Tuberculosis (TB) Fundamentals for School Nurses

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Nebraska Department of Health and Human Services
Objectives

- Identify the TB Disease Process, and TB trends/statistics
- Describe the role of the school nurse in managing TB issues in the pediatric population
- Analyze a case review solution for a pediatric case of TB
Transmission and Pathogenesis of TB

- Caused by *Mycobacterium tuberculosis* (tubercle bacillus)
- Spread through the air by inhaled droplet nuclei
- Prolonged contact needed for transmission
- Transmission can occur from an infectious TB case by coughing, sneezing, laughing, or singing
- TB most common in lungs (85%), but can occur in other parts of the body (extrapulmonary)
Tuberculosis (TB)
TB in Children

- TB is more prevalent in adults
- In children, TB is more serious than in adults
- Young children, especially under the age of 4, have difficulty fighting off infections & 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 Infection vs. TB Disease

<table>
<thead>
<tr>
<th>TB Infection Adults and Children</th>
<th>Pulmonary TB Disease Adults</th>
<th>Pulmonary TB Disease Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubercle bacilli in body</td>
<td>Tubercle bacilli in body</td>
<td>Tubercle bacilli in body</td>
</tr>
<tr>
<td>Tuberculin skin test reaction usually positive</td>
<td>Tuberculin skin test reaction usually positive</td>
<td>Tuberculin skin test reaction usually positive</td>
</tr>
<tr>
<td>Chest X-ray usually normal</td>
<td>Chest X-ray usually abnormal</td>
<td>Chest X-ray usually abnormal</td>
</tr>
<tr>
<td>Sputum smear &amp; culture negative</td>
<td>Sputum smear &amp; culture positive</td>
<td>≥12 yrs. old - sputum smear &amp; culture positive; &lt;12 yrs. old may be unable to produce sputum</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>Often infectious before treatment</td>
<td>≥12 yrs. old - pulmonary cases may be infectious before treatment; &lt;12 yrs. old rarely infectious</td>
</tr>
<tr>
<td>Not a case of TB</td>
<td>A case of TB</td>
<td>A case of TB</td>
</tr>
<tr>
<td>Treated with 1 drug</td>
<td>Treated with multiple drugs</td>
<td>Treated with multiple drugs</td>
</tr>
</tbody>
</table>
Symptoms of TB Disease

- Prolonged cough (may produce sputum)*
- Chest pain*
- Hemoptysis*
- Fever
- Chills
- Night sweats
- Fatigue
- Loss of appetite
- Weight loss/failure to gain weight

*commonly seen in cases of pulmonary TB
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.
Window Therapy

- Children younger than age five
- Placed on preventive LTBI meds until second round of skin testing can rule out active TB
Recommendations for Skin Testing

- The American Academy of Pediatrics recommends targeted TB skin testing only in areas of high TB prevalence.
- Routine skin testing does not need to be done in low prevalence areas.
- Consult with your school district and health department for local skin testing guidelines.
- School nurses may be required to administer skin tests or read results of a skin test for a physician.
Tuberculin Skin Testing (TST) - 1

- TST used for detection of TB infection
- Use Mantoux method not multiple-puncture method (e.g. Tine test)
- If a child has a documented history of a previously positive skin test, school nurse should inquire about history of treatment completion:
  - If no documented history of treatment completion is present, child should be referred to the health department
  - If documented treatment completion history is present, the child need not be skin tested nor chest X-rayed again; should be instructed to watch for signs and symptoms of TB in the future
Tuberculin Skin Testing (TST) Administration*

- Use 5 TU purified protein derivative (PPD) tuberculin
- Intradermally inject 0.1 cc of tuberculin into arm forming 6-10 mm wheal
- Have child come back for reading 48-72 hours later

* detailed method can be found in Tuberculosis School Nurse Handbook
Tuberculin Skin Testing (TST) Reading and Interpretation

- Measure only transverse induration (hardness, not erythema (redness) or bruising)
- Document result with a millimeter reading (not just as ‘negative’ or ‘positive’)
- Use school district/health department guidelines for medical evaluation and referral for a positive result
How do you expect me to operate with these old instruments?
Interferon Gamma Release Assay

- Does not react to Bacille Calmette Guerin vaccine
- Used in all instances a TST is utilized
- Needs to be processed within 12 hours
- Ok to use in children 5 and over
- Not approved for use in patients with immune problems
BCG Vaccine

- BCG vaccine is used in parts of the world where TB is highly prevalent
- It may cause a false-positive skin test result, however, there is no way to distinguish a false-positive from true infection
- If a child has a history of having received BCG vaccine & has a positive skin test result, (s)he should be referred for a medical evaluation, as per school district/health department guidelines
Diagnosis of TB

Sputum sample is obtained by coughing and is examined in the laboratory.
Diagnosis of TB - 1

- If a child has a positive skin test (s)he should have a chest X-ray and medical examination for symptoms of TB
- If the chest X-ray is negative and the child is asymptomatic, the child should be evaluated for treatment of latent TB infection
Diagnosis of TB - 2

- If chest X-ray and skin test are both positive and/or TB symptoms are present, sputum or other site specific specimen should be collected.
- Specimen smear results may show acid fast bacilli (TB-like bacilli).
- True confirmation of TB is through culture (growing *M. tuberculosis*) from the specimen.
TB Treatment

