



# CASE STUDIES IN TUBERCULOSIS

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Nurse Case Management  
Training Tools for Patient  
Success

EXCELLENCE | EXPERTISE | INNOVATION



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## Introduction

Public health nurses new to TB control and prevention face multiple challenges including:

- 1) learning the basics of tuberculosis infection and disease diagnosis and treatment, and
- 2) gaining problem solving skills essential to TB case management.

For learning the basics of TB prevention and control, it is highly recommend to complete the Centers for Disease Control and Prevention's (CDC) *Self-Study Modules on Tuberculosis* available at <http://www.cdc.gov/tb/education/ssmodules/default.htm> before using these case studies.

However, TB patients seldom follow the relatively straight-forward path outlined in the CDC *Self Study Modules on TB*. Patients have multiple barriers to accurate diagnosis and completion of therapy and public health nurses must develop skills in problem solving to successfully manage an active TB case as well as latent TB infections. These case studies are designed to provide guidance and the necessary reference material to gain experience in TB case management challenges.

The cases are based on real-life experiences of TB nurse case managers in the Heartland Region and are designed to illustrate key concepts in TB control and prevention. We recommend utilizing them for training new nurses inexperienced in TB case management; for continuing education for TB staff; to generate discussion; and to help prepare your program for similar situations in your jurisdiction.

## How to Use This Product

This collection of nursing case studies and their accompanying tools are intended to complement a TB program's education and training of its nursing staff. It can be incorporated into new employee introduction and training on TB case management; used as a continuing education tool for current employees; or as an individual learning tool. This product contains the following:

- Hard cover manual of nurse case studies (Cases 1 – 12) along with their tools (these tools can be a stand-alone educational aid)
- CD's (2) of Heartland recorded webinars (attached to back cover); includes 8 webinars from 2010 and 2011 (Appendix A in this manual)
  - 2012 and ongoing recordings of Heartland webinars are available through Heartland's website ([www.heartlandntbc.org/products.asp](http://www.heartlandntbc.org/products.asp)) or by calling 1-800-839-5864 (1-800 TEX-LUNG)
- CD of the manual with all cases, tools, answers to questions, list of references, and Appendices A-C as stand-alone PDF documents.

### Suggested Group Training

Recorded webinars can be viewed in a group setting followed by a group discussion of the points presented. PDF handout versions of each webinar can be printed to enhance the learning experience.

The individual nursing cases should be copied and distributed to the group. Cases do not need to be taught in the order presented in the manual (1 to 12). Specific cases may be pulled out to instruct on a particular programmatic issue; i.e. misinformation on how to handle a patient on TNF-alpha antagonists (Case #8).

The group leader or instructor should have a copy of the answers and if possible, a copy of each corresponding reference for each lesson. The case study should be read aloud; the instructor should stop to ask the group the questions and facilitate the answers using the references to underscore the learning point. Answers to the questions should be made available to the group after the discussion.

It is recommended that a copy of the references be readily available to the TB program staff both as a supplemental learning tool and as a future resource. A designated “library” of all the references (see Appendix B) is recommended to be part of the nursing staff training and educational resources.

### **Suggested Individual Training: Part of a structured program of employee learning**

This product, along with the recorded webinars, can be used for individually-structured training. It can be used to orient new employees; as part of a continuing education system; or a re-teaching tool when specific issues arise (i.e. staff misinformation on *Mycobacterium bovis*, Case #7). A schedule of completion can be devised by the training coordinator and mutually agreed upon by the trainee(s). A sample training schedule and checklist is provided in Appendix C.

Recorded webinars can be viewed on an individual computer. PDF handout versions of each webinar can be printed to enhance the learning experience.

The individual nursing cases should be copied and distributed as arranged by the training coordinator. A copy of the corresponding references should be available at the same time.

It is recommended that a copy of all of the references be readily available to the TB program staff both as a supplemental learning tool and as a resource. A designated “library” of all the references plus additional suggestions (see Appendix B) is recommended to be part of the nursing staff’s educational resources.

As an individual works through a case study, it is preferable that the case’s questions first be answered by the trainee and then shared with the training coordinator – discussing the learning points and clarifying any incorrect answers using the corresponding references. The *Schedule of Completion Form* has space for grading each case if the training coordinator wishes to document.

