Tuberculosis in the School Setting:
Collaborations in Care

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Objectives

At the end of this webinar, participants should be better able to:

• Describe the screening and management for tuberculosis disease and infection among children and their families;
• Discuss the roles and responsibilities of school nurse and health department staff in TB management to highlight the need for collaboration; and
• Share best practices for partnering with school nurses in the management and prevention of tuberculosis.
Significance of Tuberculosis in Children

• A case of tuberculosis in a child is considered a “sentinel healthcare event” representing recent transmission of TB within the community

Summary of Epidemiology of TB

• Cases and case rates are on the decline
• Foreign born persons account for more than 50% of US cases
• TB in children
  – Highest risk for disease:
    • <5 years of age
    • Foreign born children
      – 60% of cases develop within 18 months of arrival in US
      – Most common countries of birth: Mexico, Philippines, Vietnam
        » Varies depending on immigration patterns, i.e., recent increases in case among children from Sub-Saharan Africa and Eastern Europe
    • Racial and ethnic minorities
Symptom Assessment for the School Nurse

- Children with risk factors
- Chronic respiratory illness and cough that is not improving
- Weight loss
- Fatigue
- Multiple absences

Infectiousness

- Children have few tubercle bacilli in lungs, therefore, are rarely infectious
- Children less than 12 years of age usually lack the pulmonary force to produce airborne bacilli
- For a case of childhood TB infection, it is likely that an adolescent or adult transmitted TB bacilli to the child
  - It is important to find the source case
AAP Recommendations: Targeted Tuberculin Testing

- Risk of exposure to TB should be assessed at routine healthcare evaluations
- Only children with an increased risk of acquiring TB infection or disease should be considered for testing
- Frequency of testing should be according to the degree of risk of acquiring infection
- “Screening” is an inefficient way to manage tuberculosis

Targeted Tuberculin Testing Risk Assessment Questionnaire

- Depending on local epidemiology and priorities other possible questions include:
  - Does your child spend time with anyone who has been in jail or a shelter, uses illegal drugs or has HIV?
  - Has your child had raw milk or eaten unpasteurized cheese?
  - Is there a household member born outside the US?
  - Is there a household member who has traveled outside the US?
Using the Risk Assessment Questionnaire

- At first contact with child and every 6 months until age 2 years
- After age 2 years, ask risk assessment questions every year if possible
- Anytime a risk factor is identified, a TST or IGRA should be performed

Red Book 2015

TST and IGRA

- IGRAs are the preferred tests in asymptomatic children younger then 4 years of age who have received BCG vaccine
- TST preferred, IGRA acceptable
  - Children <4 years of age
    • Positive result of either test is considered significant
- IGRA preferred, TST acceptable
  - Children ≥4 years of age who have received BCG vaccine
  - Children ≥4 years of age who are unlikely to return for TST reading

Red Book 2015
TST and IGRA

- TST and IGRA should be considered:
  - The initial and repeat IGRA are indeterminate
  - The initial test is negative (TST or IGRA) and:
    - Clinical suspicion for TB is moderate to high
    - Risk of progression and poor outcome is high
  - The initial TST is positive and:
    - >5 years of age and a history of BCG vaccination
    - Additional evidence needed to increase compliance
    - Nontuberculosis mycobacterial disease is suspected

Limitations

- TST and IGRA by themselves cannot distinguish between infection and disease
- In circumstances of moderate to high clinical suspicion for TB disease, negative results in either/or TST and IGRA do not exclude the diagnosis
- The IGRA should not be used in children <2 years of age unless TB disease is suspected
  - In children 2 through 4 years of age, there are limited data about its usefulness in determining TB infection, but can be performed if disease is suspected
- Children with a positive IGRA result should be considered infected with MTB complex
  - TST results may be confounded by previous BCG administration (age-dependent) and infection with nontuberculosis mycobacteria
- Indeterminate IGRA results do not exclude TB infection and may necessitate repeat testing
  - Should not be used to make clinical decisions