- If TB is suspected, prior to receiving TB culture results, treatment must be initiated
- There are four first-line TB drugs:
  - Isoniazid (INH)
  - Rifampin (RIF)
  - Pyrazinamide (PZA)
  - Ethambutol (EMB)
# Usual Pediatric Treatment Regimens

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Treatment</th>
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</thead>
<tbody>
<tr>
<td><strong>TB Infection</strong></td>
<td>INH – 9 Months</td>
</tr>
<tr>
<td><strong>TB Disease</strong></td>
<td>First 2 months – INH, RIF, PZA, EMB (add EMB if drug resistance is suspected)</td>
</tr>
<tr>
<td>3 or 4 drugs</td>
<td>Next 4 months – 2 most effective sensitive drugs (INH &amp; RIF in pansensitive cases)</td>
</tr>
<tr>
<td>Multidrug resistant TB disease (resistance to at least INH &amp; RIF)</td>
<td>Treat with sensitive drugs (varies) for at least 18 months</td>
</tr>
</tbody>
</table>
Directly Observed Therapy (DOT)

- DOT is the watching of the ingestion of anti-TB medications by a trained outreach worker or healthcare worker.
- DOT **cannot** be administered by a family member.
School-Based DOT

- School nurse can administer DOT in school
- Clinician will provide regimen for nurse to follow
- School nurse can give feedback to clinician on frequency of dosing that works well for child (medication must be given only once a day, but can vary the amount of times per week as per physician order)
- School nurse can also provide feedback on child’s medical condition
Administering TB Medication in School - 1

- As with all medical conditions, there should be confidentiality surrounding taking medications.
- You cannot contract TB from administering medications to a child with TB, as an infectious child will not be sent to school.
- Administer medication in a private area at a time convenient to the child.
Administering TB Medication in School - 2

Notify the physician of problems if the child:

- Is absent for a prolonged period of time
- Is frequently missing doses of medication
- Has side effects or adverse reactions
- Has symptoms which do not improve or improve and then suddenly return
Challenges in Medication Administration - 1

School absences/vacations - make arrangements ahead of time

- Have the child’s parent/guardian inform you directly of a pending absence
- In case of absence/vacation see if health department can provide DOT
- If you are absent, arrange for substitute nurse to administer medications
Challenges in Medication Administration - 2

“No show” for medications

- Discretely, check if child is absent and then institute absentee plan
- Avoid forgetfulness by choosing a convenient time for medication administration such as before school or lunchtime
Challenges in Medication Administration - 3

Difficulty swallowing medications

- If you must, use food to mix medications with and vary food choices periodically
- Use the smallest amount of food possible to mix medications in
- Pills can be crushed and capsules can be opened and the contents mixed with food
Challenges in Medication Administration - 4

Lack of understanding and incentive

- You should constantly reinforce the importance of taking anti-TB medications as prescribed
- Refer concerns to the physician
- Provide positive feedback and small rewards to the child for successfully completing medication
Challenges in Medication Administration - 5

Lack of time

- Consider flexible scheduling so that children with varying medical needs can come for care at different times throughout the day
- Prioritize certain children’s regimens that cannot be adjusted easily
Challenges in Medication Administration - 6

Lack of time, cont’d

- Although TB medications are given only once a day, they should be given at the same time each day and dose cannot be split

- With clinician order, intermittent therapy may be possible (administering medication 2-3x per week as opposed to daily)
Reported TB Cases
United States, 1982–2013

No. of Cases

Year

Updated as of June 11, 2014.

*Updated as of June 11, 2014.

Centers for Disease Control and Prevention (CDC)
Nebraska Department of Health & Human Services
Tuberculosis Cases Reported by Health Dept. Region, 2010-2014

Legend
Local Health Depts.
- Local Health Depts.
- 2010-2014

0
1 - 10
11 - 30
31 - 66

Total Cases: 131

Source: Nebraska Department of Health & Human Services, TB Control Program
TB Among the Foreign Born

Tuberculosis in Nebraska
Foreign Born vs Active Cases
2009-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Foreign Born</th>
<th>Active Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>2010</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>2011</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>2012</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>2013</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>
Percentage of TB Cases Among Foreign-born Persons, United States*

2003

2013

*Updated as of June 11, 2014.
Case Review

- 8 y.o. Hispanic female
- Spends summers in Mexico
- Student
- Lives with parents and siblings
Clinical Presentation

- 8/12 Right side lymph node enlargement
  - Removed
  - Tested negative for m TB
  - Did not respond to azithroymycin
- 8/13 other lymph nodes removed
  - Tested for M TB
  - Tested + for m Bovis
Clinical Assessment

- No S/S except Right enlarged lymph node
- TST: 7 mm (no IGRA done)
- Chest x-ray: opacity seen at upper L mediastinum (not suspicious TB)
- Sputum: negative
- Should we do contact investigation?
DOT and F/U

- INH, RIF, EMB started 9-6-13
- DOT 2x weekly (no breaks in therapy)
- 21.4 kg (9-6-13)
- 23.6 kg (7-15-14)
Caring for child with TB is an important responsibility whether the child has infection or disease. The school nurse’s role is important in controlling TB rates in this country.
Resources

Nebraska TB Program
Pat Infield, RN, TB Program Manager
Phone: (402) 471-6441
Email: pat.infield@nebraska.gov
Kristin Gall, RN, TB Education Focal Point
Phone: (402) 471-1372
Email: kristin.gall@nebraska.gov
Or
Your Local Health Department

School Nurse Handbook
-Rutgers Global Tuberculosis Institute, 2013
School Nurse Handbook