

TUBERCULOSIS

TUBERCULOSIS

school
nurse



handbook



New Jersey
Medical School
**National
Tuberculosis
Center**

A Founding Component of the International Center for Public Health

TUBERCULOSIS

school nurse handbook

The New Jersey Medical School National Tuberculosis Center is a joint project of the UMDNJ-New Jersey Medical School and the New Jersey Department of Health and Senior Services. Funding is provided in part by a cooperative agreement from the Centers for Disease Control and Prevention, Division of Tuberculosis Elimination.

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This handbook has been prepared for you, the school nurse who is involved in screening and medicating children for tuberculosis (TB) disease and infection. Our mission at the New Jersey Medical School (NJMS) National Tuberculosis Center is to provide education to health-care professionals.

School nurses working with us had a number of concerns and barriers when dealing with screening and medicating children for TB. As a result, the NJMS National Tuberculosis Center started individual and group tuberculosis education programs for

school nurses. These programs have been successful and prove that school nurses are a great asset in the reduction of pediatric TB in the United States. The purpose of this handbook is to share our experiences with school-based testing and therapy.

This handbook is a shared project of many individuals including physicians, nurses, nurse practitioners, physician assistants, and health educators. But school nurses, like you, were mostly involved. Your efforts ensure that treatment can be completed appropriately and can directly impact the reduction of childhood TB.

TRANSMISSION

& PATHOGENESIS OF TUBERCULOSIS

Tuberculosis is caused by *Mycobacterium tuberculosis* (*M. tuberculosis*), or the tubercle bacillus, and is spread through the air by inhaled droplet nuclei. Prolonged contact is usually required for transmission. Transmission can occur by coughing, sneezing, laughing, or singing. Although TB is most commonly found in the lungs, it can affect other parts of the body as well (i.e., extrapulmonary TB).

TB is a more prevalent problem in adults, but when it affects children, it results in

serious disease. Children, especially those under the age of 4 years, have weak or underdeveloped immune systems. They can have difficulty fighting infections, and, if left untreated, infection with *M. tuberculosis* can result in active TB disease. The most serious form of TB is meningitis, which occurs more frequently in children (McSherry & Connor, 1993). **Untreated or inadequately treated TB infection and disease results in a high risk of reactivation in the future.**

Table 1. Latent TB Infection (LTBI) vs. Pulmonary TB Disease

TB INFECTION Adults and Children	PULMONARY TB DISEASE Adults	PULMONARY TB DISEASE Children
Tubercle bacilli in the body	Tubercle bacilli in the body	Tubercle bacilli in the body
Tuberculin skin test reaction usually positive	Tuberculin skin test reaction usually positive	Tuberculin skin test reaction usually positive
Chest X-ray (CXR) usually normal	CXR usually abnormal	CXR usually abnormal
Sputum smear and culture negative	Sputum smear and culture positive	≥12 yrs. old-sputum smear and culture positive; <12 yrs. old-may be unable to produce sputum; Symptoms present; many asymptomatic
Asymptomatic	Often infectious before treatment	≥12 yrs. old-pulmonary cases may be infectious before treatment; <12 yrs. old-rarely infectious
Not a case of TB	A case of TB	A case of TB
Treated with one drug	Treated with multiple drugs	Treated with multiple drugs

Adapted from the CDC, Self-Study Modules on Tuberculosis, 1995.

Table 1 indicates the differences between latent TB infection and pulmonary disease in adults and children. Children manifest TB quite differently than adults. They are usually discovered as cases through contact investigation and, if discovered early, are asymptomatic (Ussery, Valway, McKenna, Caughen, McCray & Onorato, 1996). Children with active TB disease may present at later stages of disease. These symptoms are more common in older children (American Academy of Pediatrics [AAP], 2000). Symptoms of TB disease include one or more of the following:

SYMPTOMS OF TB DISEASE

- Fever
- Prolonged cough (2-3 weeks)
- Weight loss/ failure to gain weight
- Lymphadenopathy (LAD)
- Fatigue
- Night sweats
- Chest pain
- Hemoptysis
- Chills

Children have fewer tubercle bacilli in their lungs; *therefore, children are rarely contagious*. Children less than 12 years old usually lack the force while coughing to produce airborne bacilli (AAP, 2000).

When a case of childhood TB infection is discovered, it is likely an adult or adolescent source transmitted bacilli to the child (Starke, Jacobs & Jereb, 1992). Therefore, it is important to locate the source case.

RECOMMENDATIONS

FOR SKIN TESTING

Tuberculin skin testing (TST) using the Mantoux method is the diagnostic tool used to detect latent TB infection. The American Academy of Pediatrics (AAP) currently recommends targeted testing. Routine skin testing does **not** need to be done in low prevalence areas (AAP, 2000). Frequent skin testing of children, particularly in low prevalence areas, yields little or no true positive results. Many positive skin test results in low prevalence areas are false-positives (Starke, Jacobs & Jereb, 1992). Skin testing schedules are determined by the state health department and individualized by local school district. Please check your district guidelines.