A less reinforcing method (in the interest of time) is to have the training coordinator supply the answers to the trainee AFTER they have completed the case study and have the trainee follow up errors by reviewing the corresponding references.

### **Suggested Individual Continuing Education**

This product, along with the recorded webinars, can be used for a nurse’s personal continuing education.

Recorded webinars can be viewed on an individual computer. PDF handout versions of each webinar can be printed to enhance the learning experience.

The hard cover case studies manual can be read and used to record the answers to the questions for each case. A copy of each corresponding reference should be available at the same time (See Appendix B for a list) for reinforcing the teaching points and providing supplemental information.

# CASE STUDY #1

## ***Directly Observed Therapy (DOT)***





## Directly Observed Therapy (DOT)

A 67-year-old Hispanic male was diagnosed with drug susceptible pulmonary TB in September 2005. He presented with a three week history of night sweats, weight loss, nausea, shortness of breath, and a productive cough. A chest radiograph (CXR) revealed extensive bilateral cavitory disease. He was Hepatitis C positive with elevated baseline liver enzymes; his HIV testing was negative. Sputum smears were Acid Fast Bacilli (AFB) positive with greater than 10 organisms per high powered field (4+; see Tool *Acid Fast Bacilli (AFB) Smear Reporting for Mycobacterium tuberculosis*; Table 1.). The patient's weight at diagnosis was 96 pounds (43.6 kilograms).

The patient's history included heroin addiction (stopped in 1997), cigarette and alcohol use, and incarceration. He was hospitalized in 1983 with a gunshot wound which resulted in a nephrectomy and a colostomy. The colostomy was reanastomosed at a later date.

On September 30, 2005 the patient was started on standard four daily drug therapy with isoniazid (INH) 300 mg, rifampin (RIF) 600 mg, pyrazinamide (PZA) 1000 mg, and ethambutol (EMB) 800 mg with vitamin B6 50 mg.

### A. What are some potential barriers to completion of treatment for this patient?

- 1) Cigarette and alcohol use.
- 2) Previous history of heroin addiction.
- 3) Hepatitis C positivity.
- 4) All of the above.

The patient was placed on DOT and treatment was continued until October 16, 2005 when the EMB was dropped after his isolate was reported to be susceptible to all first line drugs. The remaining three drugs were changed to twice weekly by DOT. After 2 months of therapy the PZA was discontinued. Sputa collected at the end of the initial phase was smear and culture positive. The patient was felt to be adherent to his medication and tolerated the drug regimen. He improved clinically with resolution of his fever, sweats and chills. His appetite and energy improved. His cough decreased and he gained 14 pounds. He was very cooperative with the public health worker and requested to self-administer his medications.

### B. Should the patient be taken off DOT and allowed to self administer?

- 1) Yes, allowing him to self administer will help build trust and rapport with the patient.
- 2) Yes, it is general practice to allow most patients to self administer during the continuation phase of treatment.
- 3) No, explain to him that all patients stay on DOT because no one trusts TB patients.
- 4) No, explain that DOT is the standard of care for all TB patients.

The health department changed his INH and RIF to daily treatment and provided a one month supply with instructions to return to the clinic every month to refill his prescription (Disclaimer: DOT is standard of care for all TB cases regardless of circumstances - Reference #4). Sputa were obtained at the January 2006 clinic visit; smears converted to negative and subsequent cultures were negative. In February more sputa were collected because of the patient's positive smear/culture at 2 months and cavitation on initial

CXR; his specimen of February 27th (after 4 ½ months of treatment) grew *Mycobacterium tuberculosis*. Later, a susceptibility study showed the isolate to be sensitive to all drugs.

**C. Which is the most likely reason for the new positive culture on February 27th?**

- 1) No reason, it is probably a laboratory error.
- 2) He is probably not absorbing his medication due to previous colon resection.
- 3) He is probably not taking his medication.
- 4) He has treatment failure due to his Hepatitis C co-infection.

In March a CXR revealed continuing cavitary changes in the right upper lobe although smaller in size than on radiographs at the time of diagnosis. A CT scan noted cavitation in the upper lobes — right greater than left — with the largest cavity in the right upper lobe measuring 3.2 cm. Scattered nodules were seen throughout the bilateral upper lobes, lingual and right middle lobe. The physician diagnosed him with treatment failure and sent him to an inpatient TB treatment unit. His attending physician requested information on the duration of his treatment.

