Tuberculosis Exposures at Santa Clara Valley Medical Center

May 11, 2016

Better Health for All

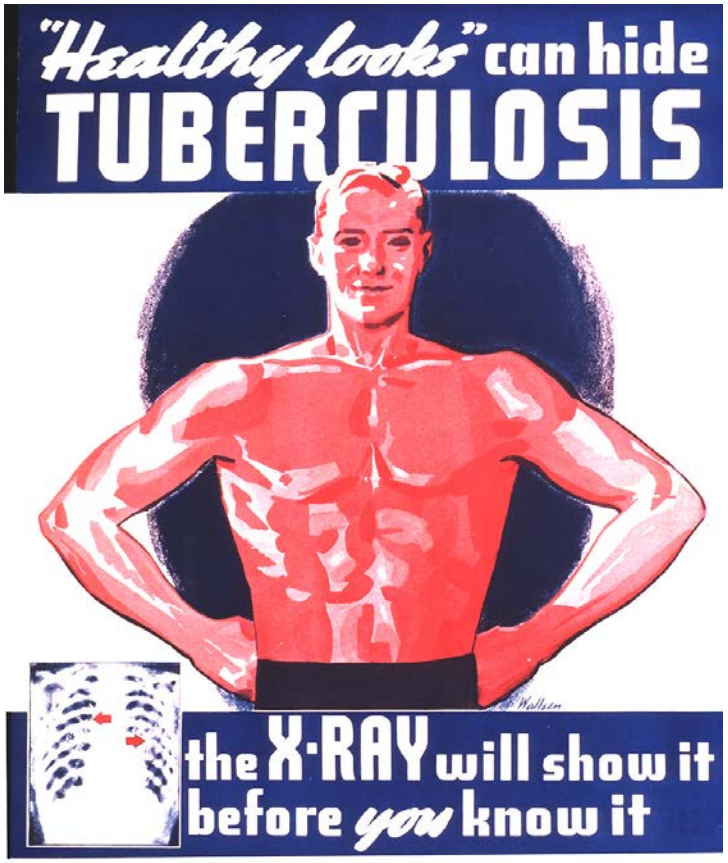
SANTA CLARA VALLEY HEALTH & HOSPITAL SYSTEM

Objectives

- To provide basic definitions of tuberculosis including differentiation between active tuberculosis disease and latent tuberculosis infection.

- To provide the framework for Santa Clara Valley Medical Center's response to two tuberculosis exposures:
  1. An employee in the Mother Infant Care Center
  2. A patient in the Infusion Oncology Center

Background Information on Tuberculosis



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Infection Prevention Department

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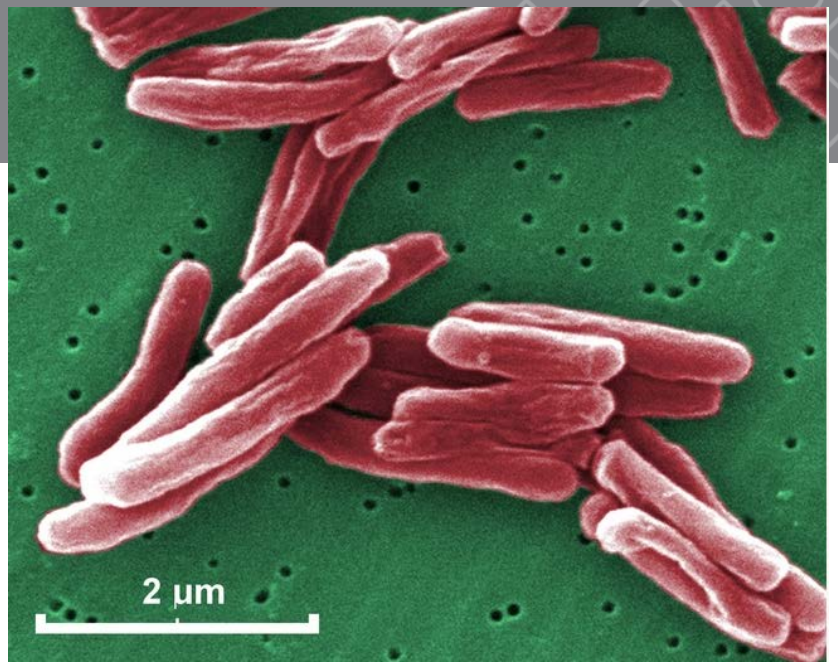
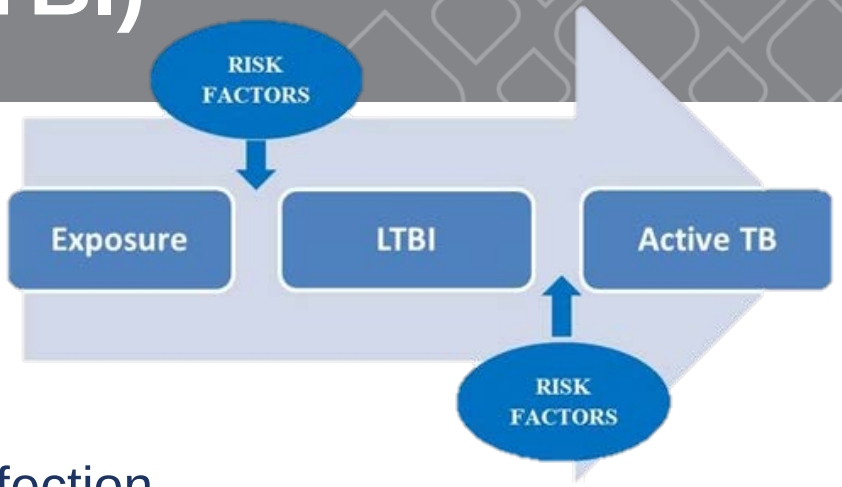
Tuberculosis (TB)



- Spread by airborne route; droplet nuclei
- Transmission affected by:
  - Infectiousness of individual
  - Environmental conditions
  - Duration of exposure
- Most exposed persons do not become infected
- Once inhaled, bacteria travel to lung alveoli and establish infection
- 2-12 weeks after infection, immune response limits activity; infection is detectable
- Some bacteria survive and remain dormant but viable for years (LTBI)

Latent TB Infection (LTBI)



- Persons with LTBI are
  - Asymptomatic, do not feel sick
  - Non infectious

- LTBI progresses to TB disease in
  - Small number of persons soon after infection
  - 5%-10% of persons with untreated LTBI sometime during lifetime
  - About 10% of persons with HIV and untreated LTBI per year

- Persons at high risk for LTBI progressing to TB disease
  - Coinfected with HIV (highest risk)
  - Recent *M. tuberculosis* infection (within 2 years)
  - Children under 4 years of age
  - Persons with certain clinical conditions or other conditions of compromised immunity
  - History of untreated or poorly treated TB

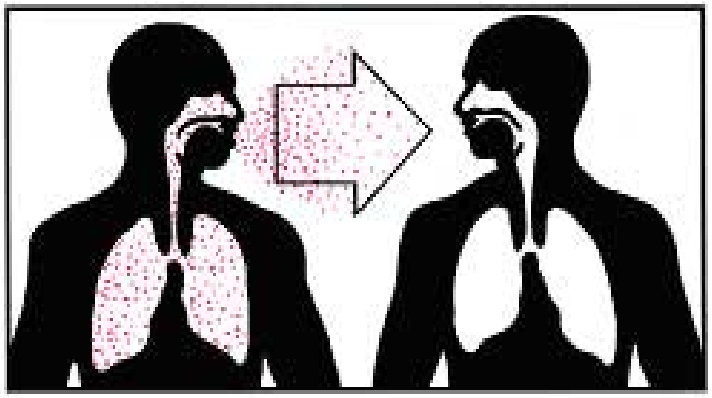
Risk Factors for LTBI to TB Disease

Relative risk reactiviation of TB in various clinical settings	
AIDS	110–170 times
HIV infection	50–110
Solid organ transplant	20–74
Silicosis	30
Recent TB infection (<2 years)	15
Chronic renal failure	10–25
Carcinoma of head and neck	16
Abnormal chest radiograph with upper lobe fibro nodular disease typical of healed TB infection	6–19
TNF Alpha inhibitor therapy	1.7–9
Glucocorticoid therapy	4.9
Children less than 4 years old	2.2–5
Diabetes mellitus	2–3.6
Underweight (BMI <20)	2–3
Smoker (1 pack/day)	2–3
Normal healthy individual	1

TB Disease

Characteristics of infectiousness

- Cough ≥ 3 weeks
- Coughing up blood or sputum
- Weakness or fatigue
- Weight loss, loss of appetite
- Chills, fever, sweating at night
- Cavitation on chest radiograph
- Positive sputum smear results



