


Evaluation of Tuberculosis Infection

Stefani Nixon, DrPH(s), MPH, CPH, MCHES



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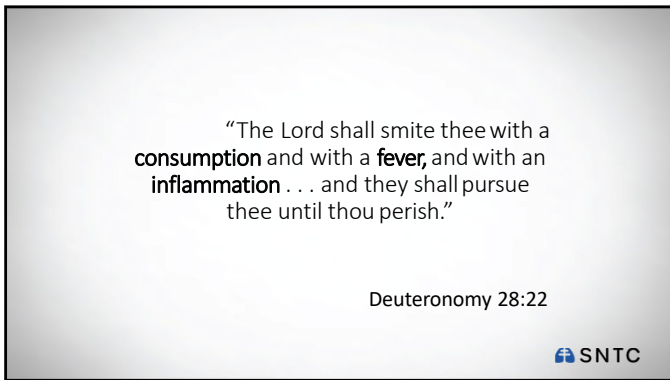
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“The Lord shall smite thee with a **consumption** and with a **fever**, and with an **inflammation** . . . and they shall pursue thee until thou perish.”

Deuteronomy 28:22



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History of TB

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Mentimeter Question #2: Open Ended Poll

- What do you know about TB and/or LTBI?



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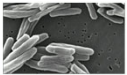
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What is Tuberculosis (TB)?

- Communicable disease caused by the bacterium *Mycobacterium tuberculosis* (M. tb)
- Major cause of ill health
  - One of the top 10 causes of death worldwide
  - Leading cause of death from a single infectious agent
    - Ranking above HIV/AIDS



M. Tuberculosis bacilli



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Latent TB Infection vs TB Disease

<p><b>TB Infection</b></p> <p>No symptoms</p> <p>CXR not suggestive of TB</p> <p>Negative AFB smear, culture, NAAT</p> <p>Not infectious</p>	<p><b>TB Disease</b></p> <p>Symptoms</p> <p>CXR usually suggestive of TB</p> <p>Often have positive AFB smear, MTB culture and/or NAAT</p> <p>Often infectious</p>
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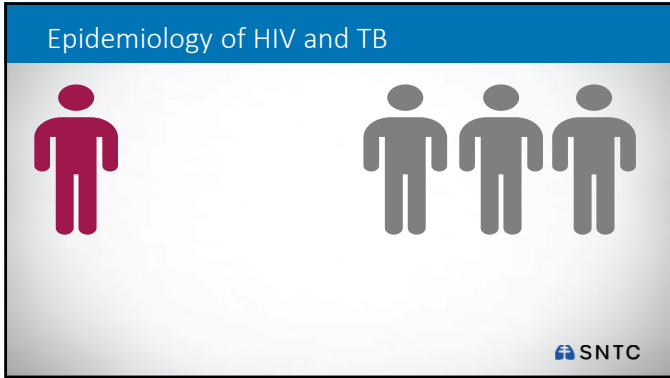
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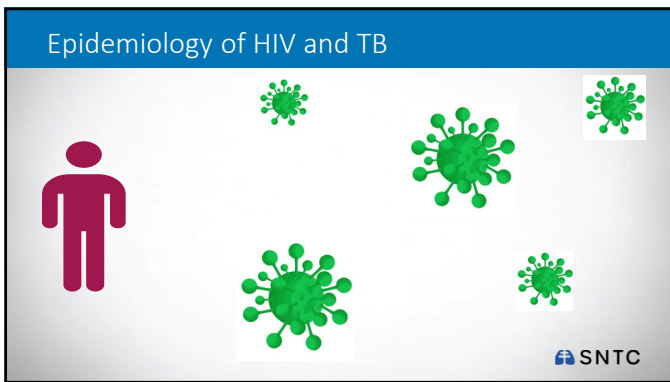
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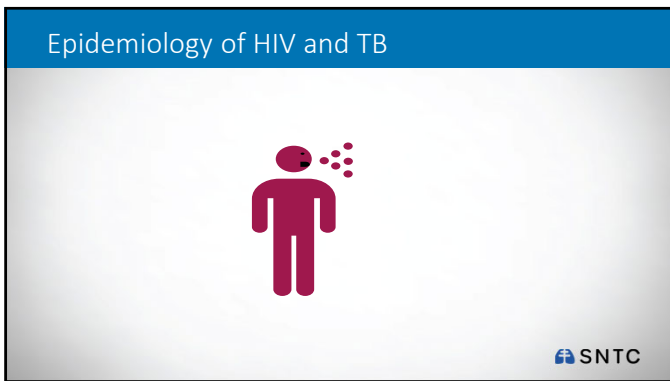
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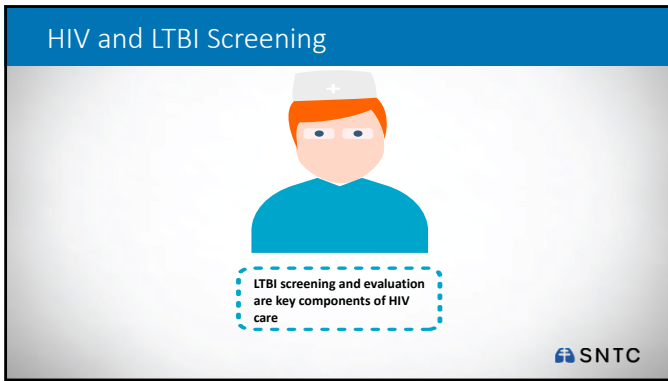
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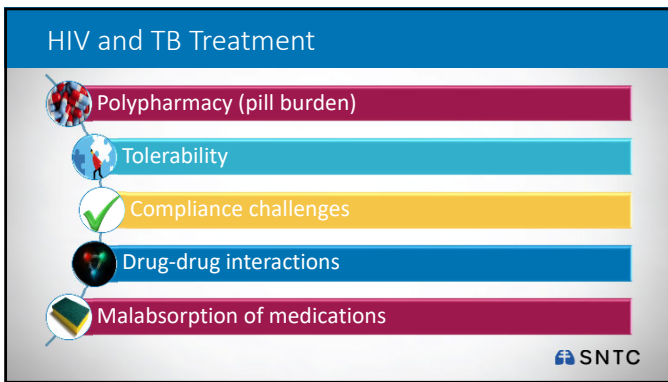
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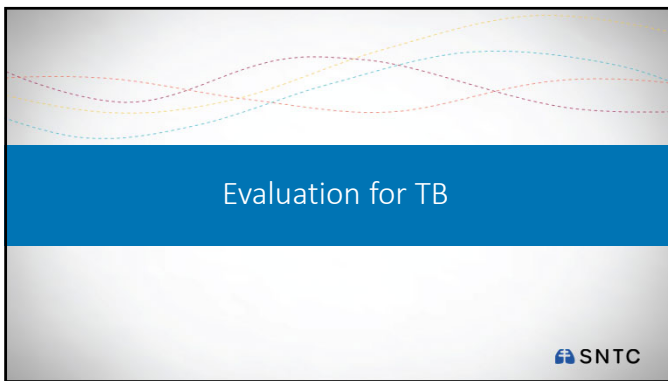
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Mentimeter Question #2: Multiple Choice Poll