**E. How do you calculate the duration of treatment?**

- 1) Calculate the duration in days from the start date to the last date patient would have self-administered his treatment.
- 2) Calculate the duration in days — excluding all of the doses he self-administered.
- 3) Calculate the total number of doses over time — both self-administered and DOT.
- 4) Calculate the total number of doses over time — excluding those that he self-administered.

At the inpatient TB treatment unit, the patient was continued on INH, RIF, and the following were added EMB with amikacin (600 mg twice weekly injection) and levofloxacin (750 mg daily) along with vitamin B6 50 mg daily. This fortified drug regimen was continued until he had 3 negative 6-week cultures. With the repeat negative cultures, amikacin, levofloxacin and EMB were dropped and the INH and RIF were changed to twice weekly for the continuation phase. During the course of his stay, the patient admitted to the nursing staff that he did not take his rifampin while on self-administered treatment. In June of 2006, the patient was discharged to DOT. He successfully completed treatment.

# TOOLS

## CASE STUDY #1

# ***Directly Observed Therapy (DOT)***

### CONTENTS:

- 1 *Acid Fast Bacilli (AFB) Smear Reporting for Mycobacterium tuberculosis*.  
Heartland National TB Center. 2010.

## Acid Fast Bacilli (AFB) Smear Reporting for Mycobacterium tuberculosis: Pulmonary Specimens

Between 5,000 and 10,000 tubercle bacilli per ml of sputum are required for direct microscopy to be positive. Sputum specimens from patients with pulmonary tuberculosis - particularly those with cavitory disease - often contain sufficiently large numbers of acid-fast bacilli to be readily detected by direct microscopy. The sensitivity can further be improved by examination of more than one smear from a patient. Many studies have shown that examination of two smears will on average detect more than 90% of infectious tuberculosis cases. The incremental yield of acid-fast bacilli from serial smear examinations has been shown to be 80-83% from the first, 10-14% from the second and 5-8% from the third specimen. Therefore three sputum specimens are recommended for suspects of pulmonary tuberculosis. A negative smear result does not exclude the diagnosis of tuberculosis as some patients harbor fewer tubercle bacilli than can be detected by microscopy. A poor quality specimen (salvia, contaminated, quantity too small, specimen not stored properly, etc.) may also produce negative results.<sup>1</sup>

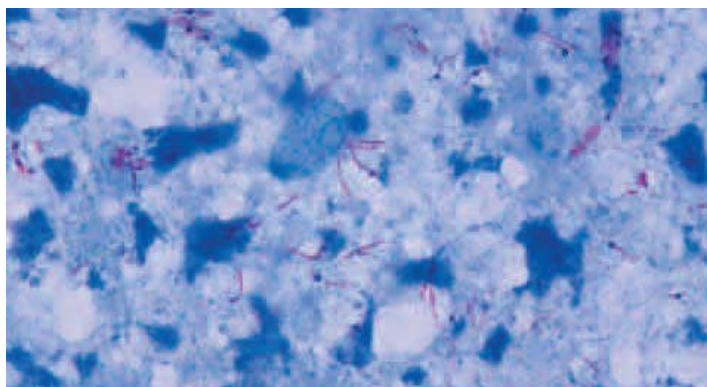
Sputum examination by microscopy is relatively quick, easy, and inexpensive and must be performed on all cases suspected of having tuberculosis. Most patients with infectious tuberculosis have respiratory symptoms and the use of smear microscopy in those presenting to health services with suggestive symptoms constitutes the most efficient means of case detection. Tuberculosis microscopy is also performed to assess response to treatment and to establish cure or failure at the end of treatment.<sup>1</sup>

**Table 1. Acid Fast Bacilli (AFB) Smear Classifications  
Using the Ziehl Neelsen Staining Method, American Thoracic Society Scale<sup>2</sup>**

<b>Classification of Smear: Type 1<sup>A</sup></b>	<b>ATS Standards<sup>2</sup></b>	<b>Smear Result</b>	<b>Infectiousness of Patient</b>
4+	> 9 AFB per field	Strongly positive	Probably very infectious
3+	1-9 AFB per field	Strongly positive	Probably very infectious
2+	1-9 AFB per 10 fields	Moderately positive	Probably infectious
1+	1-9 AFB per 100 fields	Weakly positive	Probably infectious
Report exact AFB count	1-2 organisms per 300 fields	Inconclusive, repeat test	Probably infectious
No AFB seen	0 seen per 300 fields	Negative	May not be infectious

<sup>A</sup>Stained smear read at an oil immersion 100X objective with 8–10X magnification eyepieces (1000X). Read at least 300 high power fields before reporting a negative result. (Note: Fewer than 100 fields may be read if the slide is found positive for AFB.) NOTE: Other counting classifications are used by some laboratories; check with your mycology lab for their classification and interpretation.