LTBI	TB Disease
Inactive, contained tubercle bacilli in the body	Active, multiplying tubercle bacilli in the body
TST or blood test results usually positive	TST or blood test results usually positive
Chest x-ray usually normal	Chest x-ray usually abnormal
Sputum smears and cultures are negative	Sputum smears and cultures may be positive
No symptoms	Symptoms such as cough, fever, weight loss
Not infectious – cannot spread TB bacteria to others	Often infectious before treatment – may spread TB bacteria to others
Should consider treatment to prevent TB disease	Needs treatment for TB disease

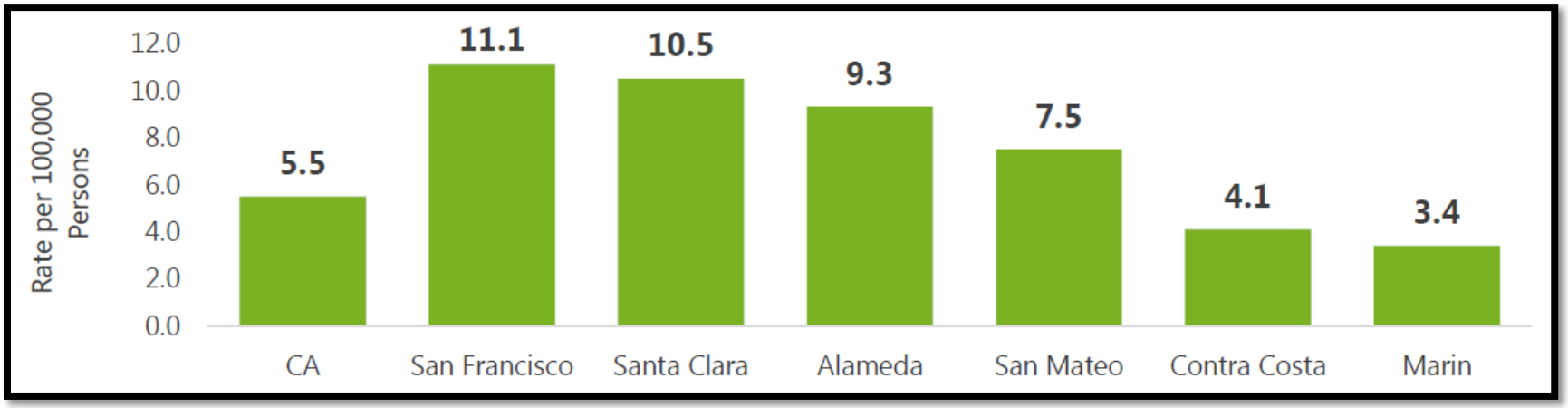
* The absence of significant physical findings does not exclude active TB. Classic symptoms are often absent in high-risk patients, particularly those who are immunocompromised or elderly.

QuantiFERON-TB Gold test (QFT-G)

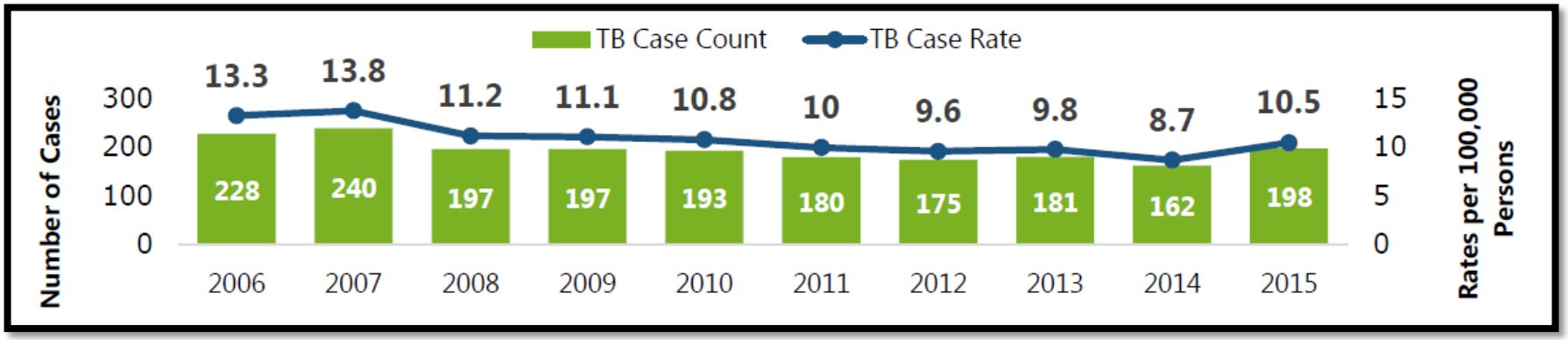
- Approved by FDA in 2005
- QFT-G is a type of blood assay for *M. tuberculosis*
  - Measures the patient's immune system reaction to *M. tuberculosis*
  - Blood samples must be processed within 12 hours
  - Interpretation of QFT-G results is influenced by the patient's risk for infection with *M. tuberculosis*
  - An alternative to TST, QFT-G
    - Requires only one visit
    - Interpretation is less subjective
    - Probably less affected by BCG vaccination
- QFT-G is not recommended for children < 5 years of age

TB in California

TB Case Rates: California and San Francisco Bay Area



Trends in TB Case Counts and Rates: Santa Clara County



SCVMC TB Protocol for HCWs

- Initial TB screening for employees
  - 2 step TST screen or IGRA (interferon gamma release assay)
  - Chest x-ray for those with significant reaction on TST test or positive IGRA
- Follow-up TB screening
  - All employees complete a yearly symptom review questionnaire
  - If previous negative TST/IGRA, complete an annual or semi-annual TST (based on employee's department)
- HCWs must be excluded from duty if has, or suspected to have, TB pending sputum results or evaluation of suspicious chest x-ray.
  - Confirmed cases: Duration of exclusion is until HCW on therapy for at least 2 weeks, clinical improvement, and clearance by Employee Health in conjunction with Infectious Disease, Pulmonary, or county TB Controller.
  - Suspected cases: Can return to work if suspected TB is ruled out.

Tuberculosis Exposure – MICC

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MICC Exposure Determination

- Notified by SCC TB Controller of employee with suspected TB disease
- Infection Prevention investigation includes
  - Confirm active TB
  - Inform key stakeholders (Department Management, Risk Management, Leadership, etc.)
  - Notification of Employee Health so that employee excluded from work effective immediately
  - Determination of classification of patient and/or employee exposures
    - Determine exposure period
    - Define what qualifies as an exposure
    - Identify exposed patients and employees

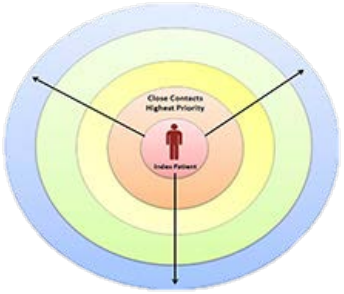


TABLE 2. Guidelines for estimating the beginning of the period of infectiousness of persons with tuberculosis (TB), by index case characteristic

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

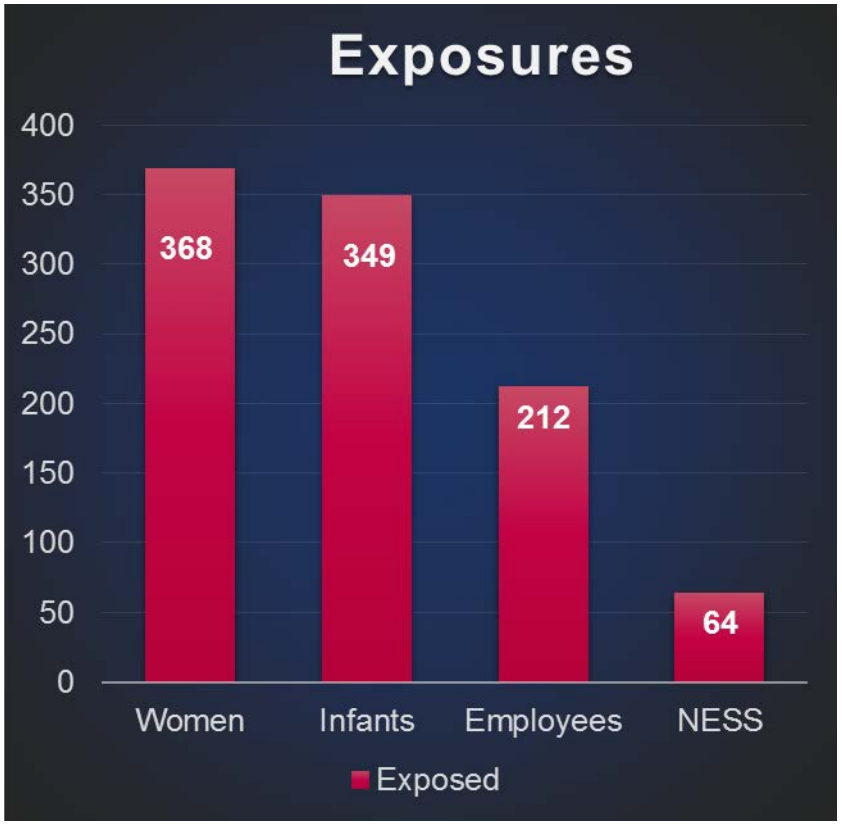
SOURCE: California Department of Health Services Tuberculosis Control Branch; California Tuberculosis Controllers Association. Contact investigation guidelines. Berkeley, CA: California Department of Health Services; 1998.
* Acid-fast bacilli.

