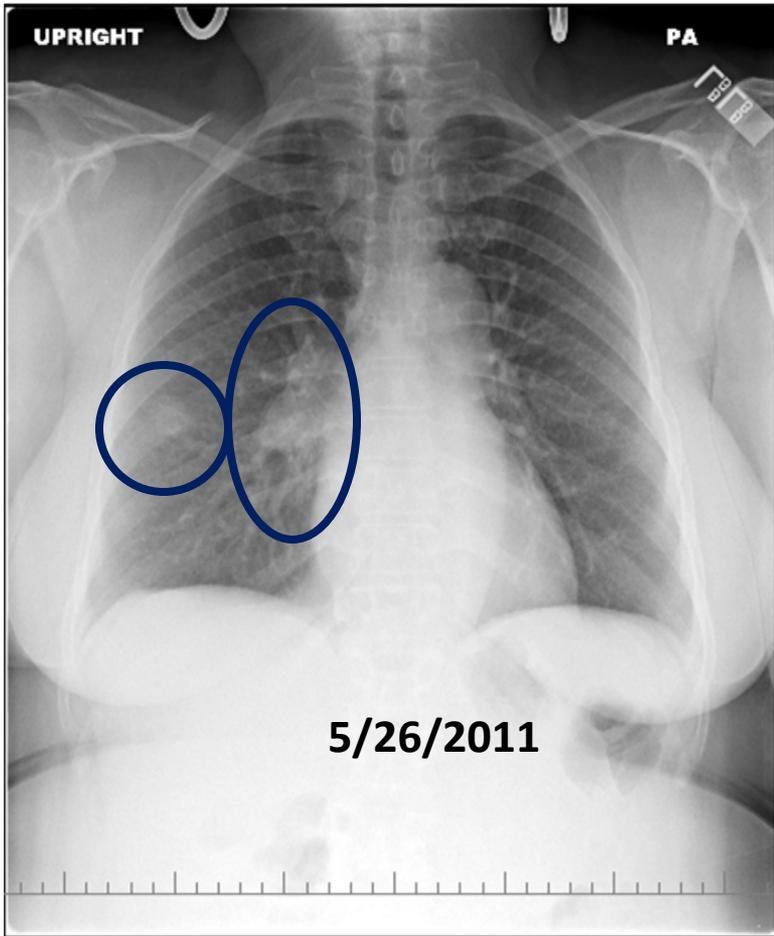
8/18/2011

- “Interval development of a new 1.1 cm pleural-based **mass** in the posteromedial aspect of the superior segment of the right lower lobe. Interval **increase in size of the necrotic right pleural-based mass** and **right subcarinal lymph node**. Constellation of findings worrisome for **metastatic disease**. The need for further evaluation with **PET/CT** and/or biopsy should be determined clinically”