Red Book 2015
Special Considerations

- Immunizations
  - TST should be administered:
    - Before the measles, mumps, rubella (MMR) vaccine
    - Simultaneously with the MMR vaccine
    - Or at least 4-6 weeks after the vaccine
- BCG Vaccine
  - History of BCG vaccine is not a contraindication for testing for TB
  - If a child is at risk for TB, a TB test should be performed regardless of BCG history

Mycobacteriologic Diagnosis of Tuberculosis

- Adults: 70-90% have a sputum that is (+) for *M. tuberculosis*
- Children:
  - Tubercle bacilli are relatively few in number
  - Sputum generally cannot be obtained from children <10 yrs old
  - Gastric aspirates in children with PTB
    - 30-40% sensitive in children
    - 60-70% sensitive in infants
  - Bronchoalveolar lavage (BAL): Sensitivity may be less than gastric aspirates
    - This is an invasive procedure not normally performed in children
Making the Diagnosis in Infants & Children

• Is the child a contact to a TB case?
• Is the child presenting to medical provider with chronic respiratory symptoms including cough, wheezing, decrease in activity, decrease in appetite and weight loss?
• Often times diagnosis is missed because providers didn’t think of TB as part of a differential
• Important to make link to foreign-born-parents, grandparents even if child is US-born

Establishing a definitive diagnosis of TB disease in children is often associated with great difficulty!!
Treatment of Latent Tuberculosis Infection

- INH 10-15mg/kg/day (max 300mg) po daily for 9 months
- Rifampin 10-15 mg/kg/day (max. 600 mg) po daily for 6 months is an alternative
  - INH not tolerated
  - Index patient isolate INH-resistant
- Rifapentine/INH
  - 12 week course
  - 900mg/900mg maximum taken once a week via Direct Observed Therapy (DOT)
- MDR-LTBI: Treat or Not Treat?
  - Treatment can reduce risk of disease by up to 2/3
  - Regimen based on susceptibilities of index patient isolate

Treatment of TB in Children & Adolescents-1

- If INH resistance rate >4% or if other risk for resistance include
  four drugs in initial regimen:
  - Isoniazid (10 mg/kg/day, range 10-15, max. 300)
  - Rifampin (15 mg/kg/day, range 10-20, max. 600)
  - Pyrazinamide (20-30 mg/kg/day)
  - Ethambutol (15-25 mg/kg/day)
- Treatment complicated by child unfriendly preparations of the medications
- Doses are counted
Treatment of TB in Children & Adolescents-2

- Directly observed therapy (DOT)
- Monitor liver transaminases? – Depends on severity of disease
- Follow susceptibility studies of Mtbc isolate (index and/or child isolate)
  - Important to be familiar with resistance patterns in the community
- In some types of extrapulmonary TB or coinfection with HIV, the length of treatment is extended 9-12 months

Assessing for Adverse Reactions

- Generally, children tolerate TB medications well and adverse reactions are rare
- It is important to monitor for such reactions and consult with the healthcare provider
- Medications should be stopped immediately if the child develops
  - Nausea
  - Vomiting
  - Anorexia
  - Abdominal pain
  - Jaundice
- Tell parents to seek advice from the child’s healthcare provider if any of these symptoms occur
Directly Observed Therapy (DOT)

- DOT is the watching of the ingestion of anti-TB medications by a trained outreach worker or healthcare worker.
- Can be supervised by:
  - Physician
  - Health Department Nurse
  - Trained Outreach Worker
  - School Nurse
- Should not be supervised by:
  - Parents or other close family member

Directly Observed Therapy (DOT)

- Obtain parental consent- signed agreement
- Maintain confidentiality-private area for DOT
- Ensure good communication between school and physician-report to MD problems such as frequent absences, or adverse reactions
- Use DOT log and monitor adherence rates
TB in Children-Summary

- TB is more prevalent in adults
- In children, TB is more serious than in adults
- Young children, especially under the age of 4, have difficult fighting off infections and can have serious forms of TB if left untreated
- Treating latent TB infection can prevent the child from getting active TB disease in the future

TB Handbook for School Nurses

- Available online at [http://globaltb.njms.rutgers.edu/educationalmaterials/productfolder/tbhandbook.html](http://globaltb.njms.rutgers.edu/educationalmaterials/productfolder/tbhandbook.html)
Managing Tuberculosis in the School Setting
Collaboration and Partnership