Definition of Exposure

An exposure shall be defined as:

- Patients who received direct patient care in MICC during the time the source employee was working scheduled shifts. When employee worked in a relief or resource role, all patients currently inpatient on the unit are included.
- Healthcare workers who worked with the employee in MICC during the time the source employee was working scheduled shifts or attending classes/training.
- Exposure period was the time the exposed patients or employees shared the same air space with the source employee during the infectious period --

Mid August to Mid November



Media Coverage

Employee Notification

Infection Prevention notified managers. Managers notified their employees to complete post-exposure follow-up:

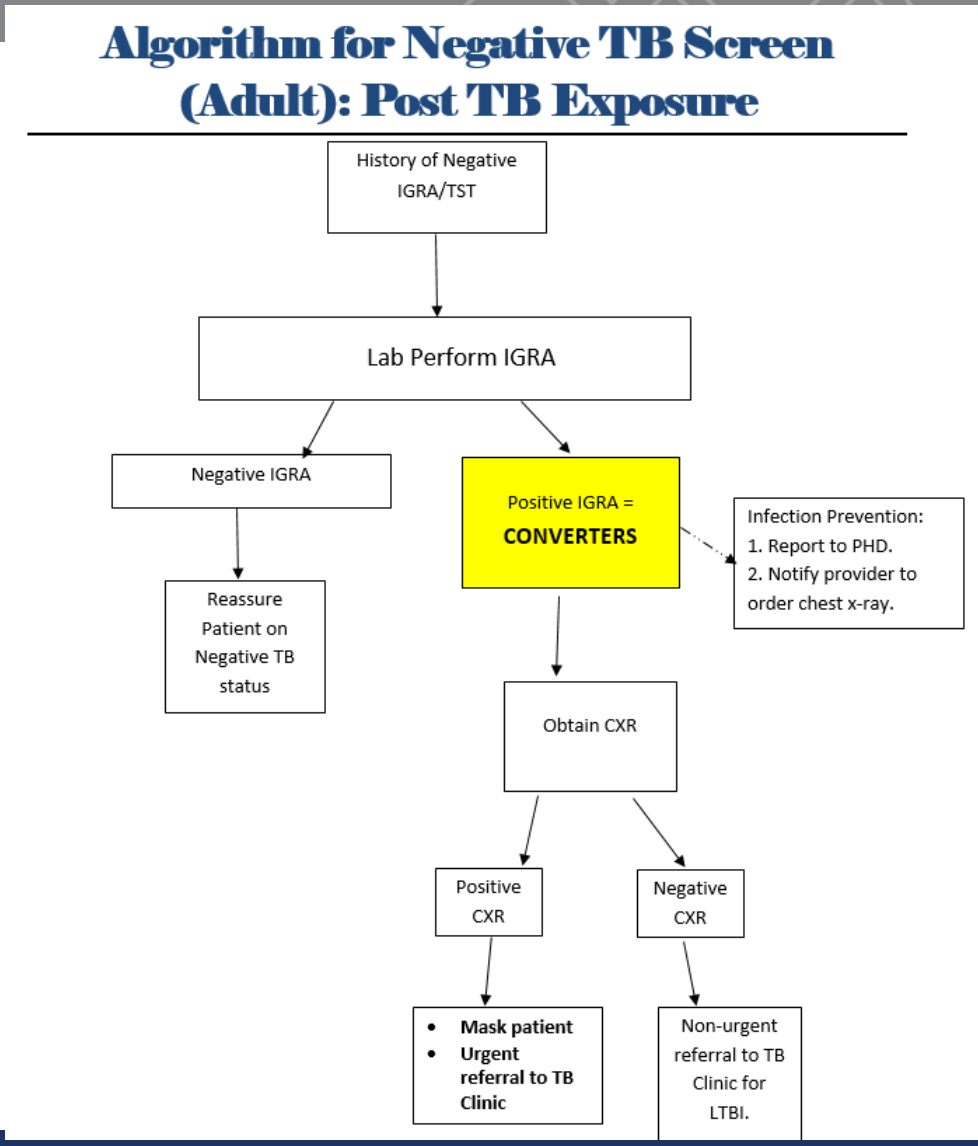
- If History of Negative TST/IGRA→ TST 8-10 weeks after last date of exposure to source employee
- If History of Positive TST/IGRA → Symptom screen 8-10 weeks after last date of exposure to source employee

Follow-Up Plan for Patients

Algorithms developed after collaboration with Infection Prevention, Hospital Epidemiologist, SCC TB Controller, Pediatric Infectious Disease, CDPH TB Control, and national experts.

Women:

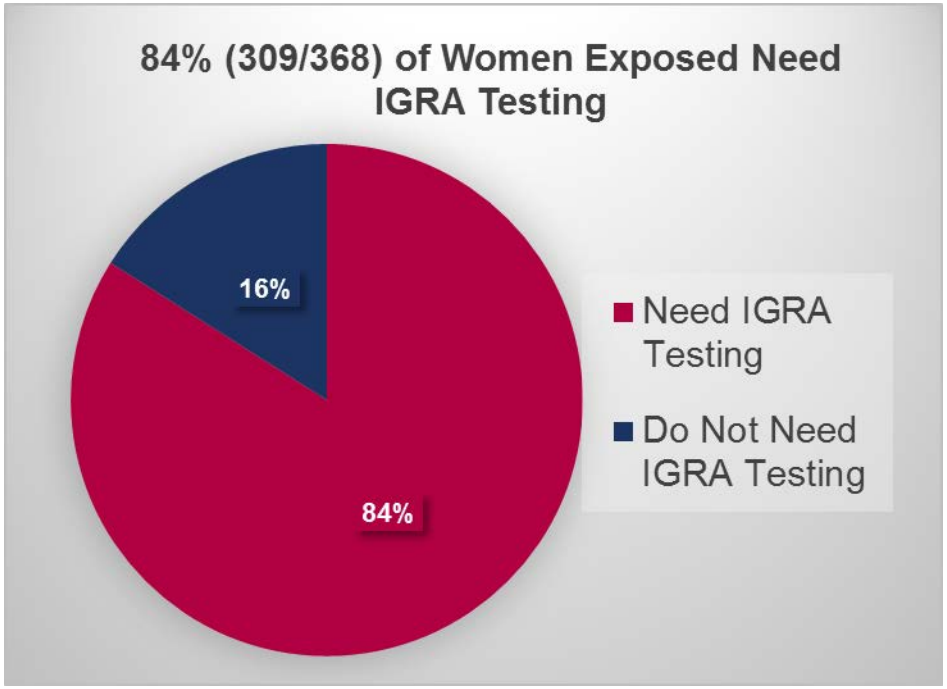
- All MICC patients are screened for TB prior to delivery at SCVMC.
- If history of negative TB screen → QFT-TB testing 8-10 weeks post-exposure