- How often do you evaluate your patients for TB?
  - Every single time I get a new patient
  - Sometimes, but it's not high on my priority list
  - Was I supposed to be evaluating for TB?



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Evaluation for LTBI





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TB screening

- TB risk assessment
- Symptom evaluation
- Test for LTBI
- Additional work-up for TB disease as needed
  - Positive TST/IGRA → CXR
  - Symptoms and/or CXR consistent with TB → Bacteriology



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### Types of TB Risk Assessments

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### TB Exposure Risk

- Close contacts to person with infectious TB
- Residents and employees of high-risk congregate settings
- Recent immigrants from TB-endemic regions of the world
- Some healthcare and laboratory workers

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### TB Disease Progression

- Caused by an inability to contain infection
- The most important characteristics determining disease progression once infected are **age** and **immune status**
- The risk of developing TB for immunocompetent individuals is approximately **10% in a lifetime**
  - For HIV infected individuals the risk is increased to **10% annually**

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**Clinical Risk of Progression to TB**

- HIV-infection
- History of prior, untreated TB
- Children ≤ 5 years with a positive TST/IGRA
- Being underweight or malnourished
- Substance abuse
- Immunosuppression



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**Clinical Risk of Progression to TB (cont'd)**

- Silicosis
- Diabetes mellitus
- Chronic renal failure or on hemodialysis
- Solid organ transplantation (e.g., heart, kidney)
- Carcinoma of head or neck
- Gastrectomy



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**Medical Evaluations**

- **Medical history**
  - History of TB and/or HIV treatment
  - TB exposure
  - Prior Medical History
  - Signs and Symptoms of TB
  - Exposure to a person with infectious TB or have risk factors for exposure to TB
  - Any risk factors for developing TB disease
  - Had LTBI or TB disease before
  - Previous treatment for LTBI/TB Disease
  - Current medications



