Pediatric Tuberculosis From Exposure to Management

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TB Nurse Case Management • April 29 – May 1, 2026 • Fort Worth, Texas

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Has the following disclosures to make:

- No conflict of interests
- No relevant financial relationships with any commercial companies pertaining to this activity

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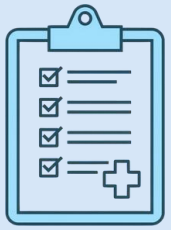
Learning Objectives



Describe current recommendations for diagnosis, treatment, and management of pediatric TB, including evidence-based clinical guidelines and best practice.

Navigate the diagnostic process in children, understanding the unique challenges of screening, testing, and confirming tuberculosis in pediatric patients.

Understand the progression from TB infection to disease, recognizing risk factors, timelines, and clinical indicators that guide management decisions.

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Pediatric TB vs. Adult TB: The Critical Differences

Pediatric patients are not "small adults" — they have unique physiology that affects how TB presents, progresses, and responds to treatment.

Immature immune systems in children significantly increase the risk of progression from TB infection to active disease, especially in those under 2 years old.

Lower bacterial loads in pediatric TB cases make diagnosis more challenging — standard tests are less sensitive, requiring clinical vigilance.

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Who Should be Screened?

Place a mark in the appropriate box:	Yes	No	Don't Know
TB can cause fever of long duration, unexplained weight loss, a bad cough (lasting over two weeks), or coughing up blood. As far as you know: has your child been around anyone with any of these symptoms or problems? or has your child had any of these symptoms or problems? or has your child been around anyone sick with TB?			
Was your child born in Mexico or any other country in Latin America, the Caribbean, Africa, Eastern Europe or Asia?			
Has your child traveled in the past year to Mexico or any other country in Latin America, the Caribbean, Africa, Eastern Europe or Asia for longer than 3 weeks? If so, specify which country/countries?_____			
To your knowledge, has your child spent time (longer than 3 weeks) with anyone who is/has been an intravenous (IV) drug user, HIV-infected, in jail or prison or recently came to the United States from another country?			

Risk factors

Patients with Symptoms or Exposure to TB

Foreign Born

Travel to High Risk Countries

Exposure to High Risk Individuals

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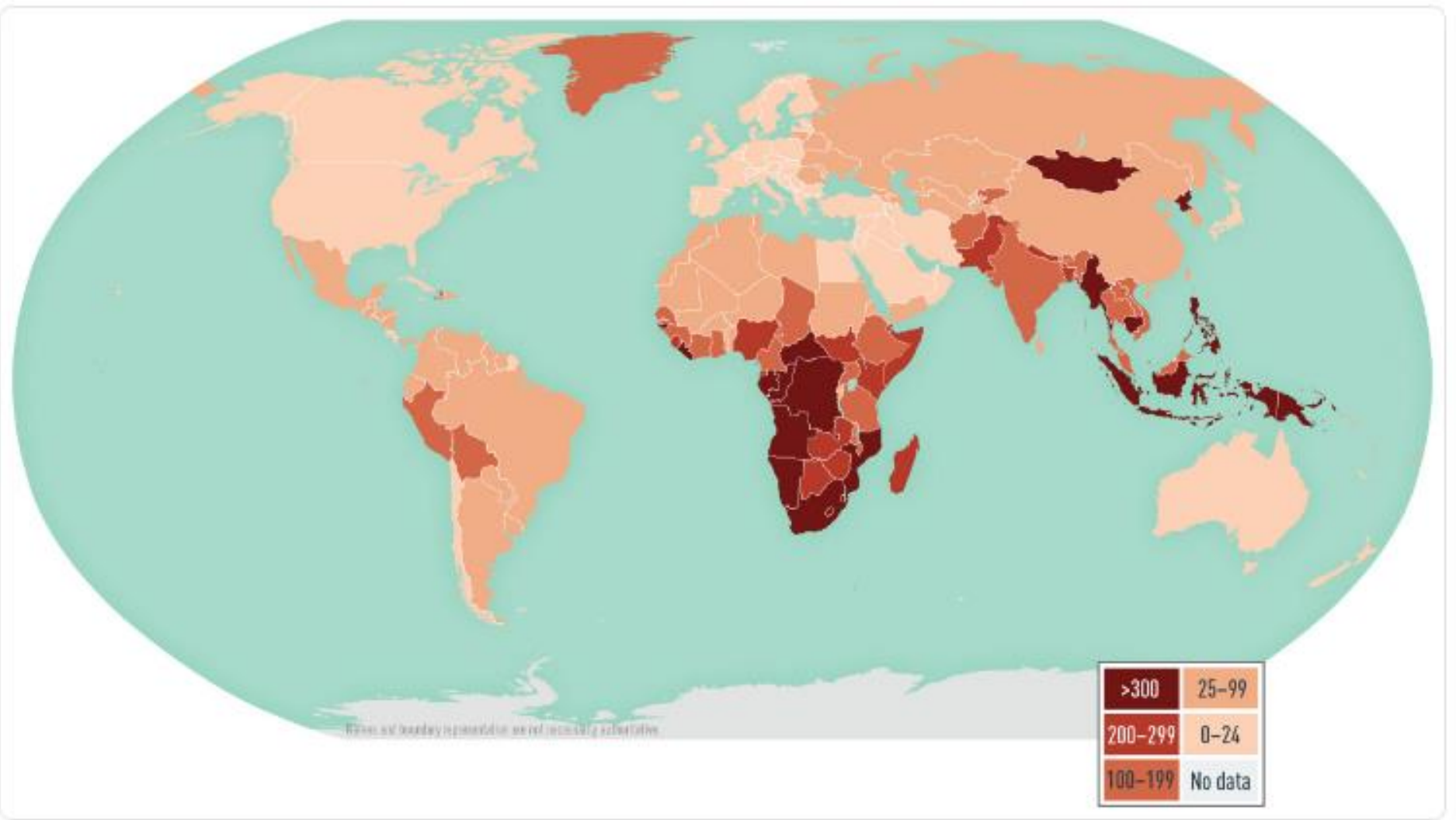
Estimated tuberculosis incidence rates



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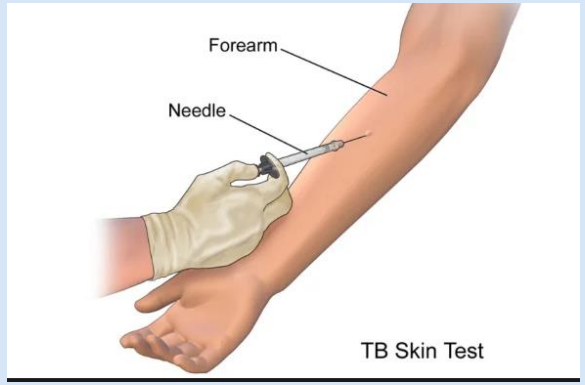
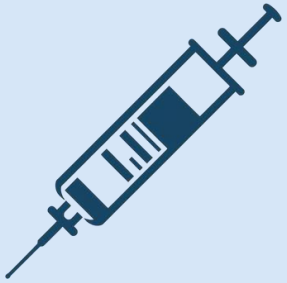
Standard Diagnostic Tools

Tuberculin Skin Test (TST) aka PPD (Mantoux test)