- In smears classified at 4+, 10 times as many AFB were seen as in smears classified as 3+; in 3+ smears, 10 times as many as in 2+ smears; and in 2+ smears, 10 times as many as in 1+ smears.<sup>3</sup>



**Figure 1.** 4+ Acid Fast Bacilli (red rods) in a sputum stained with the Ziehl-Neelsen method, 1000x oil immersion.<sup>1</sup>

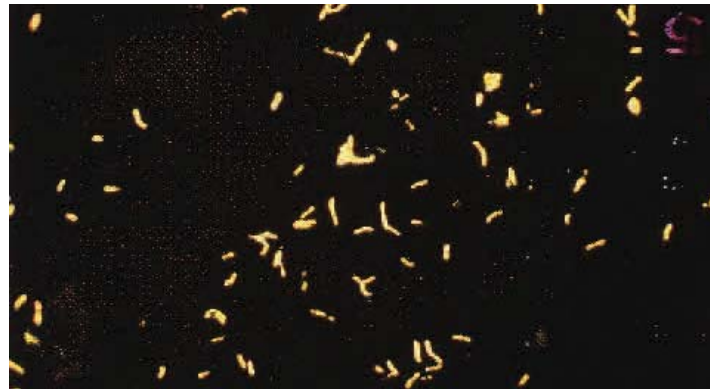
### Fluochrome Staining

Fluorescence microscopy uses illumination from either a quartz-halogen lamp or a high-pressure mercury vapor lamp. The advantage of fluorescence microscopy is that a low magnification objective is used to scan smears, allowing a much larger area of the smear to be seen and resulting in more rapid examination. However, one drawback in using a low magnification is the greater probability that artifacts may be mistaken for acid-fast bacilli. It is therefore strongly recommended that suspect bacilli be confirmed at higher magnification paying special attention to cellular morphology. Indeterminant results be confirmed or ruled out by Ziehl-Neelsen microscopy.<sup>1</sup>

**Table 2. Acid Fast Bacilli (AFB) Smear Classifications Using the Fluochrome Staining Method**

Classification of Smear	Number of Organisms Seen <sup>B</sup>	Smear Result	Infectiousness of Patient
4+	>90 organisms per field	Strongly positive	Probably very infectious
3+	10-90 organisms per field	Strongly positive	Probably very infectious
2+	1-9 organisms per field	Moderately positive	Probably infectious
1+	1-9 per 10 fields	Weakly positive	Probably infectious
1-2 organisms per 30 fields	Report exact organism count	Inconclusive, repeat test	Probably infectious
No organisms seen	0 per 300 fields	Negative	May not be infectious

<sup>B</sup>Stained smear read at 250X – 450X magnification, result is the number of fluorescent organisms seen per specified number of fields. Read at least 30 high power fields before reporting a negative result. ATS standards<sup>2</sup>