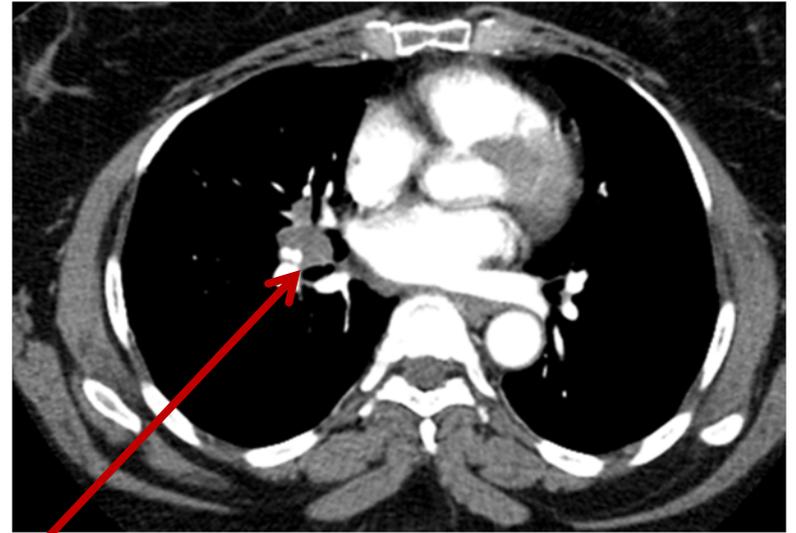
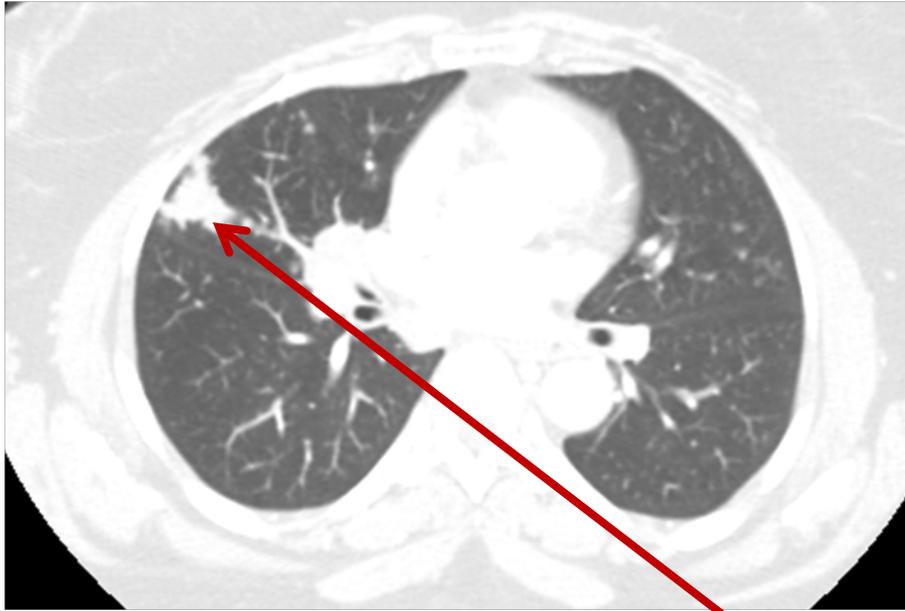
9/1/2011

- Thoracotomy
 - Wedge resection RLL “mass”
 - Wedge resection RUL “mass”
 - Mediastinal LN sampling
- Pathology
 - Necrotizing granulomas, no AFB
- No treatment, no report
- 9/2 tissue culture for mycobacteria reported +
10/18 – Health Department notified

Case 4: **Health Care Worker** Never Smoker, Cough



Frank Netter, Primary TB

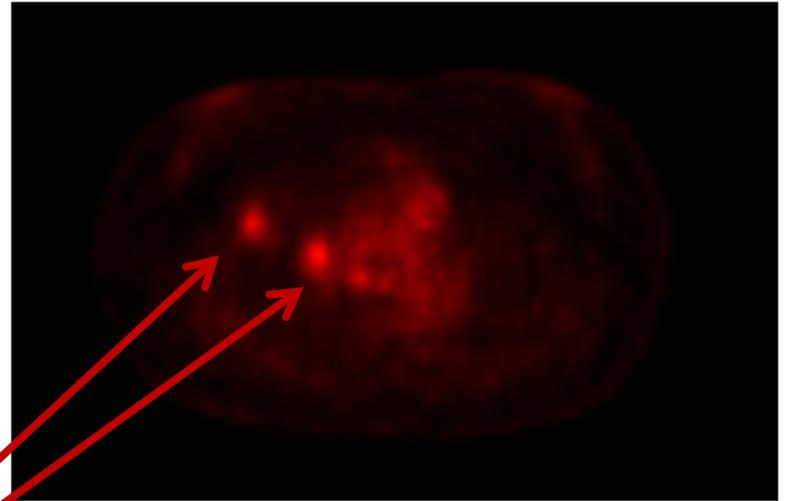
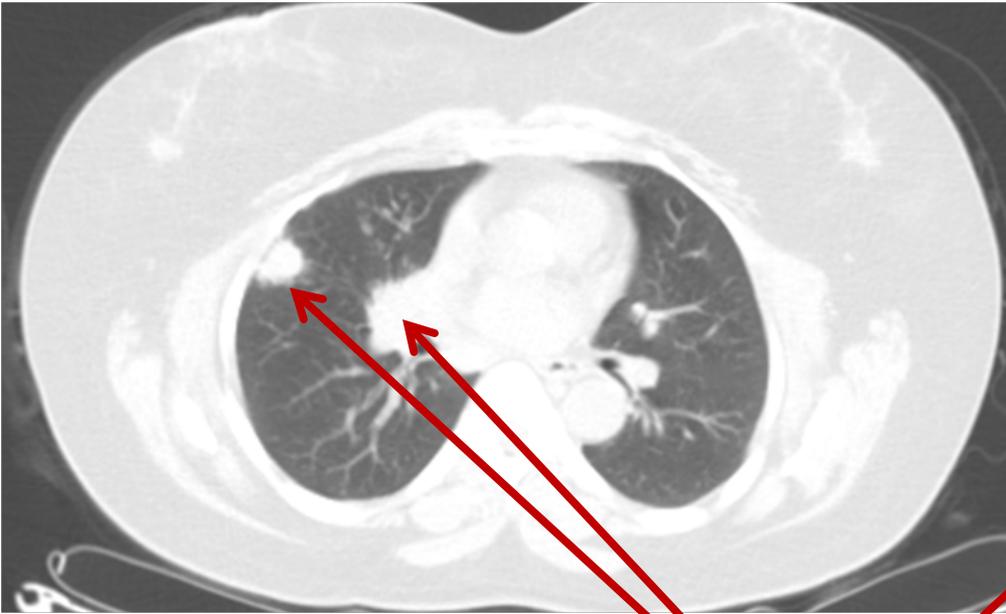