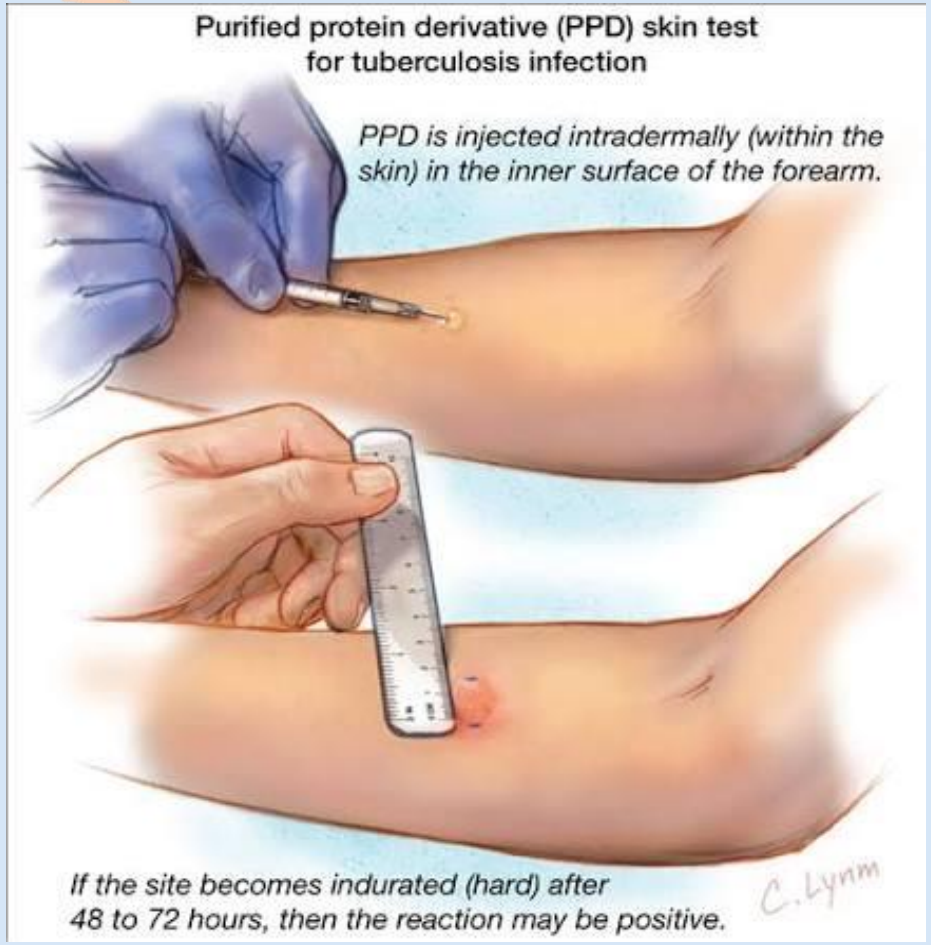
Interferon-Gamma Release Assays (IGRA)

Perfecting the TST



Administer via intradermal injection on the volar forearm, creating a 6-10 mm pale wheal. Proper technique ensures the tuberculin is deposited correctly in the dermis, not subcutaneously.

Read induration 48-72 hours after administration. Measure the hardness (induration) by palpation, not the redness (erythema). Accurate measurement technique is critical for reliable diagnostic results.



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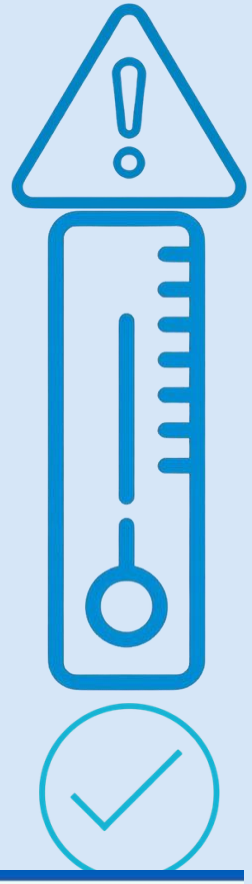
Interpreting Results



Classification of the Tuberculin Skin Test (PPD) Reaction

≥ 5 mm

- HIV positive
- Recent contact with an active TB patient
- Nodular or fibrotic changes on chest X-ray
- Organ transplant

≥ 10 mm

- Recent arrivals (< 5 yrs) from high-prevalence countries
- IV drug users
- Resident/employee of high-risk congregate settings
- Mycobacteriology lab personnel
- Comorbid conditions
- Children < 4 yrs old
- Infants, children, & adolescents exposed to high risk categories

≥ 15 mm

- Persons with no known risk factors for TB

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Understanding IGRA (Interferon-Gamma Release Assay)Use

Single visit testing with higher specificity than TST. Results are not affected by prior BCG vaccination, making IGRA the preferred choice for BCG-vaccinated children.

Requires a blood draw, which can be challenging in very young children.

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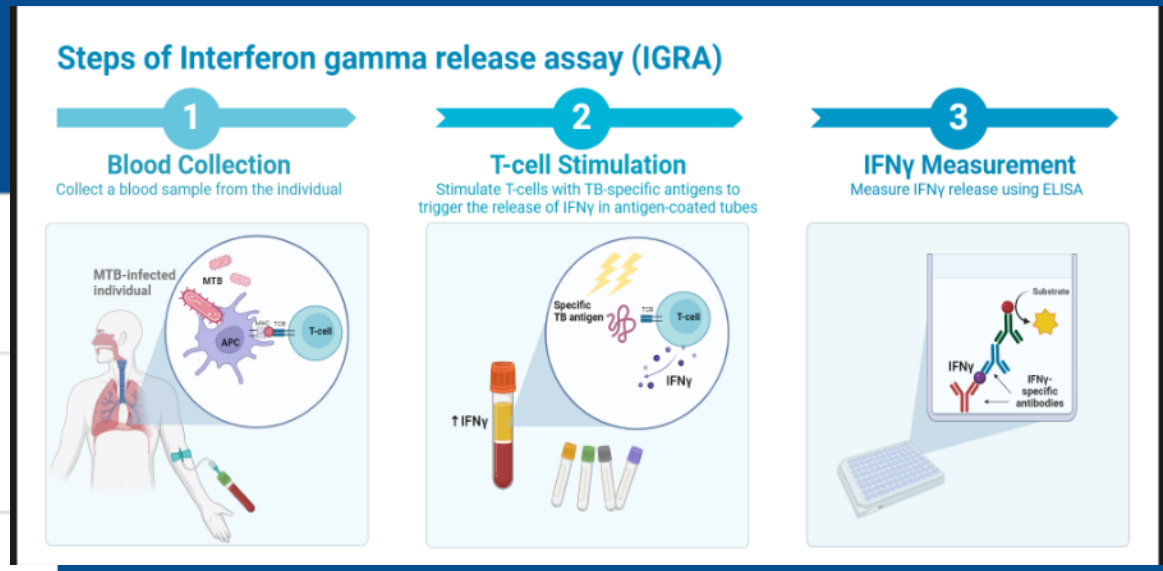
Quant gold TB vs T spot = IGRA

Feature	QuantiFERON-TB Gold Plus (QFT-Plus)	T-SPOT.TB
Methodology	ELISA (Measures total IFN-γ concentration)	ELISpot (Counts individual IFN-γ secreting cells)
Best For	High-volume clinics, routine screening	Immunocompromised, pediatric, or complex patients
Sample Handling	High Sensitivity: Must be incubated at 37°C immediately	More Robust: Can handle shipping delays better than QFT
Age Limitations	Generally used for ages 2+	FDA-cleared for ages 2+; but also good for <2 years



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Diagnosis

Clinical Symptoms:

- Persistent cough lasting more than 2-3 weeks
- unexplained fever
- progressive weight loss
- failure to thrive are key indicators requiring further evaluation.

Radiologic Findings:

- Chest X-ray typically reveals hilar or mediastinal lymphadenopathy, pulmonary infiltrates, or cavitary lesions that support clinical suspicion of active disease.

Positive TST/IGRA or Bacteriologic Confirmation: Microbiologic confirmation is often difficult in children due to lower bacterial loads, making clinical and radiologic correlation essential.

