

Pediatric Tuberculosis

**Satellite Conference and Live Webcast
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**Produced by the Alabama Department of Public Health
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Faculty

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Why is Pediatric Tuberculosis a Major Concern

- **Prevention of pediatric tuberculosis is an indicator of the success of a tuberculosis program**
- **Early identification and treatment of infected children reduces the risk of progression to disease**

Why is Pediatric Tuberculosis a Major Concern

- **Increased foreign born patients or first generation patients of foreign born parents represent an important population of at risk patients**

By the Numbers - TB in Patients Less Than 5 Years of Age

- **Infants and children infected between birth through 4 years of age have a 25% risk of progression to disease**
- **Infants infected under one year of age have up to 40% risk of disease**
- **25 - 35% of young children develop extrapulmonary disease**

Risk for Disease in Children After Infection

- **Miliary or meningeal 0.5 - 3%**
- **Pulmonary 75%**
- **Lymphatic 12 - 15%**
- **Bone and joint 1%**
- **Renal 1%**

Risk for Disease in Children After Infection

- Other sites of infection including skin, genitourinary, gastrointestinal, upper respiratory

Risk Factors for Pediatric Tuberculosis

- Exposure to high risk adults
- Born in high risk country or parents born in high risk country
- Low income
- Homeless
- Intravenous drug use (adolescents)
- Correctional / juvenile facility

Risk Factors for Progression

- Infection under five years of age
- Adolescent / young adult
- Co infection with HIV
- Conversion of PPD within two years
- Immunodeficiency

Other Concerns About Progression of TB in Children

- Diabetes
- Chronic renal failure
- Malnutrition
- Immunodeficiency - Cancers, congenital deficiencies, treatment for conditions such as JRA, Crohn's such as TNF alpha inhibitors (examples - adalimumab, infliximab)

The PPD is Old But NOT GOLD

- Can be useful if positive in exposed infant or child
- Infants cannot mount a good response to PPD under at least 16 weeks of age and some experts recommend up to 24 weeks of age

The PPD is Old But NOT GOLD

- Caution if negative in exposed infant or child
 - Between 10 - 40% of children with documented tuberculosis do not have an initial reactive PPD

Which Children Should Receive a PPD

- Contacts to known or suspected cases
- Children with abnormal radiographic findings and suggestive clinical histories / high risk groups

Which Children Should Receive a PPD

- Immigrants or adoptees from Asia, Middle East, Africa, Latin America, former Eastern Block / Soviet countries
- Children with travel histories to high risk countries or exposure to people from high risk countries

A Word about “Screening PPDs” in Some Children

- Initial TST should be done on children who
 - Are immunosuppressed
 - Are going to be on prolonged steroid therapy
 - Are going to receive tumor necrosis factor alpha antagonists

A Word about “Screening PPDs” in Some Children

- Are going to be placed on immunosuppressive therapy for illnesses such as JRA

IGRAs and Pediatrics

- Becoming increasingly useful in children with recommended age now as low as two years

Hispanic Child 19 Months of Age





• Left upper lobe consolidation



• Left hilar adenopathy

African American Child Age 9 Months

- 2.7 cm round opacity right hilum

Parallel Cases of Pediatric Tuberculosis

<p>Hispanic Child 19 months</p> <ul style="list-style-type: none"> • Asymptomatic • 18mm PPD • Identified within 3 days • Gastric aspirate x3 positive smear and culture for M. Tb • HIV negative 	<p>African American Child 9 months</p> <ul style="list-style-type: none"> • Asymptomatic • 15mm PPD • Identified within 3 days • Gastric aspirate x3 negative smear and culture • HIV negative
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Parallel Cases of Pediatric Tuberculosis

<p>Hispanic Child 19 months</p> <ul style="list-style-type: none"> • LP - negative smear / culture • Therapy I - Started with four drugs - Index case culture pansensitive • Treated standard therapy and resolved without complications 	<p>African American Child 9 months</p> <ul style="list-style-type: none"> • LP - negative smear / culture • Therapy I - Started with four drugs - Index case culture pansensitive • Treated standard therapy and resolved without complications
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Pearls of Management in Pediatric Tuberculosis

- Directly observed therapy is a must in treatment of disease
- Cultural competency plays a great role in successful treatment
- Prepare the parents / caregivers for the long treatment journey ahead
- Be creative regarding administration of medications

Therapy of Pediatric Tuberculosis

- Standard Therapy for drug sensitive tuberculosis with INH,RIF, PZA and EMB
- Special consideration for Alternative Regimens if suspicion of multi-drug resistant organism

Roles of Specific TB Drugs

- INH - Bactericidal and prevents emergence of resistance to other drugs
- Rifampin - Bactericidal and prevents emergence of resistance to other drugs

From Advanced Concepts in Pediatric TB –
Dr. Jeffrey Starke

Roles of Specific TB Drugs

- **EMB - Bacteriostatic at lower doses and prevents emergence of resistance to other drugs**
- **PZA - Allows for shorter duration of therapy**

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Drug Side Effects and Concerns

- **INH - Peripheral neuropathy; seizures in overdose; hepatotoxicity; B6 prevents neuropathy and is only treatment for INH seizures but does not effect hepatotoxicity**
- **Rifampin - Inactivates oral contraceptives; Many drug interactions; hepatotoxicity; orange urine occurs in all patients**

Drug Side Effects and Concerns

- **PZA - Can increase uric acid with resultant gout symptoms; rash; pruritis; hepatotoxicity and associated with this more in pediatrics than INH**
- **EMB - Optic neuritis; red - green color blindness; has very poor CNS penetration and not used for meningitis**

Medication Side Effects in Children

- **Overall, 5% risk of adverse effects**
- **Most are minor - abdominal pain without elevated LFTs**
- **3.3% incidence of increased LFTs with INH and Rifampin together (usually asymptomatic)**
- **Peripheral neuropathy rare**

Follow up, Therapeutic Agents, and Words of Wisdom

- **If pulmonary disease, obtain CXR after 1 - 2 months of therapy, or as clinically indicated, and perhaps, at closing of case**
- **Monitoring in patients with severe disease or conditions which may affect LFTs**

Follow up, Therapeutic Agents, and Words of Wisdom

- **Ophthalmologic monitoring with use of EMB**
- **Corticosteroids are useful with TB meningitis and some other presentations as recommended by expert guidance**

How to Give TB Medications to Children

- Discuss with parents / caregivers the importance of TB therapy and the risks of poor compliance
- Have a friendly, positive, age appropriate approach to the child
- Recognize that there will be challenges but they can be resolved

How to Give TB Medications to Children

- Do not hesitate to call in additional help or resources

Administration of Pediatric Tuberculosis Drugs

- Standard therapy drugs present less problems than second line drugs
- Avoid the use, if possible, of liquid INH due to diarrhea from sorbitol or Rifampin due to large volume of liquid

Administration of Pediatric Tuberculosis Drugs

- Crush and mix medications in suitable vehicles
 - Applesauce or applesauce mixtures, chocolate whipped cream, pudding, Nutella, small amounts of juice, simple syrup flavoring or frozen concoctions

References

- **Pediatrics in Review: Pediatric Tuberculosis.** Andrea T. Cruz, M.D., and Jeffrey R. Starke, M.D., DOI: 10.1542/pir.31-1-13
- **Tuberculosis: Information for the Primary Care Provider-Session F 2034.** American Academy of Pediatrics, October, 2012. Dwight A. Powell, M.D.
- **Advanced Concepts in Pediatric TB: Treatment of Tuberculosis Disease.** SNTC, February 12, 2015. Jeffrey R. Starke, M.D.