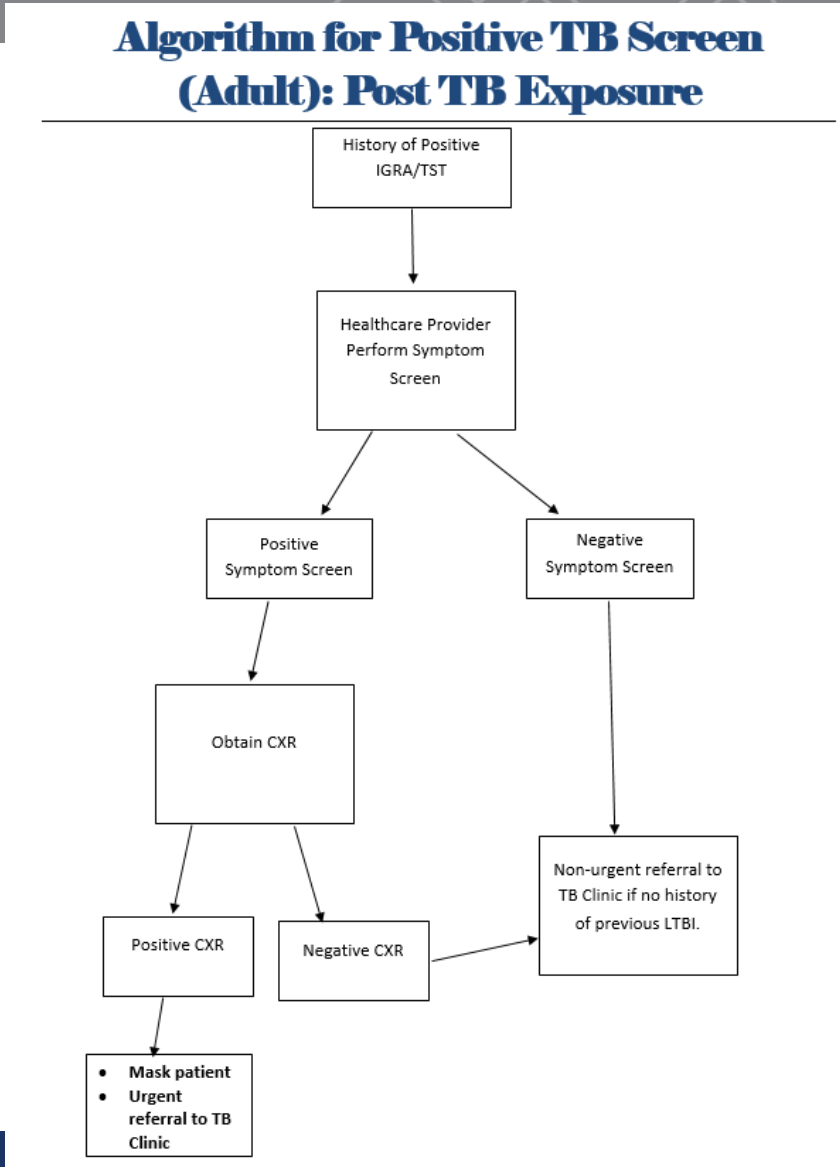


Follow-Up Plan for Patients

Women:

- If history of positive TB screen → Symptom screen and chest x-ray if indicated

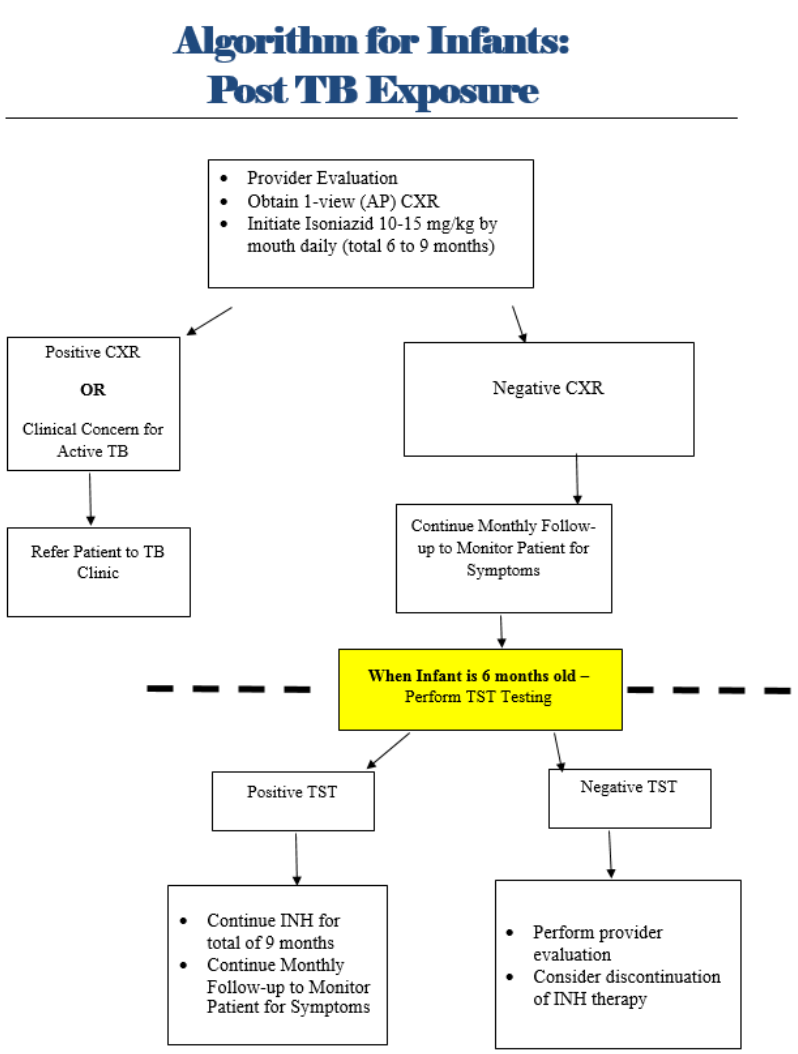




Follow-Up Plan for Patients

Infants:

- Baseline chest x-ray and medical evaluation
- Initiate Isoniazid (INH) therapy
- Monthly follow-up to monitor patient for symptoms
- TST testing at 6 months of age (QFT not reliable < 5 years of age)
  - If positive TST → continue INH for 9 months and continue monthly follow-up
  - If negative TST → perform medical evaluation and consider discontinuation of INH therapy