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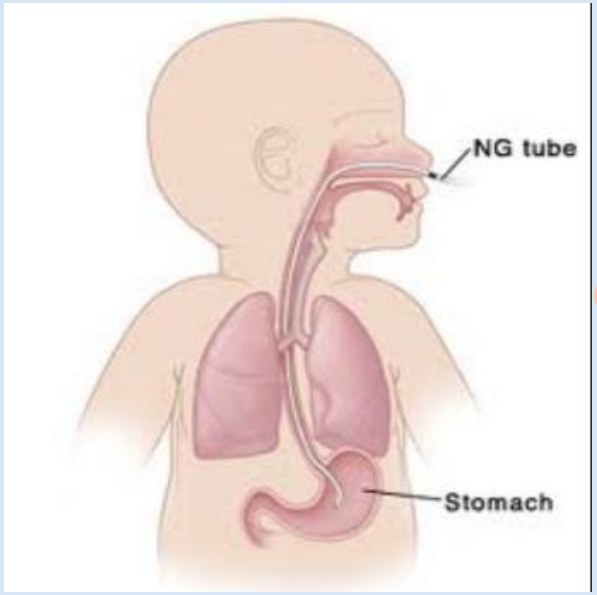
Advanced Diagnostics

Gastric aspirate is performed on 3 consecutive mornings and is the standard approach in young children.

Induced sputum collection is used for older children who can cooperate with the procedure.



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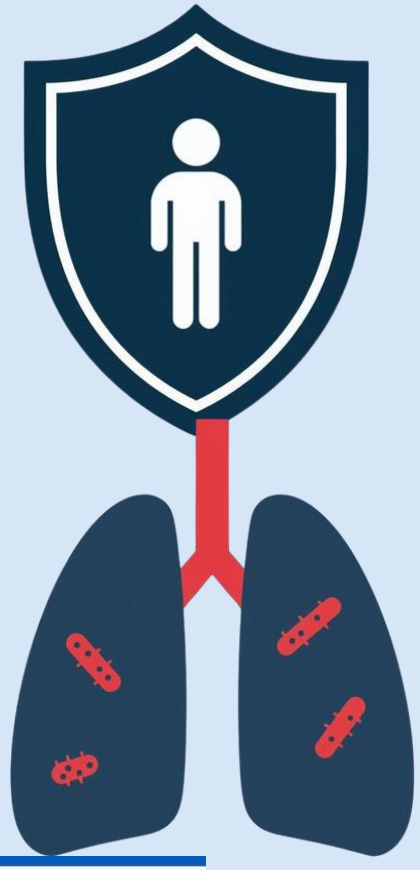
Definitions: LTBI vs. TB Disease



Latent TB Infection (LTBI): Patient is infected but asymptomatic and non-contagious. No active disease present. Primary goal is prevention of progression to active disease through prophylactic treatment.

Active TB Disease: Patient is symptomatic with clinical manifestations and is contagious to others. Risk of severe morbidity if untreated. Primary goal is cure through multi-drug therapy and infection control.

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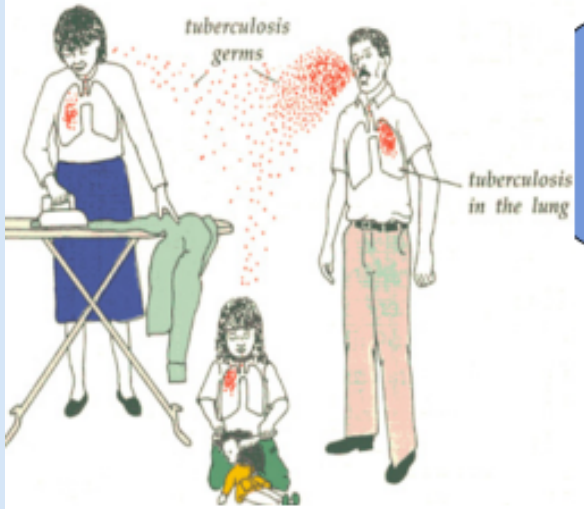
Stages of Tuberculosis



Exposure
to Contagious Adult with
Pulmonary Disease

Household
contacts

20-30%

Latent TB **Infection**
LTBI

5-10%

Risk varies by age
5-50%

Adult
Active TB **Disease**

Child
Active TB **Disease**

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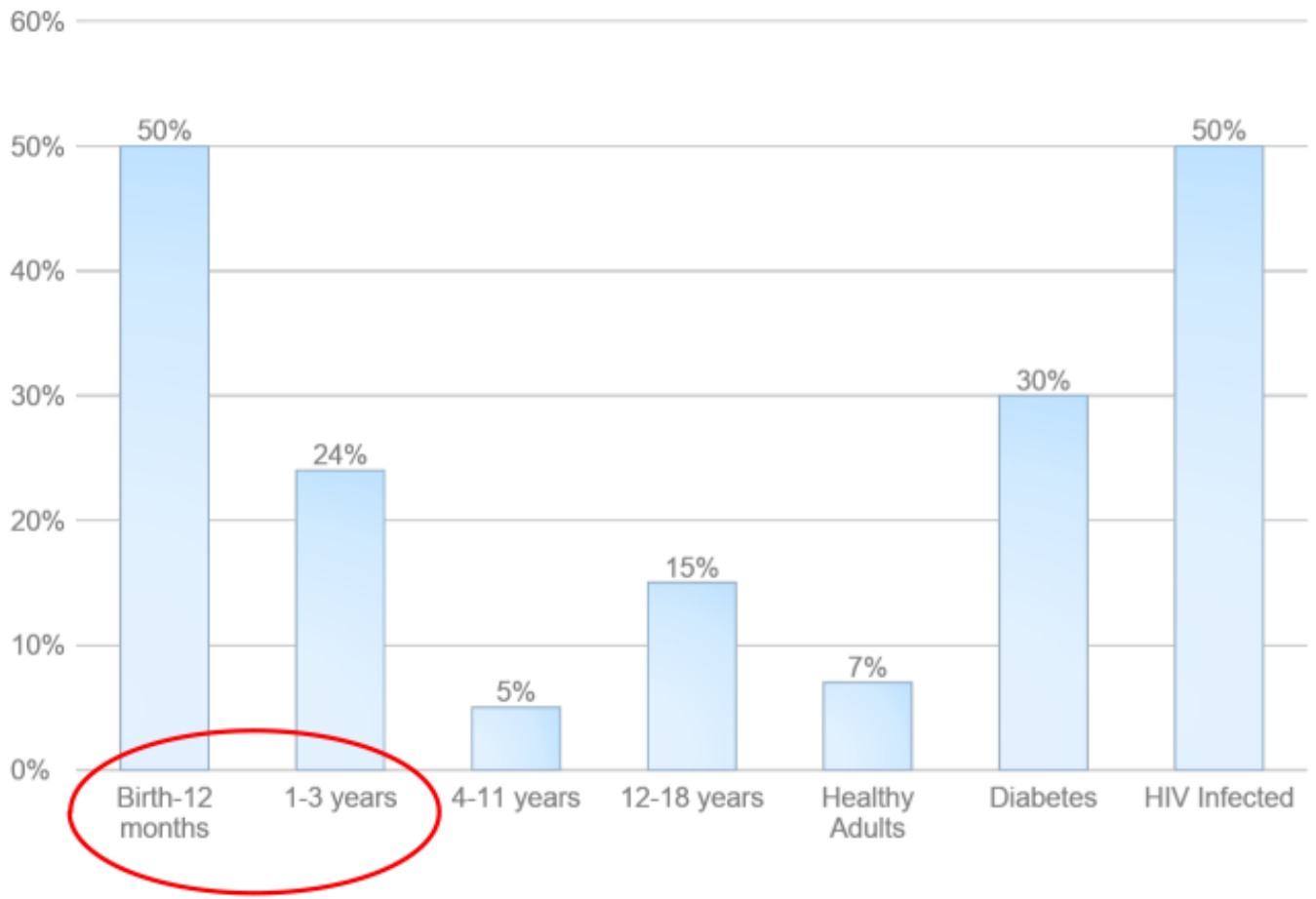
Risk of Progression to TB Disease if no Treatment

by Age Infected or Medical Condition



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Warning Signs for Pediatric patients

Non-specific signs: Failure to thrive, unexplained persistent fever, and lethargy. These subtle symptoms often delay diagnosis as they mimic common childhood illnesses.