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Faculty Disclosure

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May 2016
OBJECTIVES

- Describe Public Health Nursing and School Nursing Models in Massachusetts
- Describe areas of collaboration
  - Technical assistance for testing and treatment for incoming students
  - Technical assistance for testing employees
  - Identify when to delay school entry
  - Participate in active TB cases and contact investigations in school settings
  - Assist with Direct Observation Therapy and Direct Observation Preventative Therapy

Commonwealth of Massachusetts

- 351 cities and towns
- More individual health departments than many states in the US
- Individual and regional school systems
- Centralized State health department
- Practice is governed by public health law statutes, regulations, standards of practice
School Health Facts

- 351 individual public health school districts
- 600 non-public schools
- 880,000 public school students and 120,000 nonpublic school students
- Specific guidelines for school nurse to student population
- Practices are governed by school health leadership state wide and locally by school leadership

Public Health Disease Surveillance in Massachusetts
A Shared Responsibility
TB Case Rates in Children Age < 15, Massachusetts, 2005–2015

Total

Rate per 100,000 Population

Data current as of date 2/17/2016

TB Case Rates in Children Age < 15, by Race, Massachusetts, 2005–2015

Total  White  Non-White

Rate per 100,000 Population

Data current as of date 2/17/2016
Technical Assistance - Students

- Test or not test – School entry – State Health Department developed guidelines for risk assessment as well as testing school children
  - Child, parent and/or guardian or household contact from country outside of United States
  - Travel or residency in another country for greater than one month
  - Interpreting current testing practices
  - Interpreting transfer or overseas records

Identify when to delay school entry

- Differentiating between children with latent TB infection versus TB Disease
- Risk assessment upon returning to school after long absences abroad
- Asymptomatic children with pending chest x-ray results for positive TST or IGRA should not be excluded from school
- Local school policies are the responsibility of school leadership either enforced by school superintendent or school committee
### Technical Assistance for Employees

- Testing only based on risk factors
- Pre-employment adult risk assessment
- Reduces over-testing and possible inaccurate results
- Repeal of MGL Chapter 71, Section 55B on pre-employment tuberculosis screening of school personnel and volunteers July, 2003

### Active Case Investigation and Case Management

- State TB Program Nurse functions as consultant to schools for case investigation and contact investigation
  - Provides education for school personnel in collaboration with school nurses
  - Collaborates with school nurses to obtain class schedules for the students
  - Organize contact investigations using either tuberculin skin testing or IGRA
Active Case Investigation and Case Management

- Local public health nurse is the direct case manager
- Collaborates with school nurse in the community management of the child with active tuberculosis
- Provides the school nurse with clinical updates and medications
- Participates in contact investigations

Supporting Direct Observation Therapy in School Setting

- Direct Observation Therapy for active cases
- Direct Observation Preventative Therapy (DOPT) at school
- Provide copy of written medication orders to school nurse
- Ensure medications are labeled in accordance with School Health Policies
- Monitor side effects of medications
- Monitor adherence
Closing Points

- Tuberculosis in children raises concern in a school setting
- State and local public health nurses provide guidance, education, and support for school personnel in managing tuberculosis cases
- Collaboration is key
Using Interferon Gamma Release Assays (IGRAs) to Diagnose Tuberculosis in Schools
Kimberly Townsend, MPA, BSN, RN
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Objectives

• Discuss the demographics of Montgomery County, Maryland
• Discuss the Tuberculin Skin Test and Interferon Gamma Release Assay (IGRA)
• Discuss the TB screening process for students new to Montgomery County Public Schools (MCPS)
• Discuss advantages and challenges of using IGRAs to diagnose TB in the school setting
Montgomery County, Maryland

- Foreign-born population
- Tuberculosis case rate
- Percent of foreign-born Tuberculosis cases

Tuberculin Skin Test (TST)