5/26/2011

“Irregular nodular density in the ...RML with multiple satellite nodules. There are enlarged lymph nodes in the R hilum & subcarinal region. Findings are suspicious for **pneumonia** with **reactive lymphadenopathy**. However possibility of underlying **malignancy** cannot be excluded completely. Recommended followup with **serial chest x rays** till complete resolution.”

3 Months Later 8/10/11

PET-CT Scan



“FDG avid pulmonary nodule in the right middle lobe, along with two FDG avid lymph nodes involving the right hilum and subcarinal region. Findings suspicious for **malignancy.**”

Panic on 8/18/11

- Wedge resection RML – Large confluent **granulomas** with extensive **central caseating necrosis & groups of AFB**
- Subsequent sputum negative
- Never reported to the Health Department
- Discharged on ½ the recommended dose of PZA & EMB

TB Classification System

Class	Stage of Disease
0	No exposure, no infection
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5	TB suspect

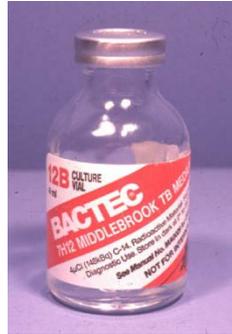
Initial Testing for TB

- Collect 3 sputum samples (mycobacteria, AFB) at least 8 hours apart
 - include at least 1 first morning sample
- TB Skin Test or Interferon Gamma Release Assay (IGRA)
- HIV test
- In-Patient DOT (Nurse watches patient swallow all medications, records doing so)

Laboratory: 6 Essential Tests

Ideal Turn-Around Times*

- AFB smear: ≤ 24 h
- Nucleic acid amplification test^{**}: ≤ 48 h
- Growth detection (culture): ≤ 14 days (broth)
- TB identification: ≤ 21 days (DNA, broth)
- Drug susceptibility testing (DST): ≤ 30 days (directly on broth) – 1^o drugs
- DST of 2^o drugs: ≤ 4 weeks from request or identification of resistant 1^o drugs