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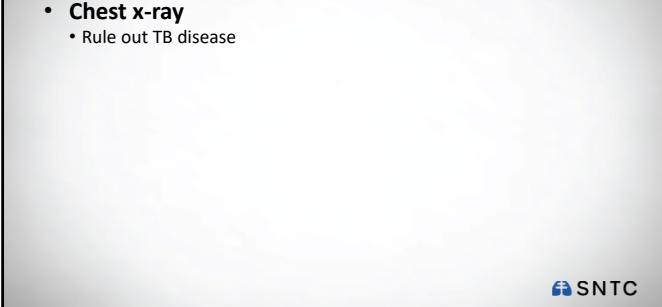
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Medical Evaluations

- **Chest x-ray**
  - Rule out TB disease



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Testing for TB infection

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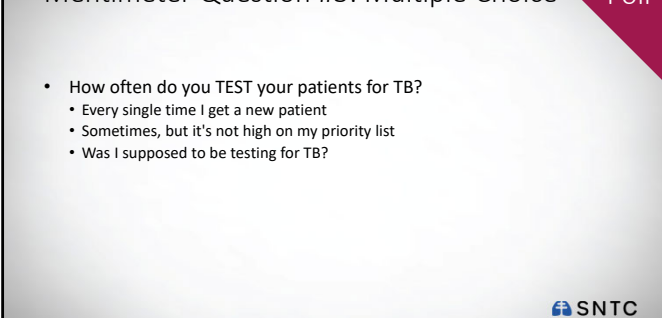
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Mentimeter Question #3: Multiple Choice **Poll**

- How often do you TEST your patients for TB?
  - Every single time I get a new patient
  - Sometimes, but it's not high on my priority list
  - Was I supposed to be testing for TB?



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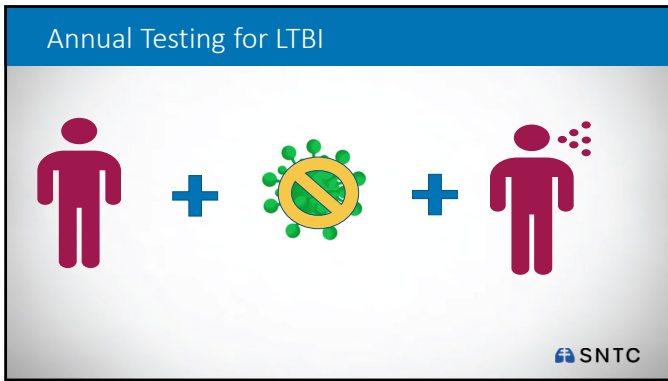
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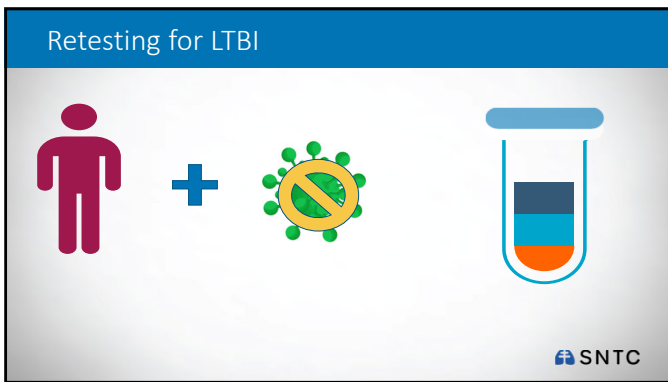
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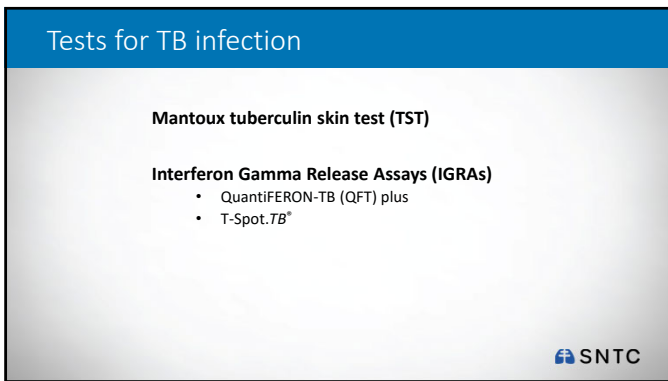
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### Mantoux Tuberculin Skin Test