The need for testing of high-risk children is determined by a clinician. This need can also be decided by a local health department as part of a contact investigation resulting from exposure to an infectious case. As the school nurse, you may be asked to do the testing for a high-risk child.

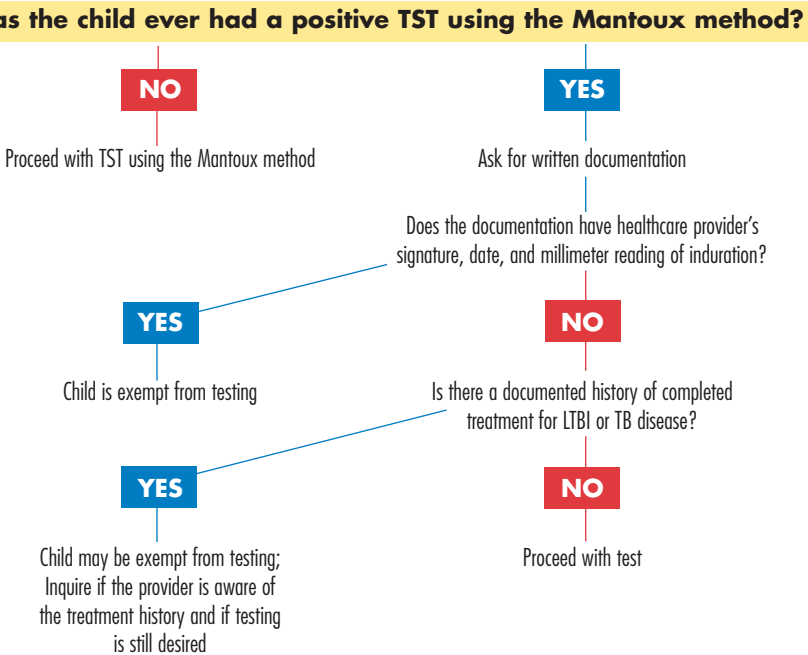
USING THE MANTOUX METHOD**A.** Before Testing

TST using the Mantoux method *is the only skin testing method that should be used to detect TB infection*. **Do not use multiple-puncture tests** such as the Tine test. Multiple-puncture tests are not acceptable

because they lack precision, giving inaccurate results (Starke, Jacobs & Jereb, 1992).

Before administration, it is important to obtain the child's TST history. The history taking process is indicated in the flowchart below. (Fig. 1)

Fig. 1 History Taking — TST Using the Mantoux Method



B. Testing Method

Tuberculin skin testing using the Mantoux method is not difficult, but it needs to be done with precision. The method for administering tuberculin skin testing follows (CDC, 1991):

SUPPLIES

Testing

- TB syringes and needles (26 gauge steel/27 gauge platinum)
- 5 TU PPD solution-Kept refrigerated at 36-46° F (**not** on door of refrigerator to avoid temperature fluctuations)
- Alcohol swabs and cotton swabs
- Patient education materials
- Sharps container for needle disposal
- Appointment cards
- Insulated cool container for PPD storage during mass testing

Reading

- Record-keeping forms
- Tuberculin skin testing ruler or ruler with millimeter measure
- Rolling ballpoint pen
- Patient education materials

Preparation

(before bringing child into room for testing)

- Ask child or responsible parent / guardian for tuberculin skin testing history or check medical record on file
- Select a well lighted, disturbance-free work area for testing
- Obtain skin testing supplies and set up test equipment
- Check expiration date on vial
- Swab vial top with alcohol
- Check that alcohol swabbed vial has dried before proceeding

Administering skin test

- Fill syringe individually prior to each administration (do not draw up more than one syringe at a time) to slightly above the 0.1 cc line; gently tap syringe to dislodge any air bubbles.
- Expel air and excess tuberculin and assure the presence of **0.1 cc** of tuberculin
- Return PPD vial back to refrigerator; store in cool container only if doing mass testing
- Make child feel comfortable
- Find inner aspect of mid-forearm; use left arm, if possible, to provide universality and consistency
- Avoid areas with veins, rashes, or other skin-surface irregularities
- Alcohol swab arm site, preferably volar surface
- Allow arm to dry
- Place needle bevel up
- Stretch skin with index finger and thumb to insert needle intradermally
- Inject just below the surface of the skin forming a 6-10 mm wheal. If no wheal forms or it is less than 6 mm, immediately fill new syringe and place 2 inches away from original site on the same arm or other arm

- If minor bleeding occurs, use a cotton swab to dab (not press) the injection point; do not use alcohol or bandage
- Dispose of needle in Sharps container
- Record date, time, your name, arm of skin test placement, brand name of PPD solution (e.g., Tubersol or Aplisol), lot number, and expiration date of PPD solution in patient's medical record or designated form

Education

- Inform child of care for injection site-child should not scratch or put bandage on injection site; ice may be used if itching occurs
- Give written information on skin test and answer any questions
- Inform child of importance of returning for reading within 48-72 hours (2-3 days)
- Give written appointment for reading

Reading-48 to 72 hours later*

- Make child at ease, arm in relaxed position
- Read in good light
- Palpate gently

* Positive reading may be detected up to 7 days later but readministration is highly recommended if there is no induration or induration is too small to be interpreted as positive.