Specific signs: Persistent cough lasting more than 2-3 weeks, night sweats, and unexplained weight loss. These classic TB symptoms warrant immediate diagnostic workup.

Red flags: Irritability or vomiting may indicate TB meningitis—a medical emergency requiring urgent evaluation and intervention. Early recognition is critical.

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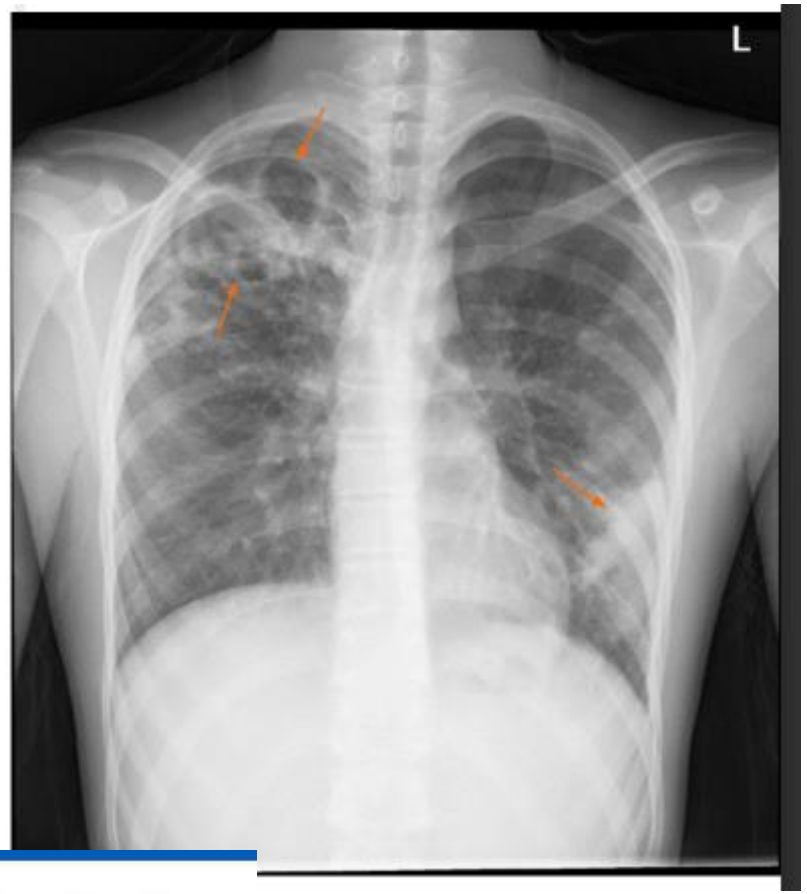
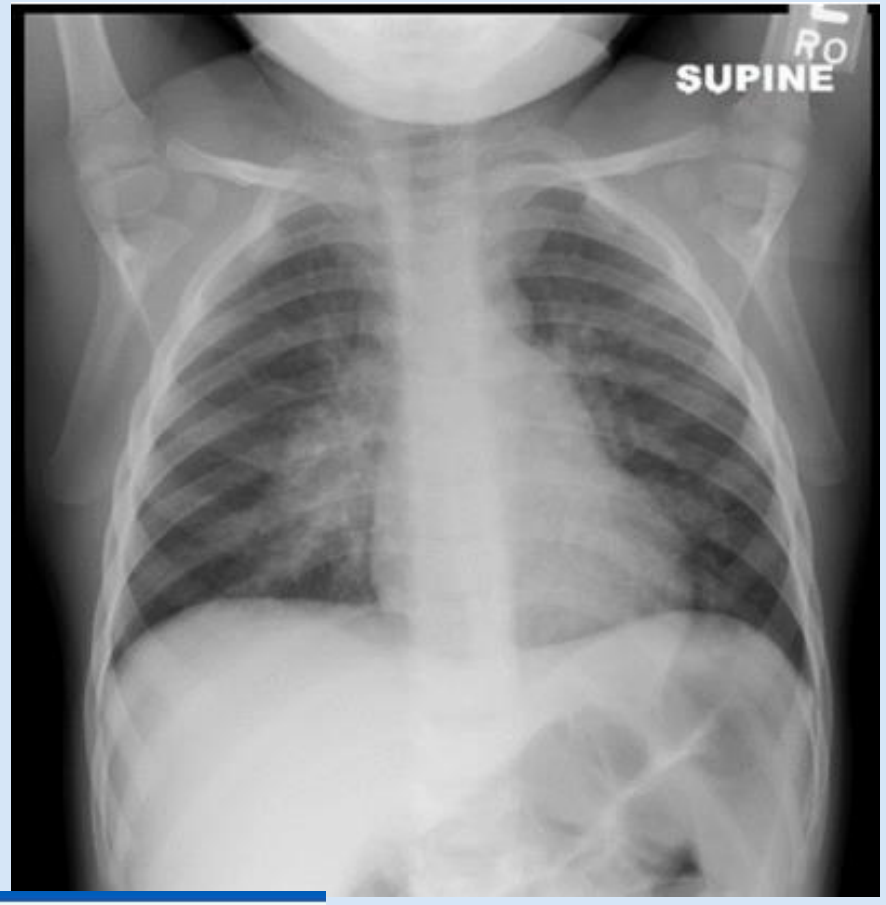
Chest X ray Findings



- **Hilar/Mediastinal Lymphadenopathy:** The hallmark of pediatric TB. Enlarged lymph nodes near the airway (often unilateral).
- **Airway Compression (Atelectasis):** Enlarged nodes compress airways, causing partial or full lung collapse (atelectasis) or hyperinflation (air trapping).
- **Primary Complex (Ghon Focus):** A small focal lesion in the lung parenchyma associated with regional lymph node involvement.
- **Miliary Pattern:** "Millet seed" appearance—tiny, diffuse, scattered nodules throughout the lungs (a sign of severe, disseminated disease).

PRIMARY TB DISEASE



- Typical of childhood TB
- Usually not cavitary

- **Classic x-ray:**

Hilar lymphadenopathy
Infiltrates or Miliary pattern

- Low numbers of organisms
- AFB smears negative (95%)
- Cultures negative in 60%
- Most children <10 yrs are not contagious
- Often asymptomatic (50%)