**Figure 2.** Acid Fast Bacilli (bright yellow rods) in a sputum stained with the Auramine O method, 250X.<sup>1</sup>

## References

- <sup>1</sup> *Laboratory Services in Tuberculosis Control: Part II Microscopy*. World Health Organization. 1998. Pages 7, 43-44, 46. Accessed at <http://wwwn.cdc.gov/dls/ila/documents/lstc2.pdf> on 6/7/2010.
- <sup>2</sup> *Diagnostic Standards and Classification of Tuberculosis in Adults and Children*. American Thoracic Society. July 1991. Page 1383. Accessed at <http://www.thoracic.org/statements/resources/archive/tbadult1-20.pdf> on 6/7/2010.
- <sup>3</sup> *Mycobacterium tuberculosis: Assessing Your Laboratory, 2009 Edition*. Association of Public Health Laboratories. Pages 36-37. Accessed at [http://www.aphl.org/aphlprograms/infectious/tuberculosis/Documents/Mycobacteria\\_TuberculosisAssessingYourLaboratory.pdf](http://www.aphl.org/aphlprograms/infectious/tuberculosis/Documents/Mycobacteria_TuberculosisAssessingYourLaboratory.pdf) on 6/7/2010.
- <sup>4</sup> *Self Study Modules on Tuberculosis: Module 3: Diagnosis of Tuberculosis Infection and Disease; The Bacteriologic Examination*. Accessed at <http://www.cdc.gov/TB/education/ssmodules/module3/ss3bacteriologic.htm> on 6/7/2010.
- <sup>5</sup> *Module 4: AFB Microscopy Methods in DOTS*. From the Advanced Course on AFB Microscopy held in Nairobi, Kenya November 17-28, 2003. Sponsored by the International Union Against Tuberculosis and Lung Disease and co-sponsored by the Ministry of Health, Kenya and the Centers for Disease Control and Prevention. Page 7. Accessed at <http://www.cdc.gov/dls/ILA/Training%20Workshops/Kenya1103/Ch3/Module4AFBtechnique.rtf> on 6/7/2010.

## ANSWERS

**A. What are some potential barriers to completion of treatment for this patient?**

- 4) All of the above.
- a. This patient has multiple potential barriers to completion of treatment. These should all be documented with a written plan of action to promote adherence, including DOT.

References:

- 4 - CDC 1999
- 1 - TDSHS 2008
- 2 - CDC 2003 Table 7 and Figure 3

**B. Should the patient be taken off DOT and allowed to self administer?**

- 4) No, explain that DOT is the standard of care for all TB patients.
- a. Universal DOT is standard for most TB programs. DOT should be considered for all active TB patients because it is difficult to reliably predict which patients will be adherent.

References:

- 4 - CDC 1999
- 2 - CDC 2003 Table 7 and Figure 3

**C. Which is the most likely reason for the new positive culture on February 27th?**

- 3) He is probably not taking his medication.
- a. Failure to convert cultures to negative after 3 months of appropriate, monitored therapy is considered a delayed response. (Some experts feel that failure to convert sputum cultures at 2 months should raise concerns about delayed treatment response and heighten the degree of observation for the patient.) Failure to convert cultures to negative after 4 months of therapy is defined as treatment failure. Patients who have a delayed response or possible treatment failure should be carefully assessed.

Reference:

- 2 - CDC 2003 Table 2 and Figure 1

**D. How do you calculate the duration of treatment?**

- 4) Calculate the total number of doses over time – excluding those that he self administered.
- a. The duration of treatment is actual number of doses a patient receives, NOT the length of therapy. Calculating the number of doses may be possible by reviewing a detailed directly observed therapy log. A drug-o-gram tool facilitates calculation of doses for more complicated cases. Both automated and hard-copy forms are referenced here.

References:

- 1 - UMDNJ 2006
- 2 - CDC 2003 Pages 3, 40 and Table 2
- 3 - CDHS/CTCA 2003



## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for TB patients using directly observed therapy (DOT).

- 1 New Jersey Medical School Global Tuberculosis Institute (UMDNJ 2006). *Designing a Drug-o-gram: A Program for Initiating Appropriate Tuberculosis Therapy*, 2006. Accessed at <http://www.umdnj.edu/ntbcweb/downloads/products/Drug%20Gram%20Users%20Guide.pdf> on 3/14/2009.
  - Also contains a download zip file for automating creation of a drug-o-gram
- 2 Centers for Disease Control and Prevention (CDC 2003). *Treatment of Tuberculosis*. MMWR: June 20, 2003; 52 (RR11); p1-77. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr5211.pdf> on 3/14/2009.
  - Table 2 on page 3 provides "Drug Regimens for culture-positive tuberculosis caused by drug-susceptible organisms"
  - Table 7 on page 16 provides a list of "Priority situations for the use of DOT"
  - Figure 1 on page 41 provides a decision algorithm for the "Management of treatment interruptions"
  - Figure 3 on page 17 provides a "Range and median of treatment completion rates by treatment strategy for pulmonary tuberculosis reported in 27 studies"
  - Figure 4 on page 18 is an "Example of a flow chart for patient monitoring"
  - Page 8 "Completion of Treatment" and Section 5.6 on page 40 provide a definition of completion of therapy and how to calculate; also Table 2 on page 3 provides the recommended number of doses for various drug regimens in the initial and continuation phases
- 3 California Department of Health Services/California Tuberculosis Control Association (CDHS/CTCA 2003). *Guidelines for the Treatment of Active Tuberculosis Disease*. April 15, 2003; p1-34. Accessed at <http://www.ctca.org/guidelines/IIA1treatmentactivetb.pdf> on 3/14/2009.
  - Appendix 2 pages 29-34 are a sample drug-o-gram template
- 4 Centers for Disease Control and Prevention (CDC 1999). *Self Study Modules on Tuberculosis, #9: Patient Adherence to Tuberculosis Treatment*. Accessed at <http://www.cdc.gov/tb/pubs/ssmodules/pdfs/9.pdf> on 3/14/2009.
  - Page 38 describes DOT and its role in TB Control Programs
  - Page 39 provides a sample DOT form