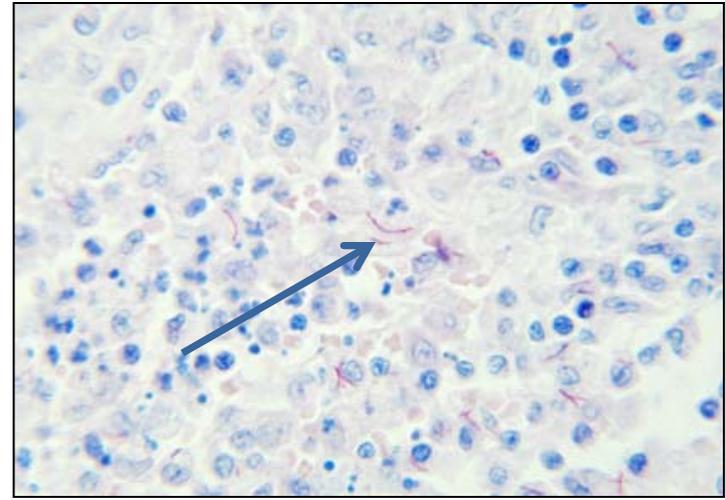
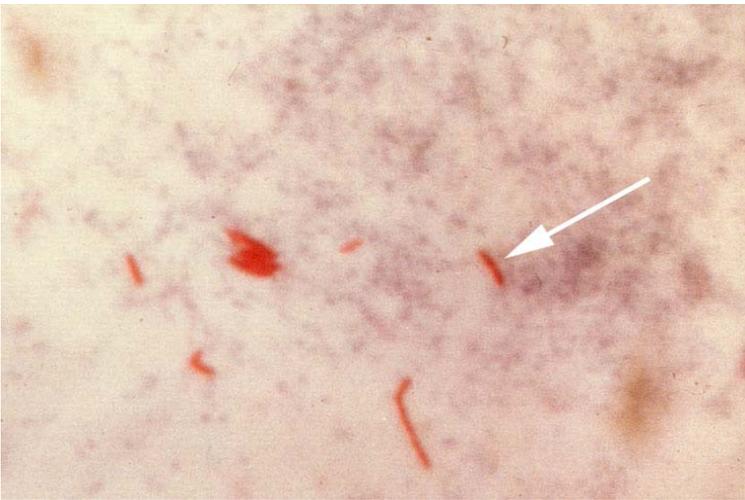


*CDC. Controlling TB in the US...MMWR 2005;54:1-79

**Updated Guidelines for the Use of Nucleic Acid Amplification Tests in the Diagnosis of Tuberculosis MMWR 2009; 58 (01); 7-10

Understanding TB Testing

- -AFB smears **DO NOT RULE OUT TB!!!!!!!!!!!!!!**



- +AFB smears **DO NOT DIAGNOSE TB!!!!!!!!!!!!!!**

Next Step

- Begin treatment even if sputum AFB smears are negative, based on:
 - Abnormal chest x-ray (or other x-ray) suggestive of TB
 - **High risk**
 - Clinical symptoms (may be minimal)
 - + TB skin test or IGRA – Repeat if negative
 - It takes 4-8 weeks to become +
- - AFB smears **DO NOT RULE OUT TB!!!!!!!!!!!!!!**

Therapy for TB

- Initial therapy: RIPE* **by Directly Observed Therapy (DOT)**

– Standardized dosing



55 – 75 kg person

Add or subtract 1 PZA & 1 EMB if weight is greater or less

Rifampin, Isoniazid, Pyrazinamide (PZA), Ethambutol

Therapy for TB

- Initial therapy: RIPE* **by Directly Observed Therapy (DOT)**

– Standardized dosing



< 55 kg person

Add or subtract 1 PZA & 1 EMB if weight is greater or less

Rifampin, Isoniazid, Pyrazinamide (PZA), Ethambutol

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> 75 kg person

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Diagnosis and Treatment of Latent Tuberculosis Infection (LTBI)

- Use a tuberculin skin test (TST) or an interferon gamma release assay (IGRA) to detect LTBI
- A decision to test is a decision to treat if LTBI is confirmed
- Treat LTBI – it benefits the individual and the community

February 2009

Based on the *Targeted Testing and Treatment of Latent Tuberculosis Infection*, 2000 Official Joint Statement of the American Thoracic Society and Centers for Disease Control & Prevention and *Red Book: 2006 Report of the Committee on Infectious Diseases* from the American Academy of Pediatrics



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Treatment of Tuberculosis: Standard Therapy for Active Disease in Adults and Adolescents 2009

Based on the Official Joint Statement of the American Thoracic Society, Centers for Disease Control and Prevention, & Infectious Diseases Society of America, published in the *Morbidity & Mortality Weekly Report*, June 20, 2009.

This card is not intended as a complete reference for treatment of TB.