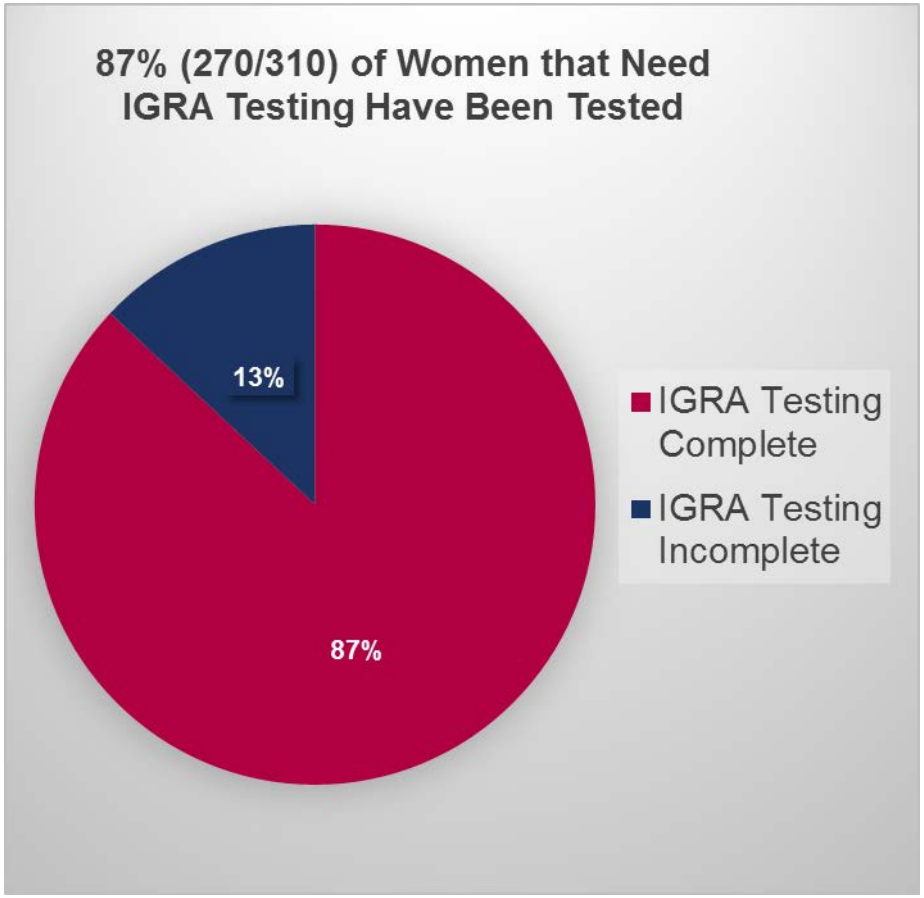


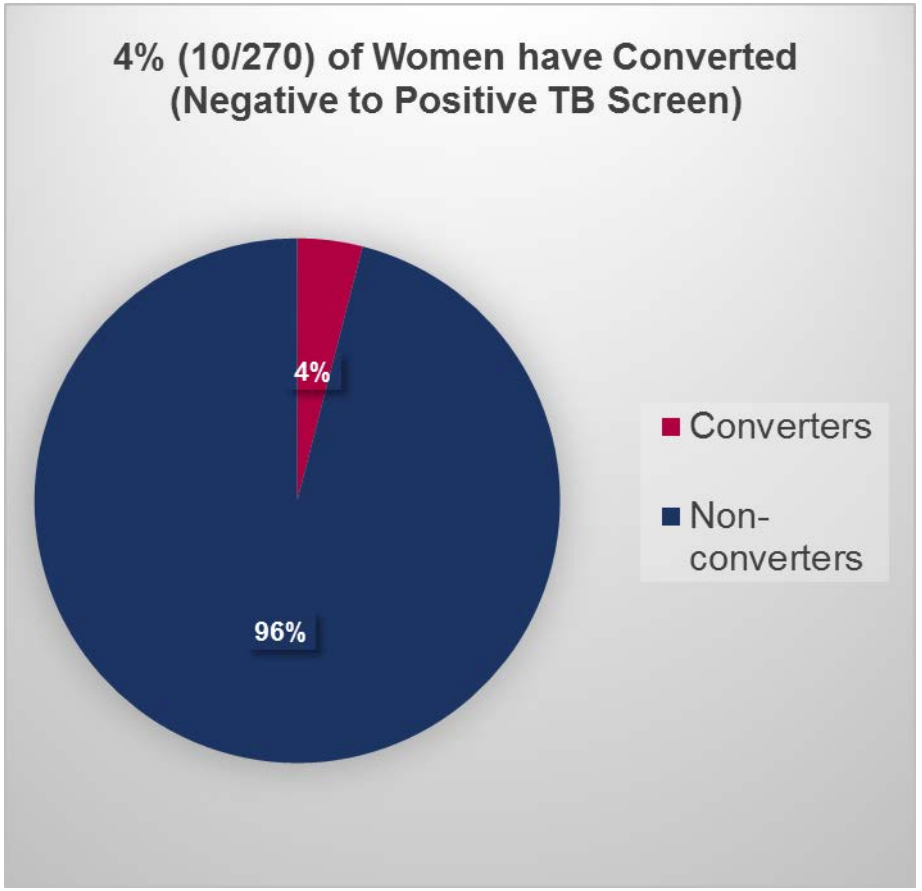
Patient Notification

- Infection Prevention developed letters to women (based on TB screen history) and infant caregivers.
  - Reviewed by multidisciplinary team and County Council.
  - Translated into Spanish and Vietnamese.
  - Letters mail to all patients and included frequently asked questions about TB specific to that patient population.
- Ambulatory Staff began phone notification of infant caregivers and scheduling appointments for infant evaluation.
- Infection Prevention developed letters to all patient's providers with algorithms for recommended follow-up procedure.
- All SCVMC providers notified of exposure via email with copies of patient letters, provider letters, algorithms for care.
- Press release issued by SCVMC.

Status of Follow-Up: Women

As of 4/11/2016

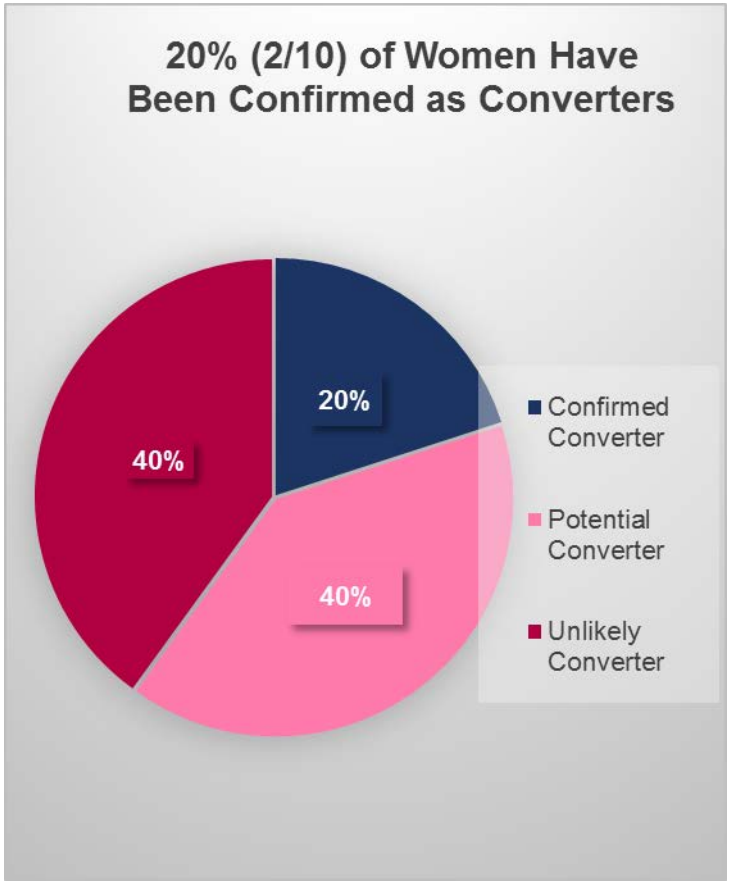




Status of Follow-Up: Women

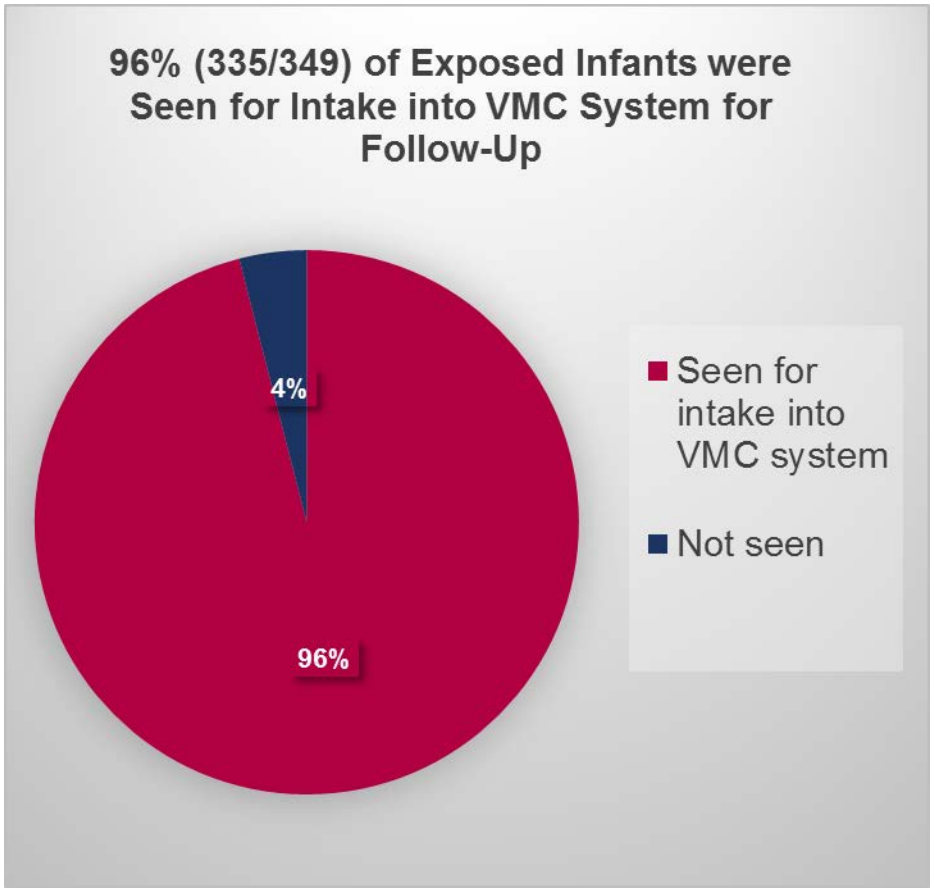
As of 4/11/2016

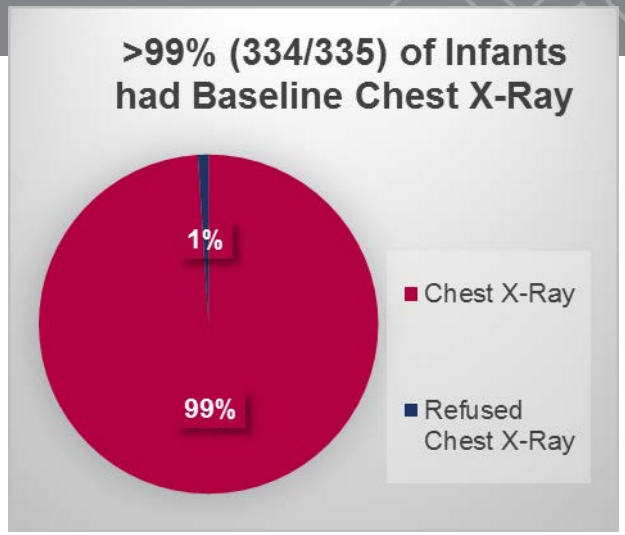
- After testing complete, providers notified by Infection Prevention of test results and any additional recommendations for treatment and/or follow-up care based on algorithms.
- Potential converters reported to SCC TB Control.
- Referrals placed with SCC TB Control on potential converters for further investigation and testing:
  - 2/10 (20%) have been confirmed as a converter
  - 4/10 (40%) have been determined to be potential converters
  - 4/10 (40%) have been determined to unlikely be converters
- Conversion is defined as a patient with a confirmed negative to positive TB test (QFT or TST). No patients have been diagnosed with active TB disease at this time.