- Tuberculin has been around for well over a century
- Robert Koch, discoverer of the causative bacterium for TB in 1882, tried using a filtrate from TB cultures he called tuberculin as a therapy in 1891. After being touted as a cure, it was shown to be ineffectual and loaded with side effects
- However, his original tuberculin when diluted was found by others to be useful in diagnosing TB in asymptomatic cattle and eventually in humans
- Problem with false positives noted early on in cattle and much later in humans. Charles Mantoux introduced the intracutaneous injection in 1908
- Old Tuberculin was a complex unstandardized mixture: refined by Seibert (1934) and others, resulting in Purified Protein Derivative, PPD-S, still in use today, standard dose of 0.0001 mg or 5 Test Units (TU)

Courtesy of Thomas Walsh, MD
Interferon Gamma Release Assay (IGRA)

- T-Spot (or EliSpot) and Quantiferon Gold-in-Tube, QFT-GIT
- Use patient’s blood sample, incubate with specific TB antigens ESAT6 and CFP10 and measure the release of interferon gamma from immune cells. Nil control and mitogen control.
- Should be more sensitive and more specific for LTBI and TB disease diagnosis than PPD TST
- IGRAs are best choice for testing for LTBI in most BCG recipients, especially those who received BCG after infancy
- Sensitivity
- Specificity, regardless of BCG

TB Screening of Children in Montgomery County Public Schools

- DHMH 896 form
- International Students Admissions Office (ISAO)/School Counseling, Residency and International Admissions (SCRIA) Office
  - Helps children from other countries enroll in MCPS
  - School-aged children that are entering MCPS for the first time are referred to the School Health Services Immunization Center for immunizations and TB Screening
- School Health Services (SHS)
  - School Health Services are provided by the DHHS
  - Immunization compliance surveillance and support
  - School Health Services Center provides immunizations and TB screening
  - Students with documented history of positive skin test or TB treatment are referred to the TB Clinic for evaluation
  - Students with a negative TST and screening are cleared to enter school
  - Students that have a positive TST and screening are referred to the TB clinic for evaluation
  - Collaboration with the TB clinic for school contact investigations and treatment of school-aged children
TB Screening of Children in Montgomery County Public Schools

TB Control Program
- Registered Nurses provide TB screening and assessment
- IGRAs
- TSTs
- Radiography/ chest x-rays
- Sputum specimen collection for bacteriological testing
- Treatment
- Case management
- School Clearance
- Coordinates, conducts and provides follow up of school contact investigations in collaboration with SHS and MCPS
Challenges of Using IGRAs in Schools

• Transition- making the “switch”!
• Cost
• Venipuncture
• Logistics
• Specimen Integrity and processing
• Training

Advantages of Using IGRAs in Schools

• Requires one visit, single blood draw
• Sensitivity
• Specificity, regardless of BCG vaccination
• Objectivity (result positive vs negative)
• Appropriate for our population
• Diagnosis and treatment of latent TB infection
Thank you!

Contact Investigations in Schools

Marguerite Leuze RN, CSN, DMH
Case Identification

- Letter/notification from the individual’s primary care provider
- Notification from the Global Tuberculosis Institute (GTBI)
- One case is a high school student who had immigrated to Newark, NJ

To properly investigate this case the district in conjunction with GTBI needed to:

- Gather and confirm the school and student data, including; date of birth, address, phone number, parents’ names, treating physician and contact information, grade, teacher(s), close friends, seating in class and at lunch
- Contact the school nurse, who will researched any baseline tuberculosis testing data
- Contact school administration
Planning

- We reviewed the data with GTBI
- Collaboratively Walking the School with the GTBI Representative
  - View all classrooms, pay particular attention to choral and instrumental classes in which this student had participated
- Walk the Classroom Areas
  - View the work situation, work areas and dividers and ventilation

Final Planning

- GTBI identified who would be tested, after determining the date student was first infectious
- School Nurse notified those to be tested and assisted in the process
Meeting with Involved Parties

- Staff – a meeting was held immediately after school for the staff to provide information on tuberculosis disease and infection, all names and identification were kept private
- A meeting for parents and the community was held in the early evening to provide information both verbally and written to reduce concerns and offer support

Testing

- Planned for student/staff testing as determined by the staff from GTBI and organized transportation to the testing site
- Worked in concert with GTBI to ensure that resistant individuals conformed to testing requirements
Follow-Up

- Re-testing as determined by GTBI

Thank you for your participation!