Measurement

- Measure the induration (raised, hardened area) **NOT** the erythema (redness) or bruise
- Feel with your fingertips, do **NOT** measure just what you see (often the induration is not clear enough to see)
- Measure the diameter of the induration perpendicular to the long axis of the arm
- Use a ballpoint pen to mark the edges of induration
- Use a tuberculin skin testing ruler or a ruler with millimeters to measure the distance between the two points
- If unsure of result ask a trained co-worker or local health department to assist you

Recording/Documentation

- Note in child's medical record when the skin test was placed
- Record the **measurement in mm of induration** (interpretation of reading will vary depending on individual child (e.g., 5 mm is considered positive in an HIV-positive person) *NOTE: Reading that is recorded as only "positive" or "negative" is unacceptable and may result in child having to repeat skin test. Record no induration as 0 mm.*
- Record who read the skin test
- Record date and time of reading

Follow-up

- Know interpretation guidelines for your community and the individual child
- Direct child for follow-up if indicated (*i.e. chest X-ray if skin test result is positive*)

Education

- Explain that a positive skin test result means infection with the TB germ
- Explain what a negative skin test result means
- Provide appropriate written materials and documentation (*See following section.*)
- Answer any questions

C. Documentation

Just as you require proper documentation for skin testing history, you must also provide proper documentation of TST results.

Figure 2 shows a sample recording form that can be used for recording skin test results (*See Appendix B*).

Fig. 2 Documentation - TST Using the Mantoux Method

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

TELEPHONE _____

SKIN TEST INFORMATION _____

ADMINISTRATOR NAME _____

DATE ADMINISTERED _____ TIME _____

ARM OF SKIN TEST PLACEMENT (CIRCLE ONE) LEFT OR RIGHT

BRAND NAME OF PPD SOLUTION _____

LOT # _____ EXPIRATION DATE OF PPD SOLUTION _____

RESULTS: INDURATION = _____ mm DATE OF READING _____ TIME _____

NAME OF READER _____

SIGNATURE _____

D. Interpretation of Results

The millimeter reading of induration is extremely important in determining a positive or negative result. Not all induration is considered positive. The child's

risk factors are important too. Table 2 indicates measurement and factors used to determine the significance of the result.

Table 2. Interpretation of Induration Measurement ¹

MEASUREMENT OF INDURATION	INTERPRET AS POSITIVE & REFER TO CLINICIAN IN FOLLOWING SITUATION
≥5 mm	Close contact to an infectious case, abnormal CXR, immunosuppression, HIV infection
≥10 mm	All others

¹ Check with your local/state guidelines to interpret results. Some areas use different guidelines.

If a child has a positive reading, refer him/her for a chest X-ray (CXR) and physical exam to check for both pulmonary and extrapulmonary TB. Any questionable results, or children with unclear risk factors should be referred to a clinician. Your school district may have an agreement with the local health department, TB control program, or hospital. If the CXR is normal, the child should be evaluated for treatment of latent TB infection and can remain in school (Connelly, 1993).

A CXR is used to evaluate individuals with risk factors for TB disease such as recent skin test conversion, symptoms, or exposure. In the past, a CXR was recommended

yearly for those who had positive skin test histories. **This is no longer recommended.** The CXR is not a screening tool for TB and is only useful in confirming manifest pulmonary disease (CDC, 1994-a).

If the CXR shows disease, treatment must begin. In addition, the local health department will determine whether a contact investigation should occur and whether anyone should be tested. If it is determined that individuals within the school must be tested, your assistance may be needed (CDC, 1995-a).

It is most likely that the child contracted TB infection or disease from an infectious adult or adolescent. The child is not likely to have spread bacilli to others. Therefore, looking for the adult/adolescent source is critical if the child is very young (Connelly, 1993). In the rare case that the clinician determines a child is infectious, individuals in close contact with the child may need to be tested. The local health department will make this determination (CDC, 1995-a).

E. BCG vaccine

A recurring concern is how to TST children who have received the bacille Calmette-Guérin (BCG) vaccine. It was once thought

that BCG vaccine would protect individuals from TB for a lifetime. However, it has been proven that this is not true. The protection provided by the vaccine varies sharply and wanes over time. In fact, most children who received BCG vaccine, test tuberculin-negative.