- Tuberculin (PPD) contains **inactive** tubercle bacilli
- Injected between skin layers on forearm
- Examined by trained HCW within 48 - 72 hours
- Measure **induration** (swelling)
  - Do NOT measure **erythema** (redness)
  - Record result in millimeters – not as “positive” or “negative”





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### Interpreting the TST Reaction

<b>&gt;5mm</b>	<b>&gt;10mm</b>	<b>&gt;15mm</b>
<ul style="list-style-type: none"> <li>• People living with HIV</li> <li>• Recent contacts</li> <li>• CXR suggests old healed TB</li> <li>• Organ transplant</li> <li>• Other immunosuppressed patients (steroids &gt;3w, chemo, TNFalpha antagonists)</li> </ul>	<ul style="list-style-type: none"> <li>• Born in high TB risk country</li> <li>• Drug abuser</li> <li>• Mycobacterial lab worker</li> <li>• Live/work in high risk congregate setting                             <ul style="list-style-type: none"> <li>◦ Nursing home, shelter, correctional facility, etc.</li> </ul> </li> <li>• Medical conditions that increase risk of TB                             <ul style="list-style-type: none"> <li>◦ Diabetes, severe kidney ds, certain cancers, certain GI conditions</li> </ul> </li> <li>• Children &lt;5 years</li> <li>• Infants, children, adolescents exposed to high-risk adults</li> </ul>	<ul style="list-style-type: none"> <li>• No risk factors for TB</li> </ul>

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### Interferon Gamma Release Assays (IGRA)

- Blood tests
- Use purified MTB antigens to stimulate lymphocytes to produce interferon-gamma (IFN-  $\gamma$ )
  - **QuantIFERON TB Gold Plus** measures level of IFN-  $\gamma$
  - **TSPOT** measures # of cells producing IFN-  $\gamma$



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### Which Test Performs Better?

- Specificity**
  - IGRAs more specific than TST
  - QFT and T-SPOT (~95%) vs. TST (~80%)
  - IGRA don't cross react with BCG
  - IGRA don't cross react with most Nontuberculous Mycobacteria (NTM)
- Sensitivity**
  - Sensitivity is high with all 3 tests
  - T-SPOT (90%) vs. QFT or TST (80%)
  - Sensitivity diminished by HIV, immunosuppression, in children

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### Which Test Should I Use?

- IGRAs preferred for:**
  - People who have received the BCG vaccine
  - People who may not return for second appointment to read the TST result
  - People with HIV
- TST is preferred for:**
  - Children under the age of 2

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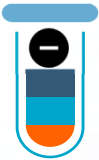
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### Dual Testing for LTBI

Person's TB risk is high, but initial test is negative

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### Dual Testing for LTBI

Person's TB risk is low, but initial test is positive



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### Dual Testing for LTBI

Initial test is positive, and additional evidence is required to encourage compliance with LTBI therapy



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### Mentimeter Question #4: Word Cloud

Poll

- What's one word that describes how you're feeling about this content so far



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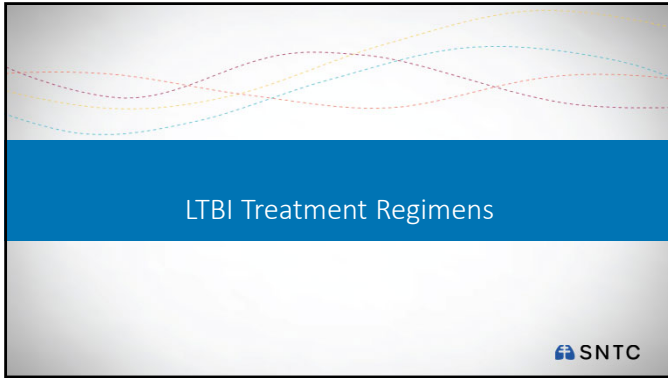
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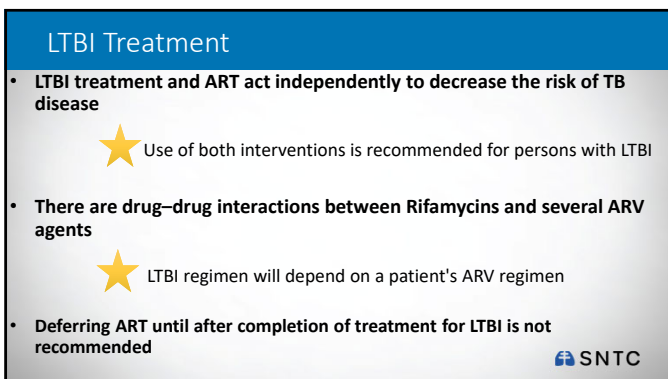
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### Special Considerations in TB/HIV Treatment