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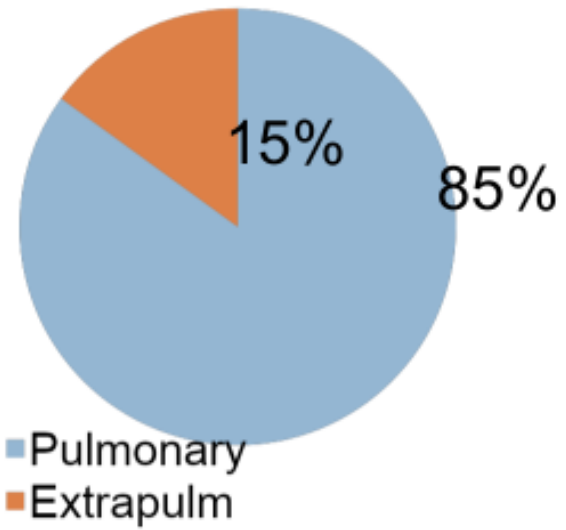
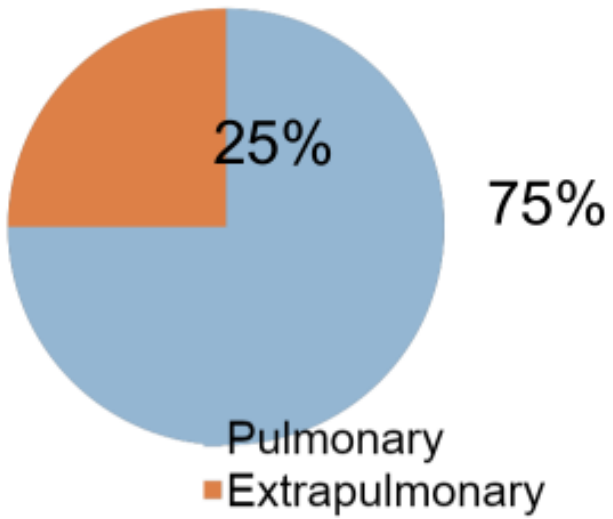
TB Disease

Adult TB Disease



Pediatric TB Disease



Source: U.S. Cases CDC

Extrapulmonary TB diseases

TB Meningitis (The Medical Emergency):

- Subtle onset. Irritability, behavioral changes, persistent vomiting, headache, lethargy.

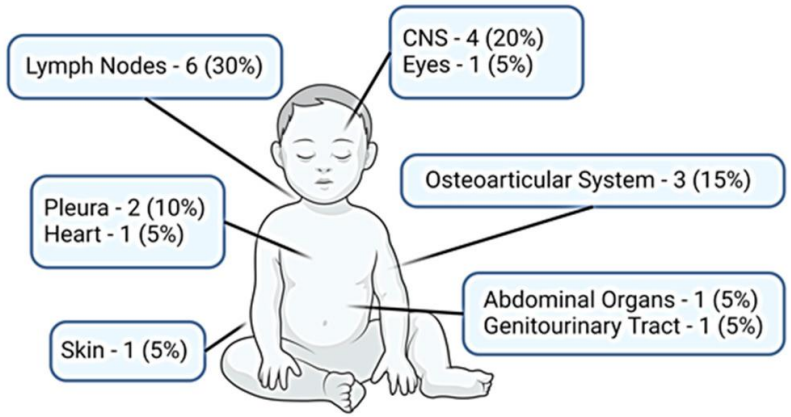
TB Lymphadenitis (Scrofula):

- The most common form of EPTB. Slowly enlarging, firm, non-tender, "cold" lymph nodes, usually in the cervical/submandibular region.
- **Differentiation:** Unlike bacterial lymphadenitis (which is "hot," red, and acute), TB lymphadenitis is indolent, chronic, and often painless until it develops a sinus tract.

Skeletal TB (Pott's Disease):

- TB of the spine. Presents with back pain, spinal deformity (gibbus), or refusal to walk.

(a)



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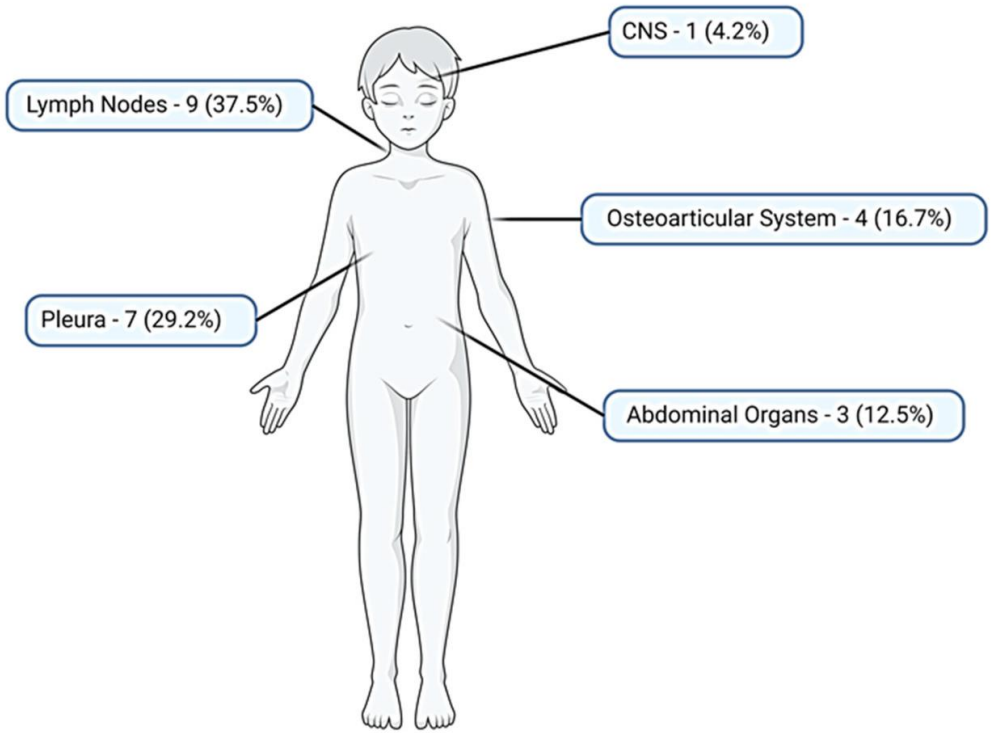