BCG vaccine is not a contraindication for receiving tuberculin skin testing. When there is a history of BCG vaccine and the tuberculin skin test is positive, the reaction should be attributed to latent TB infection and the child should be treated accordingly. (CDC, 1996)

TUBERCULOSIS

TREATMENT

Treatment

TB infection and TB disease are treated differently (*See Table 3*). There are five first-line drugs used in TB treatment:

- Isoniazid (INH)
- Rifampin (RIF)
- Pyrazinamide (PZA)
- Ethambutol (EMB)
- Streptomycin (SM)

Table 3. Usual Pediatric Treatment Regimen (AAP, 2000)

Diagnosis	Treatment
TB infection	INH — 9 months
TB disease First 2 months — 3 or 4 drugs ²	First 2 months — INH, RIF, PZA, EMB or SM Next 4 months — 2 most effective sensitive drugs INH and RIF (in pan-sensitive cases)
Multidrug resistant (MDR) TB (resistance to INH and RIF)	Treat with sensitive drugs (varies) for at least 18 months

INH = isoniazid; RIF = rifampin; PZA = pyrazinamide; EMB = ethambutol; SM = streptomycin

² Treat with 4 drugs in areas where rate of INH resistance is $\geq 4\%$ (CDC, 2000)

Children with TB disease are treated with multiple drugs because TB bacilli may be resistant to one or more drugs. It is important that these drugs are taken properly to prevent drug resistance. Determining resistance requires a sputum sample for pulmonary TB or another sample for extrapulmonary TB dependent on the site of disease. Culturing samples helps find drug-resistant bacilli.

Multidrug treatment requires some testing for adverse reactions. If a child is on EMB, baseline visual acuity and color vision testing may be recommended as a precaution, as EMB has been linked to decreased visual acuity in some adults. The use of SM may involve periodic audiometric testing as SM

may contribute to vestibular dysfunction.

The child's clinician will make decisions on whether to test and how frequently and may ask for your assistance to complete testing (Schultze & Jacobs, 1993).

Any side effects or continued presence of symptoms during treatment require medical consultation. It is also important to know the side effects and ask the child about them. (See Appendix C). Observing improvement in symptoms while the child is taking medications is important as well. If a child's condition does not improve or improves, but symptoms suddenly return, the child's clinician should be informed immediately (Buttaro, Ezell & Gray, 1995).

Therapy

Since school nurses are accessible healthcare providers, their role is critical in the child's therapy. In this way, school nurses are important to the reduction of pediatric TB in their communities. The following section describes therapies that you may be asked to implement.

A. Directly Observed Therapy for Treatment of TB Disease and Latent TB Infection

To ensure the successful completion of anti-TB regimens, it is recommended that a patient be placed on directly observed therapy (DOT) for treatment of TB disease or latent infection. With DOT, a health care worker or trained outreach worker watches a patient take each medication dose (CDC, 2000). DOT **cannot** be completed by a friend or family member (Poszik, 1993).

DOT exists because TB is a communicable disease. DOT can help ensure adherence, reduce recurrence and the spread of tuberculosis, and prevent the development of drug resistance (Harrigan, 1994).

DOT is a standard of care worldwide for treating TB disease. Several states require DOT to reduce the spread of TB (CDC, 2000).

DOT is highly recommended, and should be strongly considered for treatment failures and for individuals at an increased risk of disease. However, due to limited resources, the use of DOT for treatment of latent TB infection varies greatly throughout the country (CDC, 1994-b).

B. Daily Therapy/Intermittent Therapy

Frequency of dosing can be tailored to a child's needs by using 1 of 2 types of therapy. **Daily therapy** involves fewer pills to swallow per dose, but greater frequency of administration. **Intermittent therapy** includes more pills per dose, but involves fewer doses and less time on the part of the nurse. It is generally administered 2 to 3 times per week. Each therapy works well, with success depending on the needs of the child (CDC, 1995-c).

Process of Administering Medications in School

DOT is initiated by a clinic, private physician, or health department, depending on the part of the country in which you work, local laws, and availability of outreach staff (CDC, 2000). There are some basic guidelines to school-based DOT, which can make the experience easier for you and more comfortable for the child.

- When a child is diagnosed with TB disease or infection, **confidentiality** is essential. Tuberculosis carries a stigma, which can be especially difficult to handle (Buttaro, Ezell, & Gray, 1995). In most areas, the law includes standard patient rights: those who have the right to know about a child with TB are only those who need to know. This usually only includes the school nurse. If the local health department needs to conduct a contact investigation in the school, it will make the judgment about who else may need to know of the TB case (CDC, 2000).
- You cannot contract TB from a child during school-based DOT. A child with active disease should not be in school until a clinician determines that he/she is non-infectious.
- Choose the time and place of medication administration to ensure privacy and protection of the child's identity. The times of administration can be mutually chosen by the child, his/her clinician, and you. Some children prefer to take more pills less frequently (intermittent therapy), while others prefer fewer pills more frequently (daily therapy) (CDC, 1994-b). If you find that the prescribed method of dosing is not working well, let the clinician know. Dosing may be changed if necessary. It may take some experimenting to find the best method for the child without compromising proper treatment.

