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NEW JERSEY MEDICAL SCHOOL

## Tuberculosis in the School Setting: Collaborations in Care

May 4, 2016

Sponsored by the Northeast  
Regional Training and Medical  
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Rutgers, The State University of New Jersey

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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

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### Agenda

- Welcome and Introductions
- Pediatric Tuberculosis and Risk Assessments: An Overview- Suzanne Tortoriello, RN
- Roles and Responsibilities: School Nurses and Health Departments- Pat Iyer, MSN, RN, BC
- Using IGRAs to Diagnose TB in Schools-Kimberly Townsend, MPA, BSN, MSN
- Contact Investigations in Schools: A Case Study- Marguerite Leuze, PhD
- Questions and Discussion
- Conclusion and Evaluation

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## Pediatric Tuberculosis Update

May 4, 2016  
Suzanne Tortoriello, RN, MSN, APN

Rutgers, The State University of New Jersey

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### 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



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## 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

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## Symptom Assessment for the School Nurse

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



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## 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

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## 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

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## 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?

Pediatric 2004; 114:1175, supplement

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## 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

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**TST and IGRA**

- IGRAs are the preferred tests in asymptomatic children younger than 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  $\geq$ 4 years of age who have received BCG vaccine
  - Children  $\geq$ 4 years of age who are unlikely to return for TST reading

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**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

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**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

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**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

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**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

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**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

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## Establishing a definitive diagnosis of TB disease in children is often associated with great difficulty!!

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### 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

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### 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



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### Treatment of TB in Children & Adolescents-2

- Directly observed therapy (DOT)
- Monitor liver transaminases? – Depends on severity of disease
- Follow susceptibility studies of Mtb 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



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### 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

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### 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

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### 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



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### TB in Children-Summary

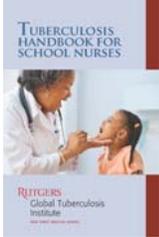
- TB is more prevalent in adults
- In children, TB is more serious than in adults
- Young children, especially under the age of 4, have difficult fighting off infections and can have serious forms of TB if left untreated
- Treating latent TB infection can prevent the child from getting active TB disease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



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### TB Handbook for School Nurses

- Available online at <http://globaltb.njms.rutgers.edu/educationalmaterials/productfolder/tbhandbook.html>




### Managing Tuberculosis in the School Setting Collaboration and Partnership

Patricia Iyer, MSN, RN, BC  
Division of Global Populations and Infectious Disease Prevention  
Bureau of Infectious Disease and Laboratory Sciences  
MA Department of Public Health  
May 2016



### Faculty Disclosure

*I wish to acknowledge that I have no commercial or vested interests or relationships to report.*

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

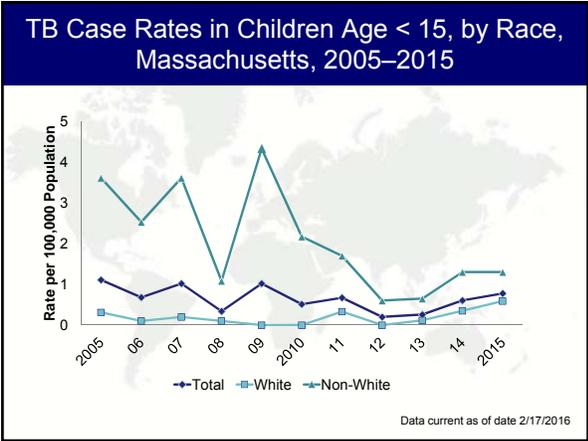
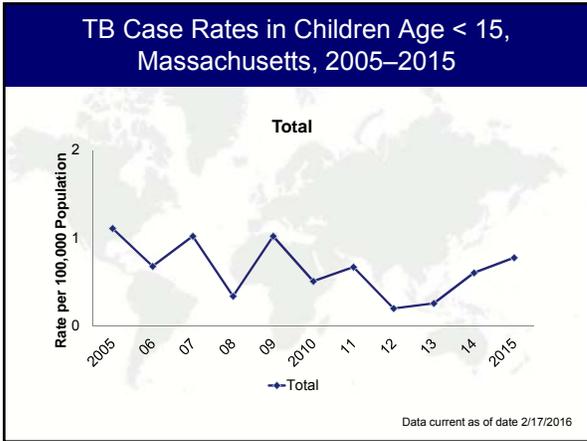
### Commonwealth of Massachusetts

- 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



### 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

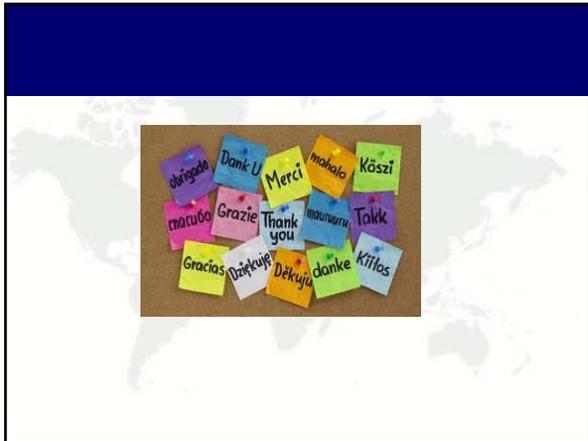
- Direct Observation Therapy for active cases
- Direct Observation Preventative Therapy (DOPT) at school
- Provide copy of written medication orders to school nurse
- Ensure medications are labeled in accordance with School Health Policies
- Monitor side effects of medications
- Monitor adherence



### 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  
Nurse Administrator  
Montgomery County, Maryland  
Department of Health and Human Services  
Tuberculosis Control and Refugee Health Program



### 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

Courtesy of Thomas Walsh, MD



### 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 research 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

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TB Consultation



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*Thank you for your participation!*