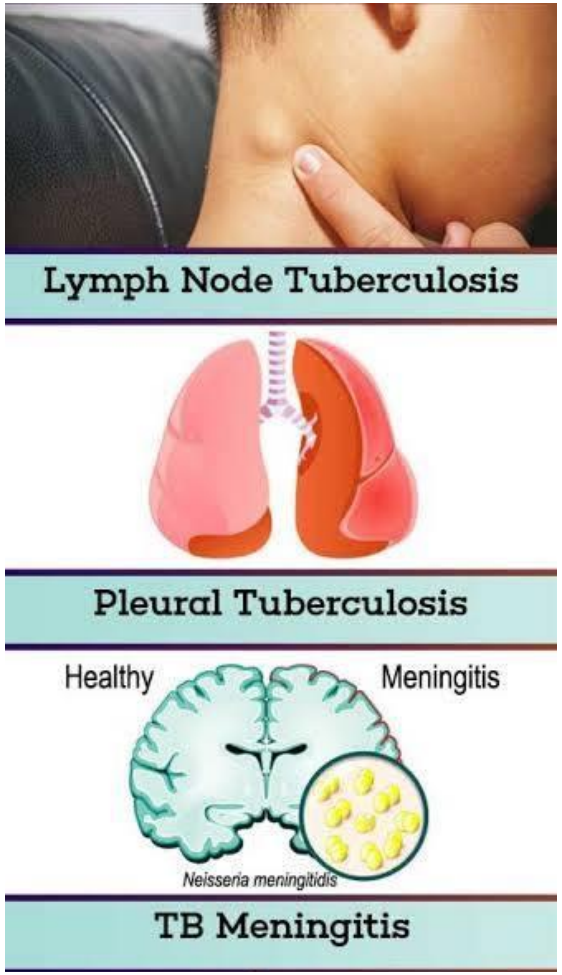

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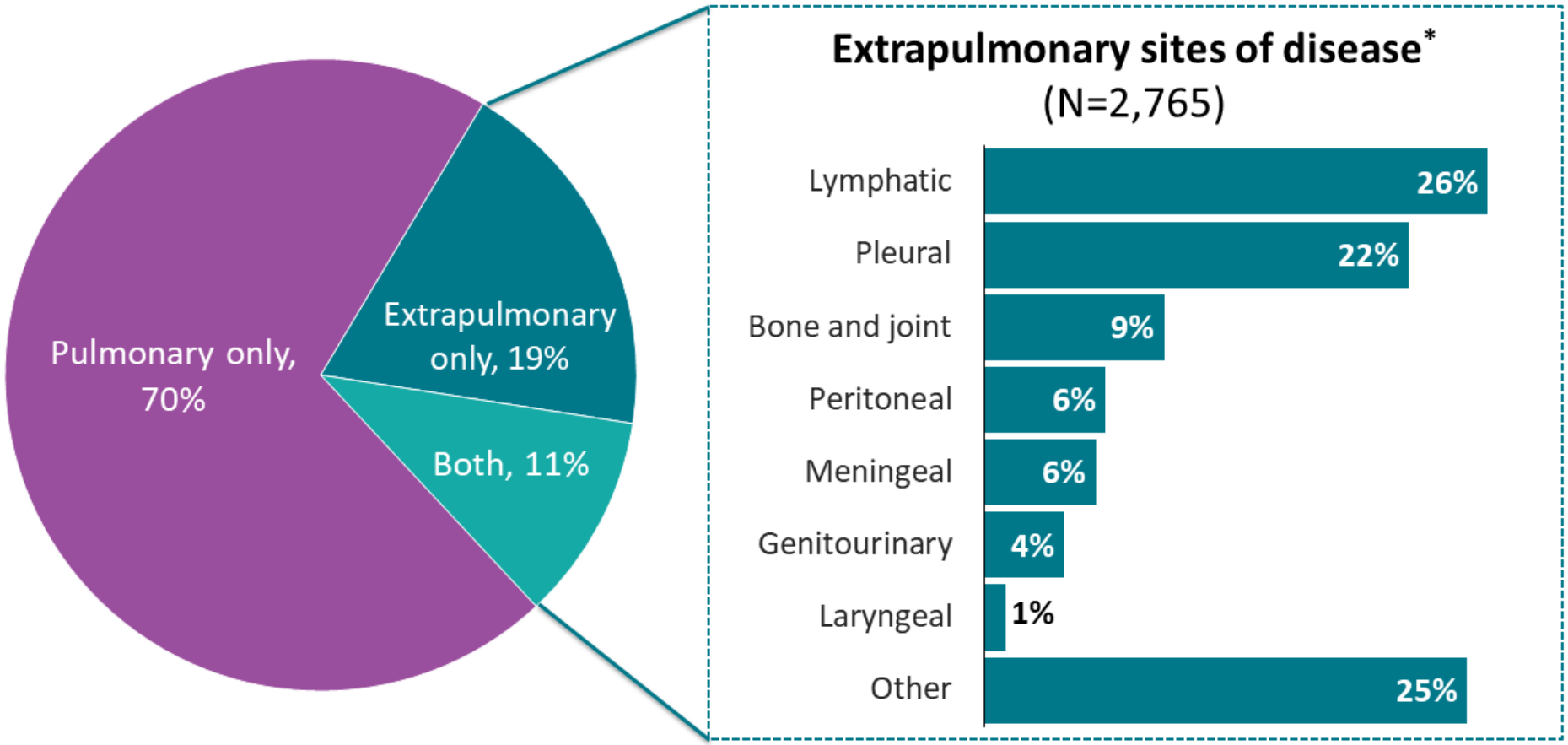
Percentage of TB Cases by Site of Disease, United States, 2022



*Persons might have more than one extrapulmonary site of disease.

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Principles of TB Management

Consistency and adherence to long-term therapy are crucial for successful treatment outcomes and preventing drug resistance.

Follow AAP Red Book and CDC guidelines for evidence-based treatment protocols and dosing recommendations.

Multidisciplinary approach including nursing support ensures comprehensive patient care and family education.

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TREATMENT OPTIONS FOR LTBI

3HP - Health Department Only

- INH & Rifapentine once weekly for 12 doses
- High completion rates
- Must be directly observed therapy (DOT)
- Lots of pills to swallow may be issue for younger children
- Approved for children > 2 years

Rifampin daily for 4 months

- High completion rates
- May be compounded to liquid or capsules sprinkled
- Potential drug interactions (OCA's, protease inhibitors)
- Red/orange urine in most patients
- More expensive

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Treatment of TB in Children

Stages of TB	TST/IGRA	CXR/Lab Physical	Symptoms	Treatment
Exposure Child ≤4yrs (adult source)	Negative	Normal	None	Window CPX Rifampin or INH 8-10 wks Repeat TST 8-10 wks after last contact
LTBI Latent TB Infection	Positive	Normal	None	• Rif x 4-6 mo or • 3HP wkly x 12 wks, DOT (directly observed therapy) or • INH x 9 mo
Disease	90% Positive 50% false neg with miliary and TBM	Abnormal CXR, PE or labs	50% of children have symptoms	RIPE x 4-12 months, duration depends on site

Window Prophylaxis

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Active TB Disease

Standard multi-drug regimens spanning 6 months total. Treatment duration and intensity depend on disease severity and patient response to therapy.

Initial intensive phase uses 4 drugs (typically RIPE: Rifampin, Isoniazid, Pyrazinamide, Ethambutol) for 2 months to rapidly reduce bacterial load.

Continuation phase with 2 drugs (Rifampin and Isoniazid) for 4 months. Monitor closely for adverse effects including hepatotoxicity and ensure strict adherence.

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Monitoring Children on TB Treatment

- Risk of drug toxicity very low
- Monitor clinical signs
  - Regular clinical visits (4-6 wks)
  - Patient education
- Routine blood work not necessary unless
  - Signs or symptoms of toxicity
  - Risk factors for toxicity (obesity, other hepatotoxic medications)
- Follow up to monitor symptoms and reinforce adherence

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Side effects of RIPE

Adverse effects of ATT drugs

Drug	Adverse effects
Isoniazid	Hepatotoxicity, peripheral neuritis, hypersensitive reactions may precipitate epilepsy, drug induced lupus, psychotic changes
Rifampicin	Hepatotoxicity, gastrointestinal, autoimmune reactions (more with intermittent administration), which include flu syndrome, thrombocytopenias, purpura, respiratory shock syndrome, acute hemolytic anemia, ARF)
Pyrazinamide	Hepatotoxicity, arthralgia, hyperuricemia, gastrointestinal, allergic reactions
Ethambutol	Optic neuritis, colour blindness, gastrointestinal, allergic reactions, hyperuricemia
Streptomycin	Vestibular dysfunction, deafness, nephrotoxicity, neuromuscular blockade, peripheral neuritis

Nursing Role in Management

Patient and family education on medication adherence, ensuring understanding of treatment regimens, dosing schedules, and importance of completing full course of therapy.

Monitoring side effects and clinical response throughout treatment, including hepatotoxicity screening, vision changes, and tracking symptom improvement.

Coordinating care and follow-up appointments with multidisciplinary team while supporting psychosocial needs of patients and families during long-term treatment.

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Case 1

A 3-year-old girl p/w

- persistent cough for 4 weeks
- low-grade fever
- failure to thrive

- Her grandmother, who recently immigrated from Tanzanya, has been coughing for 2 months.