- To monitor adherence, many clinics may provide a DOT log with the medications. If a log is not provided, you can create one. (*See Appendix D*) It should include the following:
 - Child's name, date of birth, address, and phone number
 - Name and phone number of child's clinician
 - ◆ Medications taken, days taken, time and dose
 - Name and signature of person dispensing each medication, date, time, drug and dose
 - Name and signature of person administering the dose
 - Location of parent/guardian permission form for medication administration in school. (*See Appendix E*)
 - The school nurse and the referring clinician are partners in the health and recovery of the child with TB. Therefore, maintaining a good relationship and clear communication is important. If a child is absent from school, notify the clinician so that someone can bring the medications to the child. If you have problems or concerns about medication administration or the child's health, communicate these directly to the clinician. Children may not always make issues known to their parents or clinician. All communication with the clinician should be documented on the DOT log for accurate record keeping (Buttaro, Ezell & Gray, 1995).
 - If a child is frequently or regularly missing doses, notify his/her clinician. A case conference needs to occur to evaluate and correct the problem.
- Children on a 6-month daily or intermittent regimen for disease:** ALL doses must be observed. Missed doses must be reported to the clinician/chest clinic so arrangements can be made to dose the child at home.
- Children on a 9-month daily or intermittent regimen for latent TB infection:** Treatment period is extended for any missed doses as long as treatment is completed in 12 months.
- Parents and clinician should be notified in case of non-adherence so that changes can be made.
- You can assist the clinician by noting follow-up appointments, refills, tests, and also reminding the child and his/her parent(s) about these matters. As noted in the treatment section, you can help with some of the testing results. Rather than repeated testing, you can report any routine hearing or vision screening results to the clinician who can check for adverse drug reactions.

Keys to Successful Treatment

A school nurse can greatly enhance TB treatment. The NJMS National Tuberculosis Center has worked with school nurses to identify helpful solutions to challenging issues. The following solutions can help make school based DOT much easier (Pirog, Bhavaraju, Aguila, McSherry, Mangura & Reichman, 1998).

A. School Absences/Vacations

School absences and vacations may prevent a child from receiving medications.

Therefore, it is important to establish a plan with the clinician and health department outreach staff **prior** to initiation of therapy (Harrigan, 1994).

- Your attendance office is a source of information for absences. However, it would be more efficient if the child's parent or guardian calls you directly about the absence.
- In the case of a child's absence, promptly contact the child's clinician or health department (depending on who can administer DOT outside of school) to make alternative arrangements.
- In the case of your own absence, the medications and DOT log need to be accessible for a substitute nurse. If there is no substitute, contact the clinician for alternative arrangements.

B. "No show" for Medications

- If a child does not report for medications:
- Check to see if the child is absent and follow the absentee procedure that you have instituted
- If the child is present, discretely locate the child, without compromising confidentiality
- Avoid problems by choosing a convenient time for therapy, such as before school begins or at lunchtime

C. Difficulty Swallowing Medications

All the daily medications can be convenient and effective when administered at the same time. Unfortunately, children can have trouble swallowing pills. Most TB medications, with the exception of rifampin, can be crushed and placed in food, making swallowing easier and more palatable (Starke, Jereb & Jacobs, 1992). If food is used, **consult the clinician or a pharmacist** and consider the following tips:

- Mix medications with the smallest amount of food possible, to ensure the child consumes all medications.
- Have the child or the family bring food the child likes to your office.

- Vary the choices of foods periodically, so that the child does not develop an aversion to a certain food. Some selections that work well in hiding the taste and texture of medications are frosting, jam, mashed banana, and chocolate syrup.
- Though rifampin should not be given with food, a small amount may be used if absolutely necessary. Open the capsule and mix the capsule contents with selected food.
- Some children will need to be taught how to swallow pills versus capsules (*See Appendix F*).

D. Lack of Understanding (Buttaro, Ezell & Gray, 1995)

A common complaint is that children and parents/guardians do not understand the severity of TB and, therefore, medications are not taken properly.

- You must constantly educate the child and parent/guardian about the disease process
- You can refer concerns to the clinician

E. Lack of Incentive

If a child is hesitant about taking medications or does not understand the effects of non-adherence, incentives can help (CDC, 2000).

- Positive feedback boosts a child's morale
- Small, tangible rewards, such as stickers or certificates, are good incentives
- Check with the child's clinician for ideas that were successful with other children. Some clinics and health departments have effective incentive programs and are willing to share ideas

F. Lack of Time

Even with the time constraints of a school nurse, a child with TB needs medications to stay healthy.

- Consider flexible scheduling of medication administration so that children's visits to your office are spread throughout the day.
- Prioritize particular children's regimens since it may not be possible to follow a flexible schedule with all medications (School Health Alert, 1998).

School nurses have much to add to the health of the public. Remember....

High adherence = Lowered incidence and no reactivation of disease.

GOOD LUCK !!

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Review Questions

The following questions are for self-assessment of your understanding of this handbook's content. The answers follow the questions.