Conditions for Considering the Patient to be Non-Infectious

- All of the following are met:
 - Adequate treatment for 2 weeks or longer
 - Improved symptoms
 - 3 consecutive negative sputum smears from sputum collected in 8-24 hour intervals (at least one early morning specimen)
- Note: in hospital maintain isolation until **all** conditions are met

Conditions for Discharge

- TB **suspect** or case has been reported to the local health department
- Follow-up plan is in place, home has been evaluated, patient has been interviewed
 - If possible, the patient is seen in the hospital
 - DOT arranged, contract signed
- The patient is NOT to be given prescriptions for TB drugs

Conditions for Discharge

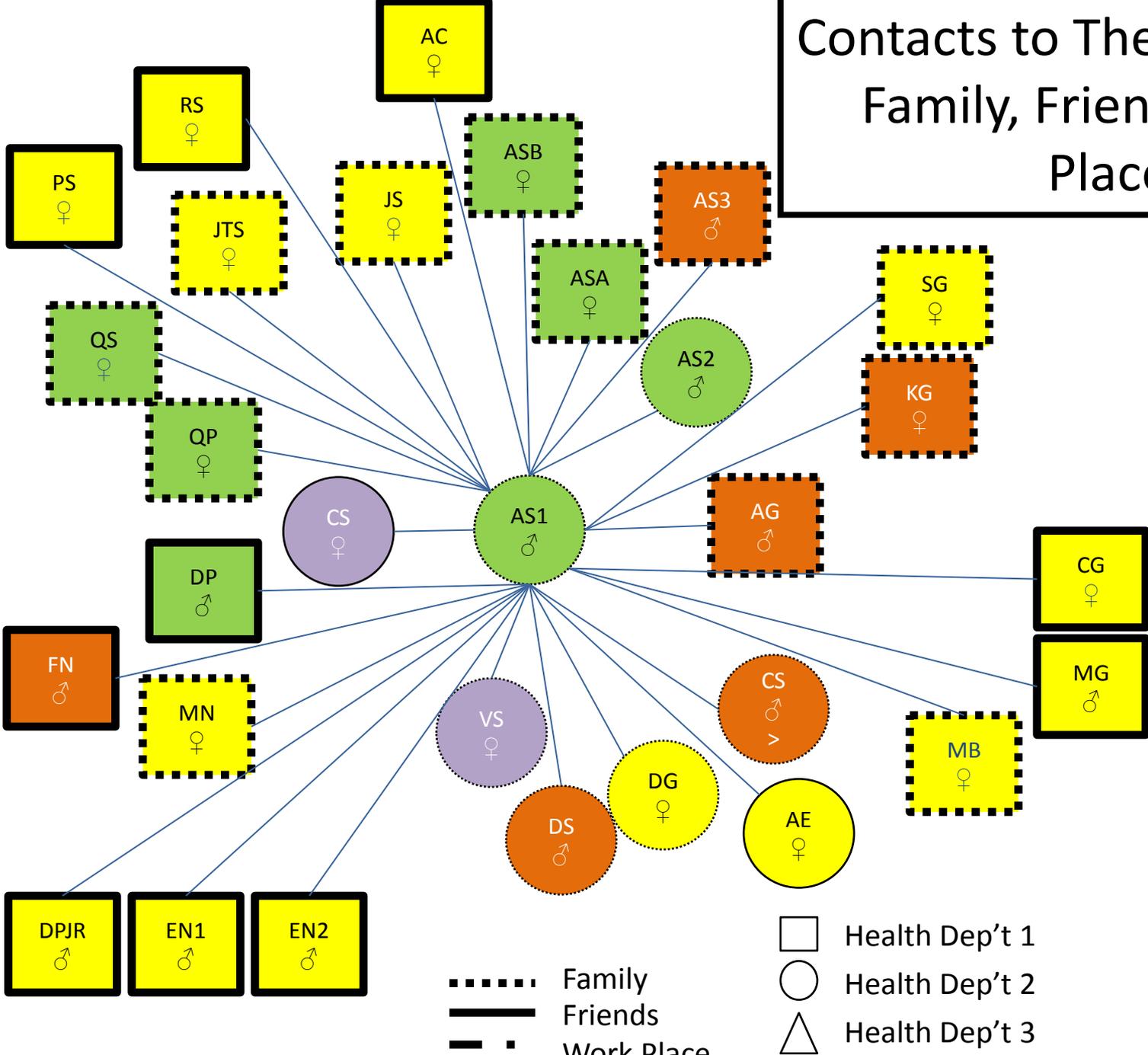
- For infectious patients:
 - The patient has a home to return to
 - Children < 4 years old & anyone with HIV or other immune compromise are either not in home or have been evaluated & started on “window prophylaxis” (preventive therapy) or treatment for disease
 - Patient is willing to be on “home isolation”



Health Department

- Arranges DOT
- Performs contact investigation
- Provides expert consultation
- Might know where the patient may fit within a cluster
- Assures case supervision & completion of Rx

Contacts to The Index Case Family, Friends, Work Place



- Active
- TST 1 +
- TST 1 -
- TST 1 Pending
- Prior +
- Health Dep't 1
- Health Dep't 2
- Health Dep't 3
- Family
- Friends
- Work Place

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Class	Stage of Disease
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What is a Case of TB?