- Concurrent administration of ARV'S and treatment for TB is complicated by:
  - Common/overlapping toxicity of both agents
  - Drug-Drug Interactions
  - Poly Pharmacy/Pill Burden
  - Adherence



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### Preferred Treatment of LTBI

**3HP**

<b>1</b> Rifapentine Weight-based dosing PO Once weekly	<b>2</b> Isoniazid 15mg/kg PO Once weekly (900mg max)	<b>3</b> B6 50mg PO Once weekly	<b>12 weeks</b>
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### Preferred Treatment of LTBI

**9INH**

<b>1</b> Isoniazid 300 mg PO Daily	<b>2</b> B6 25-50mg PO Daily	<b>9 Months</b>
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### Alternative Treatment of LTBI

**4RIF**

1  
 Rifampin  
 600 mg PO  
 Daily

4 Months



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### Treatment Completion for LTBI Regimens

	DRUG	DURATION	FREQUENCY	TOTAL DOSES	DOSE AND AGE GROUP
Preferred	ISONIAZID <sup>†</sup> AND RIFAPENTINE <sup>††</sup> (3HP)	3 months	Once weekly	12	Adults and children aged ≥12 yrs INH: 15 mg/kg rounded up to the nearest 50 or 100 mg; 50 mg maximum RPT <sup>††</sup> : 10–14.0 kg: 300 mg 14.1–25.0 kg: 450 mg 25.1–32.0 kg: 600 mg 32.1–49.9 kg: 750 mg ≥50.0 kg: 900 mg maximum Children aged 2–11 yrs INH: 25 mg/kg; 300 mg maximum RPT <sup>††</sup> : See above
	RIFAMPIN <sup>†</sup> (4R)	4 months	Daily	120	Adults: 10 mg/kg; 600 mg maximum Children: 15–20 mg/kg; 600 mg maximum
	ISONIAZID <sup>†</sup> AND RIFAMPIN <sup>†</sup> (3HR)	3 months	Daily	90	Adults INH: 5 mg/kg; 300 mg maximum RIF: 10 mg/kg; 600 mg maximum Children INH: 10–20 mg/kg; 300 mg maximum RIF: 15–20 mg/kg; 600 mg maximum
Alternative	ISONIAZID <sup>†</sup> (6H/9H)	6 months	Daily	180	Adults Daily: 5 mg/kg; 300 mg maximum
		9 months	Twice weekly*	52	Twice weekly: 15 mg/kg; 900 mg maximum
		9 months	Daily	270	Daily: 10–20 mg/kg; 300 mg maximum
			Twice weekly*	76	Twice weekly: 20–40 mg/kg; 900 mg maximum

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**DOT**

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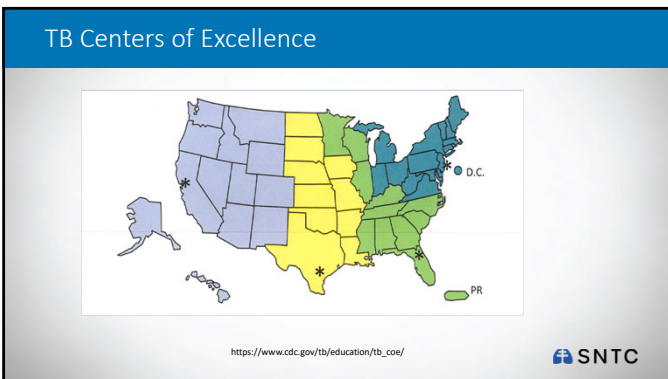
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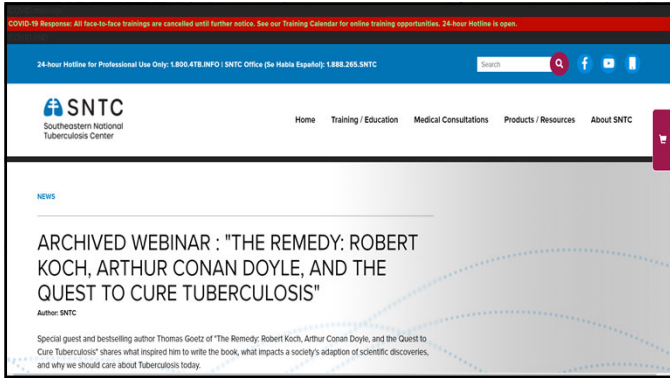
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