1. TB is transmitted through
 - a. blood
 - b. droplet nuclei
 - c. saliva
 - d. hand contact
 - e. urine
2. The most common symptom of pulmonary TB in young children is
 - a. night sweats
 - b. hemoptysis
 - c. chills
 - d. chest pain
 - e. no symptoms
3. Which of the following is *not* characteristic of TB infection?
 - a. positive tuberculin skin test reaction
 - b. presence of tubercle bacilli in body
 - c. chest X-ray is normal
 - d. sputum smear positive
 - e. treatment with one drug
4. High risk factors related to the development of TB include all of the following except:
 - a. HIV infection
 - b. prolonged stay in an endemic country
 - c. smoking history
 - d. recent TB infection
 - e. exposure to high risk adults
5. Acceptable test(s) to screen for TB infection include
 - a. tuberculin skin test using the Tine method
 - b. bacille Calmette-Gueřin (BCG) vaccine
 - c. tuberculin skin test using the Mantoux method
 - d. sputum smear
 - e. all of the above
6. A positive tuberculin skin test result means that a patient
 - a. possibly has TB disease
 - b. had BCG vaccine
 - c. has TB and is infectious
 - d. is allergic to PPD solution
 - e. possibly has TB infection
7. A tuberculin skin test is most accurate when read how long after placement?
 - a. 1 hour
 - b. 24-36 hours
 - c. 48-72 hours
 - d. 5 days
 - e. 7 days

8. If a child has a positive skin test result, the next step should be to
- order a chest X-ray
 - begin multiple drug treatment
 - begin one drug treatment
 - place child in isolation
 - inform the local health department
9. If a patient has had a BCG vaccine, a tuberculin skin test should be
- not done at all
 - read as smaller than it really is
 - read as usual, ignoring the vaccination history
 - read as larger than it really is
 - read according to the size of the BCG vaccination scar
10. A child being treated for latent TB infection should take the medication for
- 6 months
 - 9 months
 - 12 months
 - 24 months
 - Until the skin test becomes negative
11. Before sputum culture results are available, how many drugs are used for a child who has a positive tuberculin skin test and signs and symptoms of TB?
- 1 or 2
 - 2 or 3
 - 3 or 4
 - 4 or 5
 - None
12. A patient involved in intermittent therapy takes
- fewer pills with greater frequency of administration
 - more pills per dose with lesser frequency of administration
 - fewer pills per dose with lesser frequency of administration
 - more pills per dose with greater frequency of administration
13. Directly observed therapy (DOT) can be administered by all of the following except by
- a trained outreach worker
 - a school nurse
 - a parent or guardian
 - a physician
 - a physician assistant
14. Which indicates proper documentation of a positive tuberculin skin test result?
- millimeter reading of the induration transversely
 - millimeter reading of the induration transversely by longitudinally
 - millimeter reading of any erythema or bruising with induration
 - writing the result simply as 'positive'
 - millimeter reading of the circumference of induration

- 15.** If a child does not come for medication(s) at a scheduled time, a school nurse should
- a.** mark the child as absent
 - b.** locate the child
 - c.** call the child's teacher
 - d.** call child's clinician
 - e.** mark the child as refusing medications
- 16.** Isoniazid, rifampin and pyrazinamide have which common adverse reaction?
- a.** rash
 - b.** hepatitis
 - c.** blurred vision
 - d.** peripheral neuropathy
 - e.** athralgias
- 17.** A child on streptomycin should be monitored for changes in
- a.** mental status
 - b.** vision
 - c.** hearing
 - d.** skin color
 - e.** gait
- 18.** If you have a child with a positive skin test in your school, you should immediately inform
- a.** the state health department
 - b.** the school principal
 - c.** the local health department
 - d.** the child's physician/chest clinic
 - e.** all of the above
- 19.** If a child has had a documented positive tuberculin skin test using the Mantoux method in the past you should
- a.** continue to screen the child with a tuberculin skin test and read result as usual
 - b.** continue to screen the child with a tuberculin skin test and read result as smaller than usual
 - c.** screen the child with a yearly chest X-ray
 - d.** use a different type of tuberculin skin test for screening
 - e.** do nothing if there are no symptoms of TB

1. b 4. c 7. c 10. b 13. c 16. b 19. e
 2. e 5. c 8. a 11. c 14. a 17. c
 3. d 6. e 9. c 12. b 15. b 18. d

APPENDIX A: FREQUENTLY ASKED QUESTIONS

(For further information, see pages as noted.)

- Q.** Do I take BCG vaccination into account when interpreting a skin test result?
- A.** No. Having received BCG vaccine does not preclude a child from having a skin test nor should it be taken into account when interpreting a skin test result. (See page 11.)
- Q.** If a child returns from international travel, should I administer a skin test?
- A.** Not every child should be tested merely due to travel. If the child is at high risk for TB or has had some exposure as indicated by a family member, testing may be necessary. Children should not be targeted for testing based merely on their travel history, but on an assessment of risk factors (See page 4.)
- Q.** If a child has TB disease, should the school be concerned? Will additional testing of students and staff be required?
- A.** Only a child's prolonged and repeated exposure to an infectious person results in transmission. Contact investigations are usually done by the health department in cooperation with school officials. Consult your local health department regarding contact investigation policies. (See page 10-11.)
- Q.** A child in my school dislikes the taste of medications and has a difficult time swallowing pills. What is the best way to administer them?
- A.** If a child is having trouble swallowing medications, ask why so that the reasons can be communicated to the clinician for a solution. If the clinician approves, pills can be crushed and capsules opened. Place crushed medications with a small amount of food that the child likes. Food can also be used to hide the medication's taste. Some children prefer a few pills taken frequently while others prefer more pills taken infrequently. (See page 13, 14, 16, 17.)
- Q.** If bleeding occurs after skin testing, how can I stop it?
- A.** The blood can be absorbed with the dab of a cotton swab. Do not wet the area, with alcohol or use a bandage. (See page 6.)
- Q.** Why do some children take a B vitamin with their INH while others do not?
- A.** Although not prescribed routinely, vitamin B6 or pyridoxine, is used to prevent peripheral neuropathy due to INH in children with poor nutrition. The child's

healthcare provider will determine this need. Most children have no indication for B6 use.