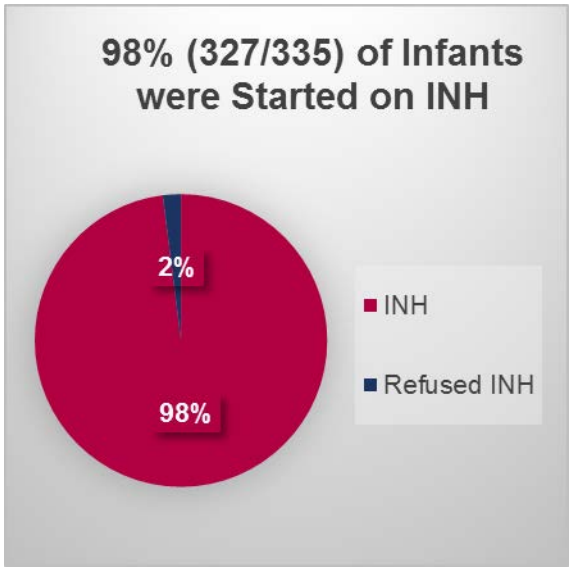


Status of Follow-Up: Infants

As of 4/11/2016

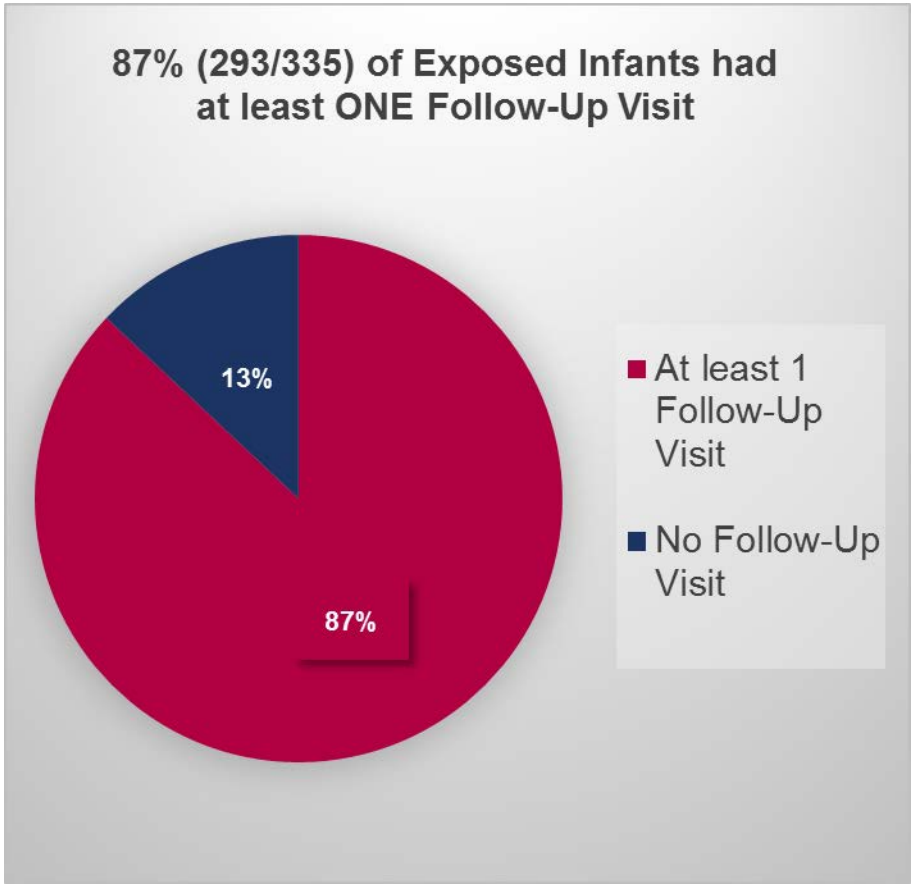


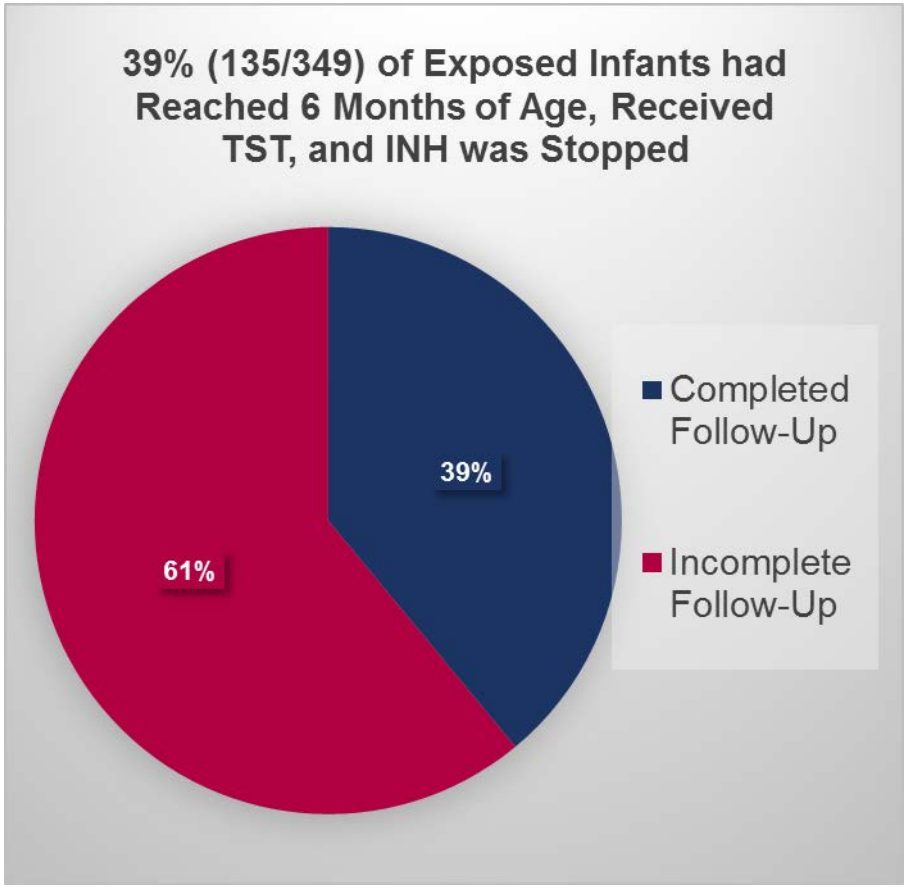




Status of Follow-Up: Infants

As of 4/11/2016





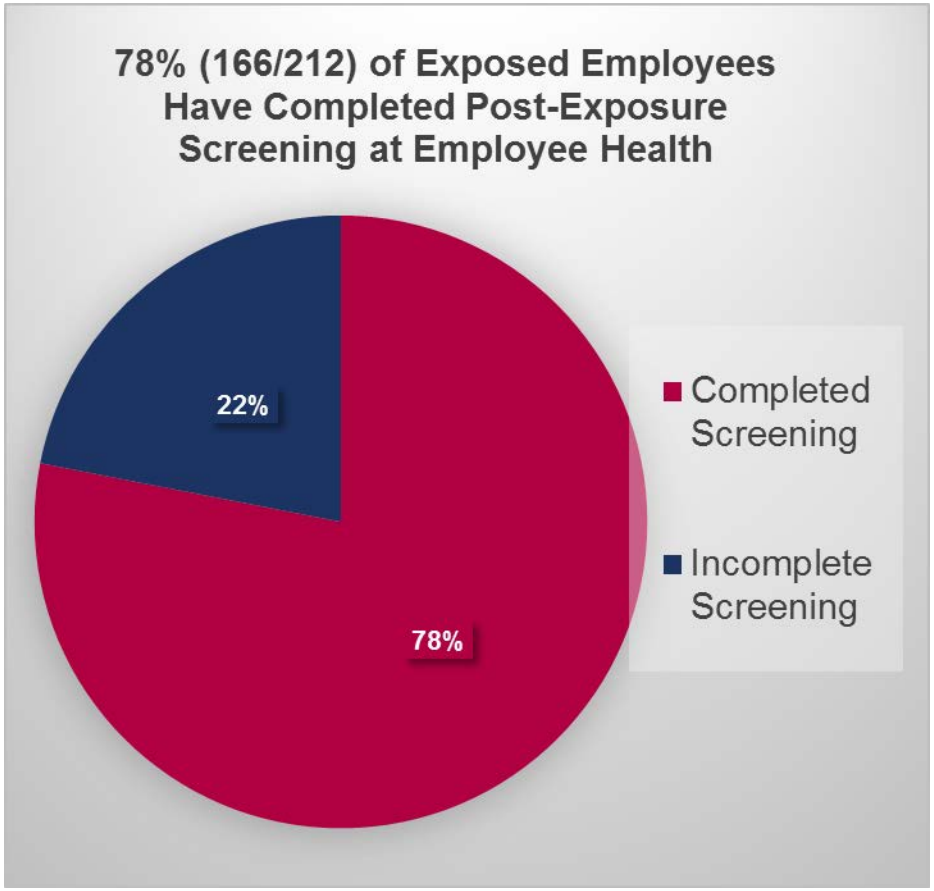
All infants TST tested have resulted 0 mm at this time.