- Reporting regions (states, District of Columbia, NY city) report cases to CDC.
- Definition of a case
 - Laboratory confirmed
 - Clinical Case
 - Provider Defined

What is a case of TB?

- **“TB Surveillance.** For purposes of surveillance, a case of TB is defined on the basis of laboratory **or clinical** evidence of active disease due to *M. tuberculosis* complex.”
- **“Case classification** Confirmed: a case that meets the clinical case definition or is laboratory confirmed.”

Laboratory Confirmed Case

- **Any 1** of the following is required
 - 1. Isolation of MTB complex from a clinical specimen
 - Note: this can be a false + in cases of laboratory or other contamination
 - 2. Demonstration of MTB complex in a clinical specimen by Nucleic Acid Amplification Test (NAAT)
 - 3. Demonstration of Acid Fast Bacilli (AFB) from clinical specimen when culture has not or cannot be obtained or is falsely negative or contaminated
- The health care worker fit this definition & should have been reported to the health department

Clinical Case. No Lab Confirmation.

- Clinical case definition: **ALL** of the following are present
 - TST or IGRAs is +
 - Signs or symptoms of TB are present
 - Abnormal chest x-ray, granulomas on biopsy, lymphocytic pleural effusion, etc..
 - Treatment with ≥ 2 anti-TB drugs is started
 - A diagnostic evaluation is completed

Provider Diagnosis

- The clinical or laboratory case definitions are not made, but a diagnosis of TB is made
- Reporting areas have the option of “verifying” a case
- An example may be a lymphocytic pleural effusion with negative TST in a contact to an active case
- Another example may be an immunosuppressed patient -

2010: Cases Without Microbiologic Confirmation

<u># of Verified Cases</u> 11,182	<u>Percentage</u>
• + culture 8,413	• 75%
• + NAA 136	• 1%
• + AFB smear 72	• 1%
• Clinical case 1,877	• 17%
• Provider diagnosis 684	• 6%

2010: 78% cases pulmonary

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Latent TB Infection

- Cannot be diagnosed while a person remains a TB suspect
- Active disease must first be ruled out
 - Sputum cultures may take up to 6-8 weeks to be +

Discussion Points

- Radiologists are missing cases of TB
- Clinicians are not focusing on risk factors
- Initial investigations are incomplete
 - Cases 3 (Foreign Born) & 4 (health care worker) had TST & QFT, respectively. Both were negative. Case 3 was treated with systemic steroids, both probably had early disease. TST / IGRA should be repeated – they remain negative until 3-8 weeks after infection
- Failure to involve the health department / report cases
- Delayed diagnosis & poor infection control
- Are we seeing nosocomial spread of TB?
- Sending people home with prescriptions (foreign born woman, health care worker)
- Wrong doses of medications, inadequate follow-up

THINK TB!

Recognize positive signs and symptoms of tuberculosis. Early diagnosis and treatment reduces spread. Contact your Health Department or Physician for more information.

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service

CDU

Symptoms and signs listed around the central text:

- coughing up blood
- WEAKNESS
- Weight Loss
- POSITIVE SKIN TEST
- Night Sweats
- Loss of Appetite
- CHESTS
- MALISE
- FEVER
- Chest Pains
- HEMOPTYSIS
- ANOREXIA
- Exposure to Tuberculosis
- fatigue
- difficult breathing
- Significant Skin Test
- failure to thrive
- cough
- Abnormal X-Ray
- Shortness of Breath



TB

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Resources

- Michigan Department of Community Health
 - www.michigan.gov
- Find TB Resources
 - www.findtbresources.org
- CDC Division of TB Elimination
 - www.cdc.gov/TB/
- NJ Medical School Global TB Institute
 - www.umdnj.edu/globaltb/home.htm