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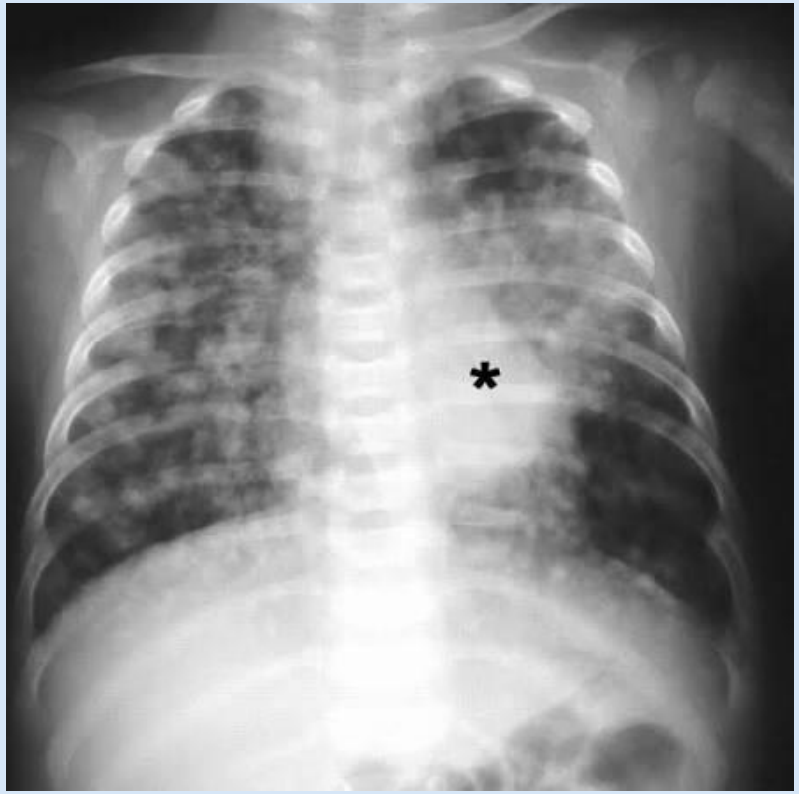
Next steps?



- **Isolation**
- **TST shows 12mm induration**
- **Chest X-ray done**

- Gastric aspirate collection over 3 consecutive mornings
- Educating the family on infection control measures
- Ensuring medication adherence through directly observed therapy.

- **Key decision points:** risk stratification based on **close contact** and **age <4 years**,
- 4-drug regimen for active disease
- Scheduling regular follow-up to monitor treatment response and side effects

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Case 2

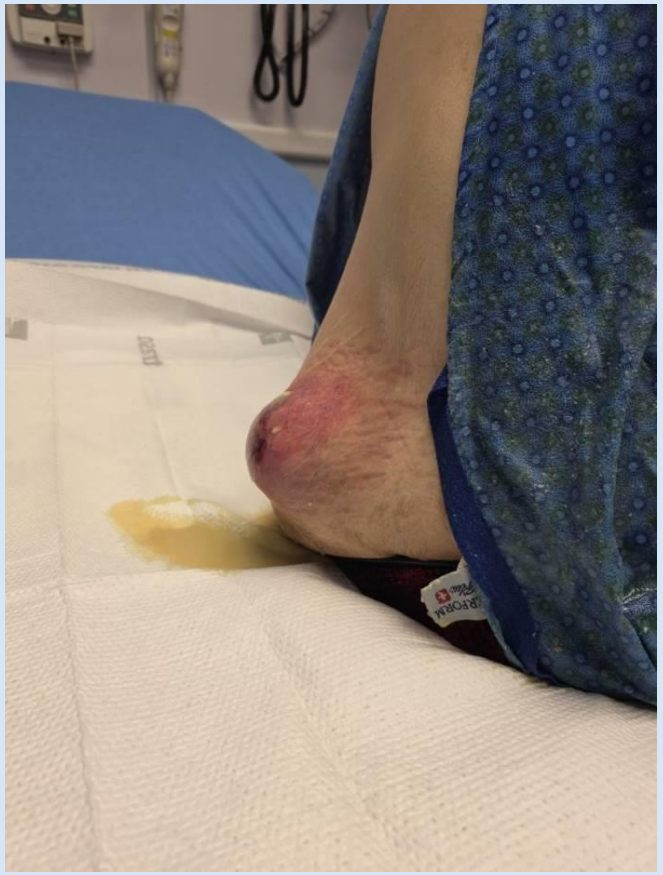
17 yo M p/w

- Back pain
- Gradual swelling on left lower back for >1 year
- Self draining lower back abscess

- Night sweating
- Weight loss 40 pounds over past year

- MRI spinal:

1. Discitis osteomyelitis at L2/L3 and L5/S1.
2. Large complex fluid collections within the bilateral iliopsoas muscles, right greater than left, consistent with abscesses.
3. Osteomyelitis of the left ilium and left sacrum with septic arthritis of the left sacroiliac joint.



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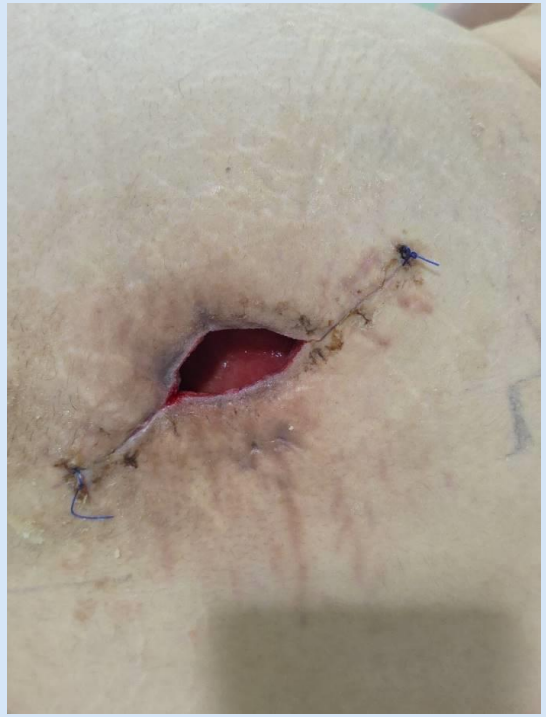
Case 2

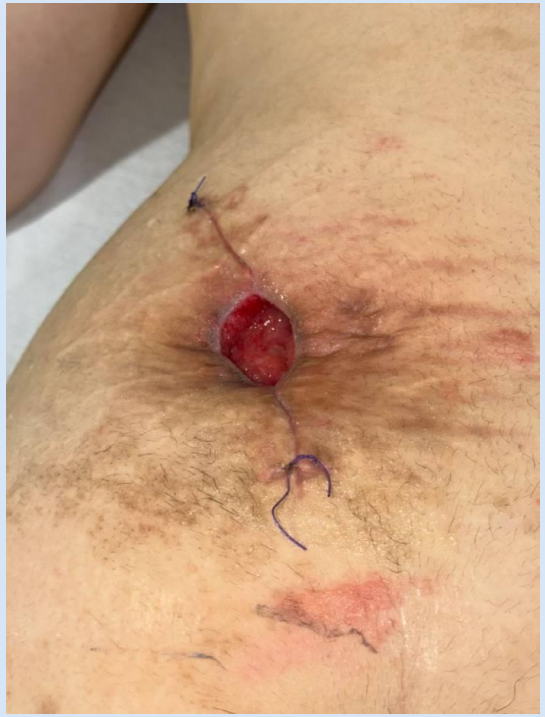
S/p I&D of back and wound vac placement and IR drainage of bilateral psoas abscesses with drain placement on 1/23

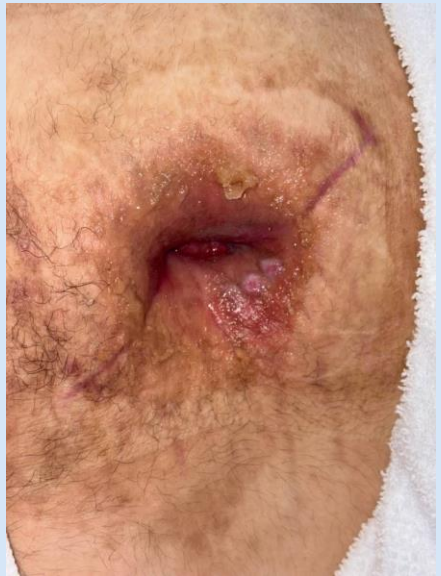
T spot sent 1/22 and resulted positive 1/25
MTB PCR from abscess fluid positive 1/30
PPD positive