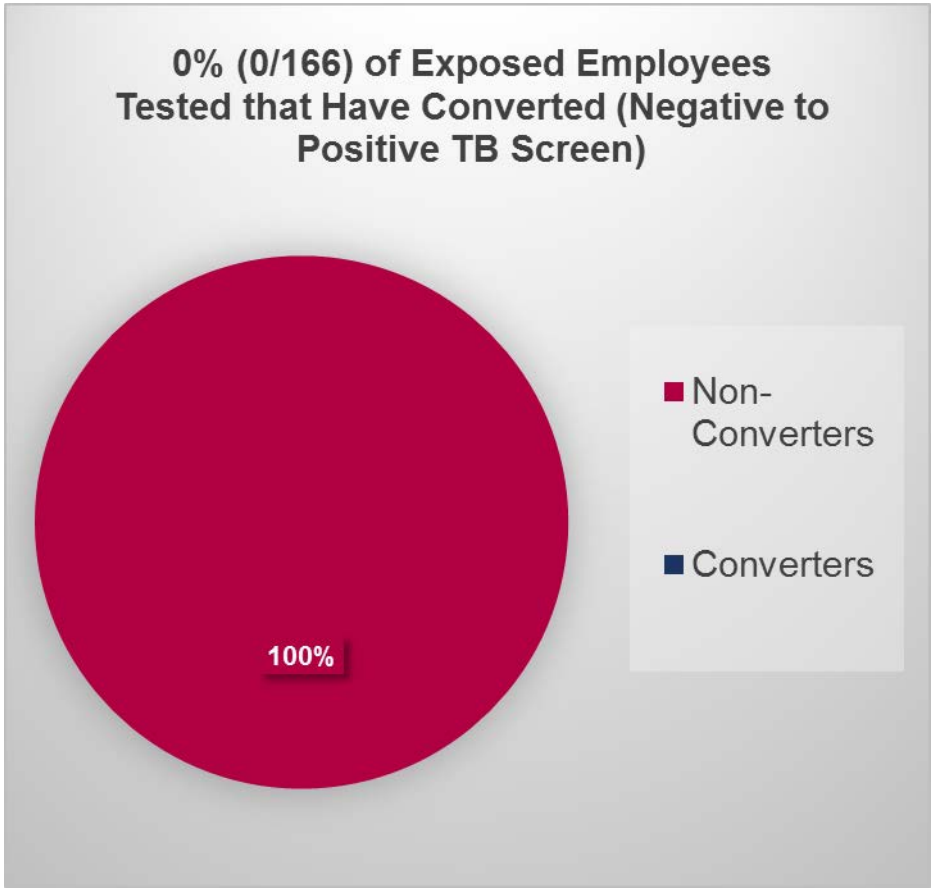
SCC Public Health Department

- Referrals sent to SCC PHD for:
  - Any patient that is unreachable by phone and mail.
  - Any patient that has moved out of the county.
  - Any patient who has chosen to receive testing and/or follow-up care outside of SCVMC.
  - Women who have not completed QFT testing.
  - Infants that have not completed follow-up testing or care as recommended.
- PHD process:
  - 2 phone calls to patient
  - 2 home visits (morning and evening)
  - Additional letter

Status of Follow-Up: Employees

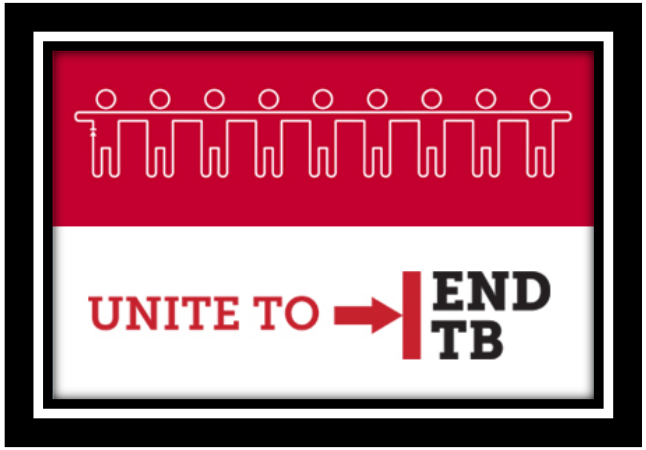
As of 4/5/2016





Current Status

- Continue testing and follow-up of all employees and patients.
- Continued meetings of multidisciplinary team to evaluate progress and identify additional needs and challenges.
- Implement new methods for employee education on LTBI, TB Disease, Employee Health screenings and exclusions from work.
- Evaluate current recommendations/practices for employees to receive LTBI treatment, when applicable.
- Update Infection Prevention policies and procedures to reflect lessons learned during this exposure event.
- Publish findings in order to globally contribute to best practices for TB exposures.



References

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Tuberculosis Exposure – Infusion Oncology Center

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Case study background (1)

65 yrs old male

- New immigrant from Vietnam
- Seeking medical attention for suspected gastric cancer
- Had abnormal chest CT scan
- Came to SCVMC ED after discharge from local hospital
- Was referred to VHC Infusion-Oncology clinic

Case study background (2)

Clinical Follow-up

- Diagnosed with gastric cancer (Jan 2015)
- Started on chemo tx (Feb 2015)
- Suspected mets to lung
  - chest CT shows lung mass (Jan 2015)
- Admitted to SCVMC (May 2015)
  - increasing dyspnea, chest discomfort, significant weight loss, fatigue
  - AFB smears positive
  - cxr RUL nodularity possibly cavitary lesion

CSI (1)

Patient Identification

- Medical history
- Clinical history
- When patient entered SCVMC healthcare system
- Which SCVMC locations patient had encounters

CSI (2)

Period of Infectiousness

- AFB smears positive (May 2015)
- Symptoms
  - Medical chart indicated occasional cough
  - Chest discomfort
  - Dyspnea
  - Fatigue
  - Weight loss
  - fever

CSI (3)

Findings

- Pt was hospitalized at local hospital (Jan 2015)
  - 4 days inpatient
  - Work-up indicated gastric cancer
  - Chest CT showed lung mass
- Pt seen in SCVMC ED (Jan 2015) same day after discharge
  - Abdominal pain
  - Was referred to VHC Infusion-Oncology clinic for further f-u

CSI (4)

Findings

- Pt seen in VSC Infusion-Oncology clinic starting(Feb 2015)
- Pt had multiple scans done from Jan-June 2015
- Also seen at Valley Health Clinic with PCP in June 2015

Was there an exposure?

Indicators for a potential exposure

- Infectivity of the index case
- Symptoms that warrant potential transmission
- Location of encounters
  - Shared air space
  - Air exchanges/min
  - Ventilation pattern

Was there an exposure?

Indicators for a potential exposure

- AFB smears positive (June 2015)
- Sputa positive MTB PCR (June 2015)
- Pt was seen in Infusion-Oncology clinic setting

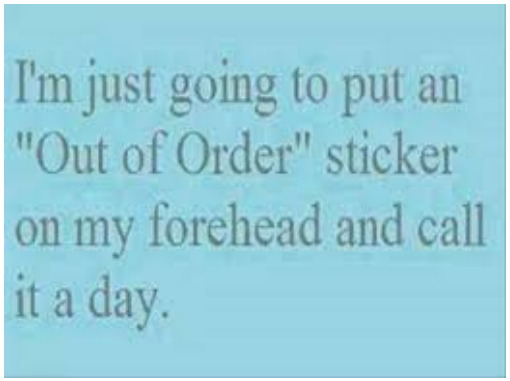
When was the period of infectiousness?

- Jan 2015—June 2015
  - From entrance into SCVMC healthcare system until hospital admission date

Tally

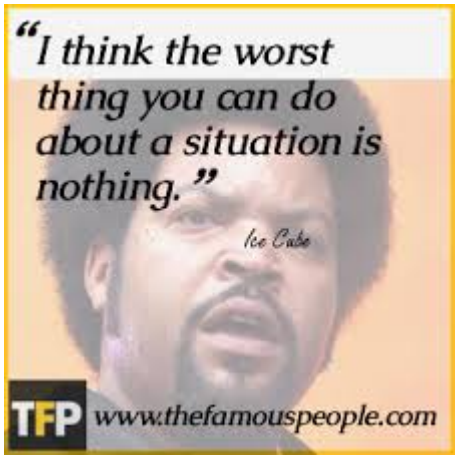
Locations

- Pt seen in VSC Infusion-Oncology clinic starting(Feb 2015)
  - Over 700 patients identified
- Pt had multiple scans done from Jan-June 2015
  - Unaccounted for
- Also seen at Valley Health Clinic with PCP in June 2015
  - About a dozen
- Healthcare workers identified
  - Over 80 staff



Who is considered most at risk?