## CASE STUDY #2

# ***TB Disease and Patient Isolation***



## TB Disease and Patient Isolation

A 31 year old caucasian male presented to the Emergency Department (ED) after experiencing gross hemoptysis. He had a 2 month history of productive cough, a 25 pound weight loss, night sweats, and fatigue. A chest X-ray (CXR) revealed bilateral cavitory infiltrates. The initial sputum specimen was 4+ positive for Acid Fast Bacilli (AFB) (see Case #1, Tool *Acid Fast Bacilli (AFB) Smear Reporting for Mycobacterium tuberculosis*; Table 1.) and the specimen was submitted for a nucleic acid amplification assay (NAAT), culture, and sensitivity. The patient had a history of heavy alcohol and drug use, was HIV negative but Hepatitis B and C positive. He had a long history of cigarette use and a chronic smoker's cough. The patient resided with his wife and three children (ages 9, 7, and 2 years old). The ED physician decided to admit this patient.

### A. Should this patient be admitted to the hospital and placed in an airborne infection isolation room (AIIR)?

- 1) No, he should be admitted but not isolated; TB has not been confirmed yet.
- 2) No, he should be admitted to a private room because he probably has lung cancer and isolation would be too distressing.
- 3) No, he should not be admitted; he is too infectious to be in the hospital.
- 4) Yes, he should be admitted and isolated in AIIR.

The patient's NAAT was positive for *M. tuberculosis*. He was immediately started on a four drug treatment and tolerated the medications well. After four days of hospitalization the physician called the local health department at 9:00 AM to report the case and his intention to discharge the patient by noon. He provided the prescriptions for isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), ethambutol (EMB), and vitamin B6.

### B. What is the appropriate response for the request to discharge?

- 1) Document the patient information, fill the prescriptions as ordered and proceed with discharge plans.
- 2) Document the patient information and inform the physician that the patient cannot be discharged until the prescriptions are filled by the state health department.
- 3) Document the patient information and inform the physician that the patient does not meet the standard for discharge because of the high-risk home setting (children < 4 years old and patient AFB-smear positive).
- 4) Document the patient information and inform the physician that it is inappropriate to discharge a tuberculosis patient with only 3 hours notice.

After one week of hospitalization, the patient is revisited to obtain further history and contact information. The patient was fairly cooperative; however, the nursing staff reported the patient had been out in the hallway a couple of times without his mask. The hospital staff was anxious for the patient to be discharged. The physician called the local health department to coordinate the discharge.

**C. What is the appropriate response to the physician's request?**

- 1) Agree to coordinate discharge as long as the patient is on directly observed therapy (DOT).
- 2) Discuss with the physician that discharge should still be delayed until 3 negative smears are received and/or home arrangements can be made.
- 3) Agree to coordinate the discharge since the patient is a nuisance in the hospital and keeping him there is doing more harm than good.
- 4) Deny discharge until susceptibilities are known.

Two days after the second interview the still hospitalized patient had AFB-smear positive smears. In the meantime, all the children in the home were tested and placed on INH window prophylaxis treatment by DOT. The mother decided to have the children stay next door with their grandmother as an added precaution. The patient was visited in the hospital by a nurse from the local health department to coordinate his discharge.

**D. What is the most important task of this hospital visit?**

- 1) Have the patient sign an Isolation and Treatment Agreement for directly observed therapy.
- 2) Have prescriptions ready to go so no dose is missed.
- 3) Assure patient completely understands the pathophysiology and transmission of TB.
- 4) Establish a referral for smoking cessation classes.