Q. Why are children with TB disease noninfectious?

A. Infectiousness is related to symptoms. Few children cough, decreasing the probability of infectiousness. Those who do cough may lack the force to aerosolyze a large number of bacilli. Also, children harbor fewer tubercle bacilli than adults, which contributes to the lower level of infectiousness. (See page 4.)

Q. Are children with extrapulmonary TB infectious?

A. Not at all. However, if there is a discharge from a TB diseased site, standard precautions must be taken in handling drainage (CDC, 1994).

Q. We had a TB outbreak in our school, and a teacher insisted that he must know who the source case was. Isn't it a teacher's right to know?

A. No. You are a healthcare professional, and the infectious individual is a patient. Standard provider and patient confidentiality must be maintained at all times. (See page 14.)

Q. A child to whom I give medications is frequently absent. What is my responsibility in making sure this child gets medications?

A. You need to arrange this with your local health department or whoever provides

outreach for TB patients. Alternative plans must be established at the initiation of treatment. (See pages 15, 16.)

Q. How long do I have to wait to give a tuberculin skin test after a child has received a live vaccine?

A. The skin test can be given at the same time as a live vaccine is given, or 4-6 weeks thereafter.

Q. Sometimes I am unable to locate a child within 48-72 hours after the skin test has been placed. Do I have to retest if the child does not return after 3 days?

A. A positive skin test reading may be visible for up to 7 days after the test has been given. However, if there is no induration on the arm or the induration is not large enough to be interpreted as positive, the skin test must be repeated on either arm. When placing the test the first time, explain to the child the reason that testing and returning for the result in time is important. (See page 7.)

Q. After administering a TST using the Mantoux method on a child, I found that the child had a documented positive TB skin test in the past. However, when reading the current test, the result was negative. How did this happen and what should I do?

A. There are several possibilities for this occurrence. First, the previous skin test may have been a false-positive. It may also be possible that the current test was placed incorrectly. If the PPD solu-

tion is injected too deeply, the result can be negative. If not placed deeply enough, solution may leak out and not form an adequate reaction. Also, inactivated PPD solution that has either expired or has been improperly stored, may cause a negative reaction (Starke, 1993). If a child has a documented positive test and has also taken INH for at least 6 months, nothing further will need to be done unless signs and symptoms of TB are present. If there is no history of treatment for TB infection, the skin test should be placed again. (See pages 6-8.)

Q. I need to document a positive skin test result. What needs to be indicated?

A. Documentation for skin testing history needs to be from a healthcare worker who interpreted a skin test result. As a school nurse, you qualify. Any documentation of positive skin testing needs to include the following: type of TST administered, date, millimeter reading of the induration, medications taken, if any, and whether treatment was completed or how the clinician assured completion of therapy. The latter two can be completed by the clinician. Similarly, look for the same criteria in receiving documentation of a positive skin test result. (See page 9.)

Q. Do I have to skin test new children in my school district?

A. School skin testing rules vary by school district. Consult your local health

department and school board for more information. (See page 4.)

Q. At times, I have not understood the prescribing clinicians instructions for medications or have not agreed with the treatment. What is the best way to approach a clinician regarding this?

A. Call the clinician to discuss the appropriate treatment regimen that is necessary for the safety of the child. However, if disagreement or misunderstanding still ensues, the school nursing supervisor or medical advisor may be consulted. You may also ask for clearly written instructions. Name of each drug, dosage and time of administration must be displayed on the prescription bottle and DOT log. (See page 15.)

**DOCUMENTATION FOR TUBERCULIN SKIN TESTING
USING THE MANTOUX METHOD**

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

TELEPHONE _____

SKIN TEST INFORMATION _____

ADMINISTRATOR NAME _____

DATE ADMINISTERED _____ TIME _____

ARM OF SKIN TEST PLACEMENT (CIRCLE ONE) LEFT OR RIGHT

BRAND NAME OF PPD SOLUTION _____

LOT # _____ EXPIRATION DATE OF PPD SOLUTION _____

RESULTS: INDURATION = _____ mm DATE OF READING _____ TIME _____

NAME OF READER _____

SIGNATURE _____

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The following questions can be used to elicit information regarding side effects and adverse reactions. Presence of any side effects or adverse reactions should be reported immediately to the clinician.