Risk Stratification Criteria



- Most high risk medical diagnoses
- Number of encounters in correlation with index case
- Those who have documented baseline TB screening
- All identified patients categorized into 1 of 3 tiers
- Those with documented previous positive TB screenings were not included in any Tiers

Tier 1

Tier 1 Criteria

- 3 or more encounters and or has the following medical diagnoses/conditions
  - HIV
  - Lymphoma
  - Leukemia
  - Renal Disease
  - Immunosuppressive conditions (DM, RA …)
  - Provider considers highest risk due to immunocompromised conditions

Tier 2

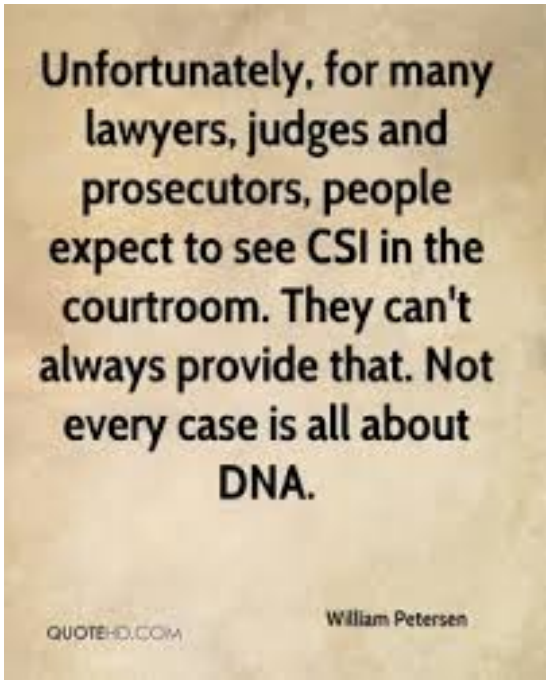
Tier 2 Criteria

- Other diagnoses not listed in Tier 1
- High risk medical conditions
- Those with 3 or less encounters in correlation with index case

Tier 3

Tier 3 Criteria

- Remaining patients not listed in Tier 1 or Tier 2



Determination of the follow-up screening

No documented baselines

Interferon Gamma Release Assay

- Quantiferon Gold
- Symptoms screen

Documented positive baselines

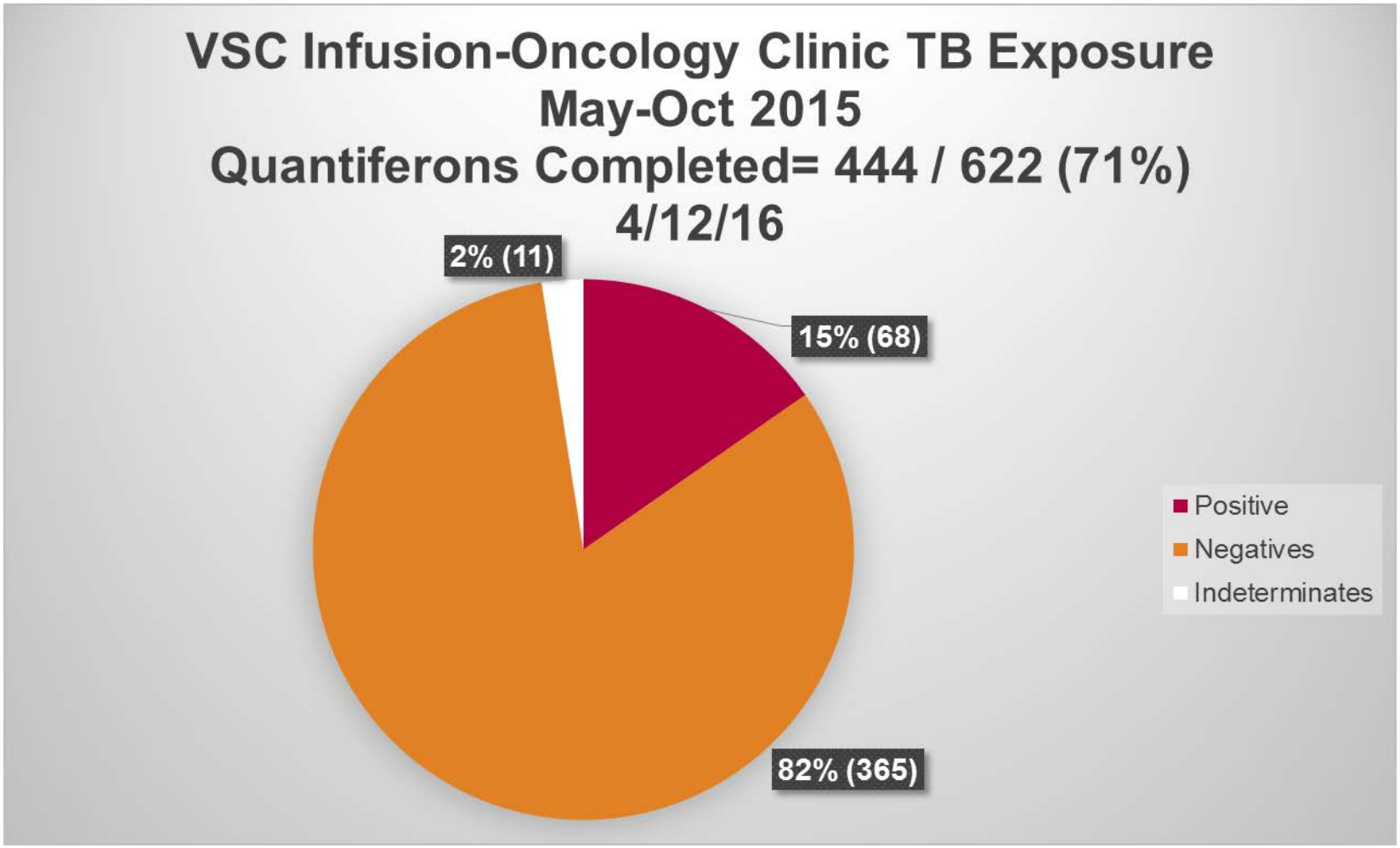
- Symptoms screen
- cxr

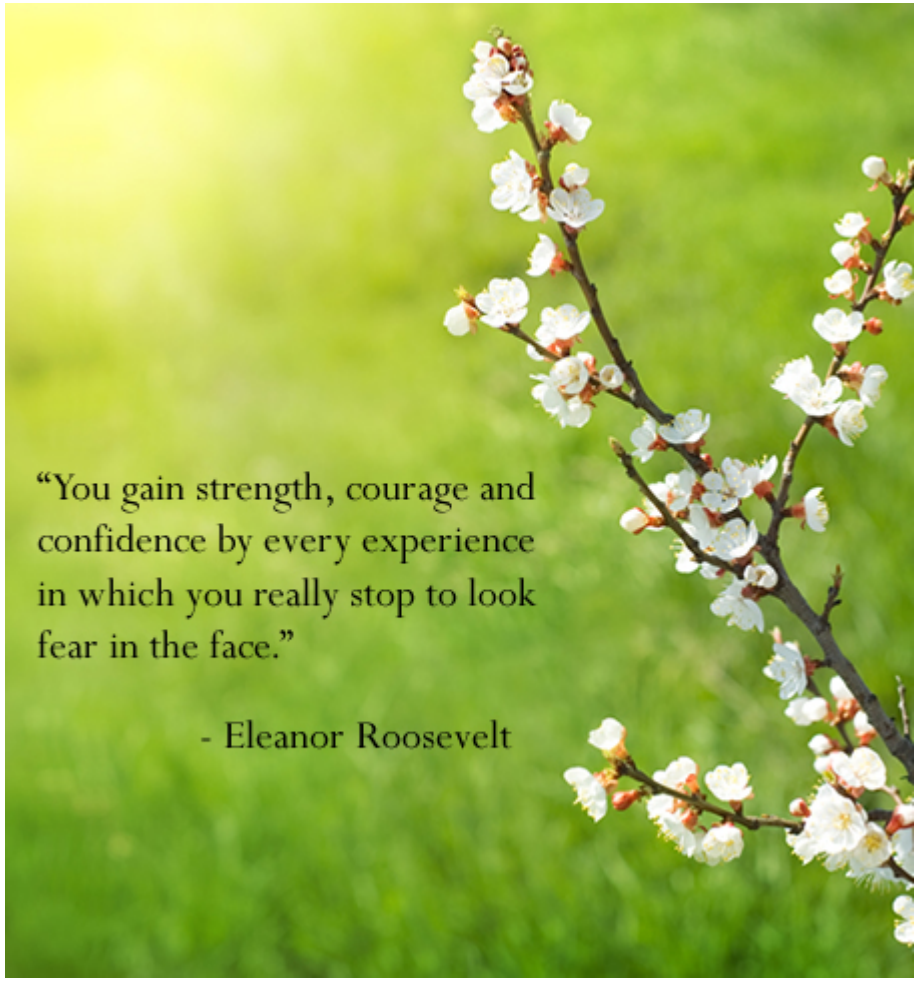
Potential exposure notification

Method of Notification

- Individual letters to potentially exposed patients
  - Explanation letter (language specific)
  - FAQs
  - Lab Hours
  - Symptoms Review form
- Letters to Providers
  - Explanation letter
  - FAQs for providers

Results of patient screenings





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