AFB cultures from fluid and bone grew M TB – 2/5

RIPE for 2 months – 9-12 months RI







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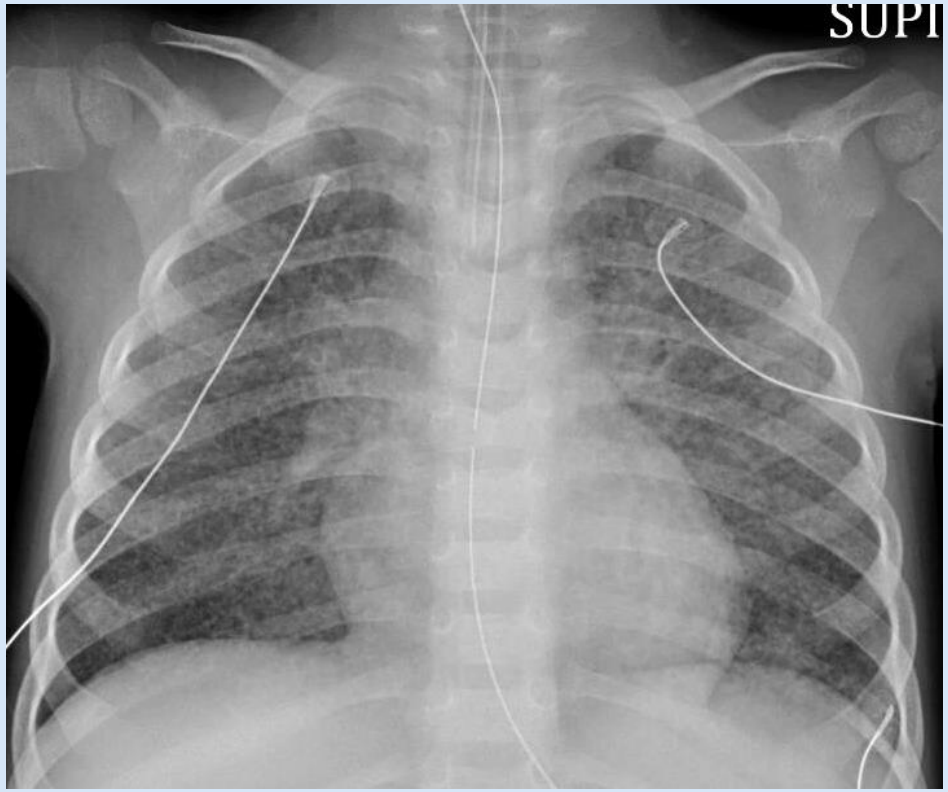
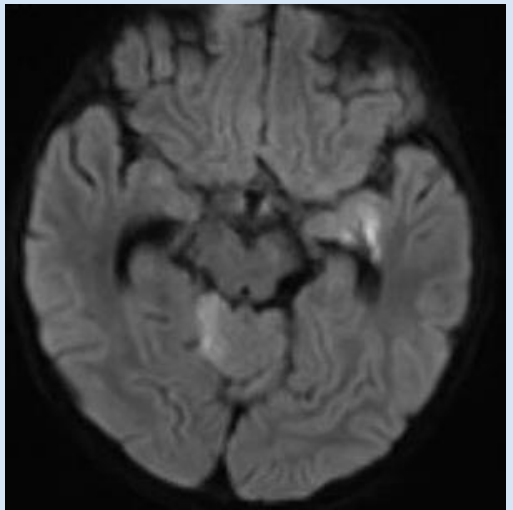
Case 3

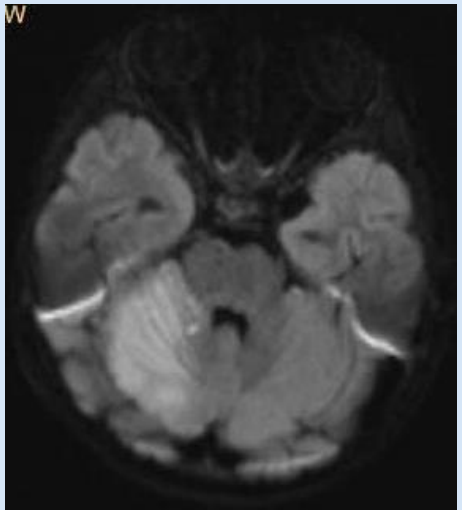
2 yo M p/w

- Fever
- Vomiting
- Prolonged seizure required intubation for airway protection
- Recent admission due to febrile seizure and pneumonia
- Mother denies that patient has had longstanding cough, weight loss, night sweats.

- CXR w/ reticular nodular opacities noted bilaterally without pleural effusion or pneumothorax
- MRI brain w/ innumerable enhancing punctate lesions scattered throughout the brain with areas of diffusion restriction, enlarged ventricles concerning for acute hydrocephalus – concerning for TB







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Case 3

Exposure history

- Mother reports they live with patient's sibling, uncle and grandparents.
- Grandparents were born in Mexico and uncle recently started going there every 2 to 3 months.
- Grandfather has had a dry cough off-and-on for a year.
- She is not aware of anyone around him with TB diagnosis.

Case 3

	Latest Reference Range & Units	02/28/26 17:44
Glucose, CSF	60 - 80 mg/dL	87 (H)
CSF Tube Number		3
CSF Appearance		Slightly Hazy
CSF Color		Colorless
CSF Volume	mL	1.5
CSF WBC	0 - 5 /uL	**622** (H)
CSF RBC	0 - 0 /uL	119 (H)
CSF Total Protein	15.0 - 40.0 mg/dL	243.2 (H)
CSF Total Cells Counted		100
CSF, Lymphs	40.0 - 80.0 %	**9.0** (L)
CSF Monocytes/Macrophages %	%	15.0
CSF Neutrophils %	2.0 - 6.0 %	**76**.0 (H)

T spot : positive (sent 3/1 – resulted 3/4)
MTB PCR from CSF negative

AFB cultures (2/28) from
- Sputum
- Gastric aspirate
- CSF
- All neg for AFB smear but positive on 3/22

- RIPE started on 2/28 given high concern
- Plan for 2 months RIPE and 9-12 months RI

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PEDIATRIC TB DISEASE SUMMARY

Higher risk for

- Progression to disease - Especially infants and children < 2 years
- Extrapulmonary and disseminated disease including TB meningitis

Most common TB disease sites in children

- Pulmonary and lymph nodes

Symptoms may be subtle or absent in children

Children < 10 years

- Have low bacterial load (paucibacillary disease)
- Usually are not contagious - Unless cavitary or AFB smear positive disease

AFB smears and TB cultures

- Often negative in children

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PREVENTION OF TB IN CHILDREN

Screen with TB Questionnaire
Order PPD or IGRA if TBQ positive

Window prophylaxis
For kids < 4 years with TB exposure

Treat latent TB infection
Shorter course therapies preferred due to higher completion rates

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Key Takeaways

Pediatric TB diagnosis is **challenging but manageable** with proper tools.

Early recognition and risk stratification are essential. **Children under 2 years face the highest progression risk.** Timely identification of infection and appropriate risk-based interpretation of screening results enables prompt intervention and prevents disease progression.

Nursing roles are pivotal in all stages of care. From patient education and medication adherence support to monitoring side effects and coordinating multidisciplinary follow-up, nurses drive successful outcomes in pediatric TB management.

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Thank You

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