A. Subjective

1. How do you feel?
2. Do you have any of the following:
 - a. abdominal pain
 - b. fatigue
 - c. unusual breathing
 - d. rash
 - e. joint pains/swelling
 - f. other unusual symptoms
3. Are you taking any medications other than anti-TB medications?
4. How is your appetite?
5. How do you feel after you take the medications?
6. What color is your urine (should be orange for rifampin patients)?

B. Objective

1. Does the child have signs and symptoms of hepatitis including any of the following:
 - a. yellow eyes
 - b. yellow skin
 - c. nausea
2. Is the child vomiting as opposed to spitting up?

vomiting = 1-2 hours following ingestion of medications

spitting up = immediately after administration of medications
3. Does the child have a rash?
4. Does the child have a fever?
5. Is the child gaining weight steadily (re-evaluate monthly)?

C. Open ended question: Are you having any problems taking the anti-TB medications?

First-Line Anti-Tuberculosis Drug Side Effects (CDC, 2000)

DRUG	SIDE EFFECTS/TOXICITIES
Isoniazid (INH)	liver enzyme elevation, hepatitis, peripheral neuropathy, CNS effects
Rifampin (RIF)	orange discoloration of secretions and urine (occurs in all patients), GI upset, hepatitis, bleeding problems, flu-like symptoms, rash
Pyrazinamide (PZA)	GI upset, hepatitis, hyperuricemia, arthralgias, rash
Ethambutol (EMB)	decreased red-green color discrimination, decreased visual acuity
Streptomycin (SM)	hearing loss, vestibular dysfunction, renal toxicity

Appendix D

Directly Observed Therapy Log

DIRECTLY OBSERVED THERAPY FOR THE MONTH OF:

PHYSICIAN:											
DATE	INI	MEDICATION	DOSAGE	RTF	FREQ	DATE	INI	WEEKEND MEDICATION	DOSAGE	RTF	FREQ

NAME:	
ADDRESS:	
SCHOOL:	
TELEPHONE:	AGE:
DIAGNOSIS:	DOB:
DOT START:	
DOT DISCONTINUED:	

SIDE EFFECTS:
IF PRESENT, CHECK AND WRITE DISPOSITION UNDER COMMENTS
IF ABSENT, CHECK NONE BOX

DATE	DAY	SIGNATURE OF PERSON OBSERVING OR GIVING MEDICATION	TIME MEDS OBSERVED	COMMENTS	PHYSICIAN NOTIFIED OF ADVERSE REACTION

- | PATIENT COMPLAINTS | |
|-----------------------|--|
| Nausea | |
| Abdominal Pain | |
| Headache | |
| Loss of Appetite | |
| Jaundice/Yellow color | |
| Rash | |
| Fatigue | |
| Joint Pain | |
| Vomiting | |
| Others | |
| None | |

Meds taken (Number of days) _____ = % Compliance
 Available Days

REQUEST FOR MEDICATION TO BE ADMINISTERED BY A SCHOOL NURSE**Parental Request**

Student _____ DOB _____ Grade _____ RM# _____

I, the parent/guardian of the above named, request that medication prescribed by a physician be administered to the above named by the School Nurse. I agree to arrange for the supply of medications to be given to the school nurse.

Signature_____
Address_____
Date_____
Phone**Physician's Statement**

In order to protect the health of the above named, it is necessary for her/him to have the following medication during school hours.

Medication _____

Dosage _____

Time to be administered _____

Any possible side effects that might be expected _____

Purpose of Medication _____

Length of time medication is to be given prior to reevaluation _____

DIAGNOSIS _____

I authorize the school nurse to administer the above medication.

Signature_____
Address_____
Date_____
Phone

Adapted from Jersey City School District, Jersey City, New Jersey.

HOW TO GET TB MEDICINE IN THE CHILD AND NOT ON YOU! Techniques from Public Health Nurses in San Diego County:

A. If young child cannot swallow pills or capsules:

Step 1 Crush pills between two spoons or in a small bowl;
Empty capsule into small bowl

Step 2 Mix with liquid or food as below:

a. Liquids:

1. Add 1 tablespoon of **sweetened** drink powder
 1. mix in 1 or 2 tablespoons of water,
 2. stir until mixed well, and
 3. spoon feed to child (*or you may use a medicine dropper*)
2. Juices (*use juice that has a strong, sweet flavor*)
 1. mix in 1 or 2 tablespoons of juice,
 2. stir until mixed well, and
 3. spoon feed to child (*or you may use a medicine dropper*)

b. Examples of food to use:

- applesauce ■ frosting
 - bananas ■ jelly or jam
1. mix 1 or 2 tablespoons of food with crushed medicine,
 2. stir until mixed well, and
 3. spoon feed to child

* Nurses have found that the above liquid/foods work best. Avoid complex proteins such as dairy products and peanut butter as they may interfere with absorption of medicine. Check with pharmacist before using other liquids/foods.

B. Teaching older children to swallow pills or capsules.


There is a difference!

Tablets tend to SINK, so tilt head UP when swallowing.

Capsules tend to FLOAT, so, tilt head DOWN when swallowing.

REWARD children with PRAISE when they succeed! Bravo!

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