The patient was pansensitive (his isolate was susceptible to all first line drugs) and discharged 17 days after admission. His last sputum smears were 1+, 1+, and 2+; he gained a total of 12 pounds and his chest radiograph improved, although there was still a cavitary lesion present. During Week One of home isolation the patient was present for all DOT visits as arranged. Sputa were obtained at the first visit of Week Two. At the second visit of Week Two, the patient was informed that his sputum smears were still positive (1+, 0, 1+) and home isolation would need to continue. The patient appeared despondent but agreeable. At the next visit the patient was not home. The wife shared that "he got stir crazy," went drinking with his friends a couple of nights ago, and had not been back since.

**E. What should be done at this point?**

- 1) Admonish the wife for not calling you sooner.
- 2) Ask the wife's assistance in locating the patient.
- 3) Leave your card and instructions to call you if the patient ever shows up again.
- 4) Report patient to police.

The patient was finally found at a relative's house. He was visited there and small children were noted in the house and the patient smelled of alcohol. The patient was not wearing a mask. The health issues were discussed with the patient and he was teary-eyed and apologized repeatedly. He promised to cooperate from that point on.

**F. What recommendation should be made to the administrator of the health department clinic managing the patient?**

- 1) Continue to work with the patient. He seems genuinely remorseful and you think he will be cooperative from now on.
- 2) Give the patient another chance as to not compromise your rapport with him.
- 3) Seek a court order based on non-adherence to isolation, non-adherence with instructions to avoid alcohol, and non-adherence with DOT.
- 4) Turn the matter over to the police. What this patient did would be considered a criminal offense.

The nursing supervisor of the clinic decided to give the patient another chance. The patient was adherent with orders for about a week, then disappeared again. After 2 months, the Emergency Department reported the patient was admitted with hemoptysis, hepatotoxicity, and a high blood alcohol level. His sputum smears after 24 hours were 3+, 2+, and 2+. The patient threatened to leave against medical advice. This time, a court order was obtained based on his initial contract and documented records of non-adherence. The patient was remanded to an inpatient treatment facility for the duration of his treatment. Ten infected contacts were identified, including three children; one was 8 months old and diagnosed with TB meningitis.

**Discussion Questions**

1. If the hospital refused to keep the patient, what arrangements could your health department make for the patient? (i.e hotel room, children live elsewhere; provide portable HEPA filters)
2. What is the DOT policy in your organization? Your state?
3. What are the steps your health department uses to increase treatment adherence? (i.e. Letter of Treatment Agreement, incentives, enablers)
4. What are the non-adherence and quarantine laws that govern your organization? Your state?
5. Do you know who to call to begin a court-order isolation procedure? What are the steps you need to follow?

# TOOLS

## CASE STUDY #2

# ***TB Disease and Patient Isolation***

### CONTENTS:

- 1 *TB-410: Order to Implement and Carry Out Measures For a Client with Tuberculosis, August 2004.* Texas Department of State Health Services, (TDSHS 2004).
- 2 *Preventing TB Transmission – Guidelines for Home and Hospital Isolation, March 2009 (DRAFT).* Heartland National TB Center (HNTC 2009).

**Texas Department of State Health Services  
Order to Implement and Carry Out Measures  
For a Client with Tuberculosis**

To: (Name) \_\_\_\_\_

(Address) \_\_\_\_\_

\_\_\_\_\_ (Phone #) \_\_\_\_\_

I have reasonable cause to believe that your diagnosis, based on information available at this time, is (probably/ definitely) TUBERCULOSIS, which is a serious communicable disease. By the authority given to me by the State of Texas, Health and Safety Code, section 81.083, I hereby order you to do the following:

1. Keep all appointments with clinical staff as instructed.
2. Follow all medical instructions from your physician or clinic staff regarding treatment for your tuberculosis.
3. Come to the Public Health Department Clinic or be at an agreed location and time for taking Directly Observed Therapy (DOT).
4. Do not return to work or school until authorized by your clinic physician.
5. Do not allow anyone other than those living with you or health department staff into your home until authorized.
6. Do not leave your home except as authorized by your clinic physician.
7. Special Orders - see reverse side.

**YOU MUST UNDERSTAND, INITIAL AND FOLLOW THE INSTRUCTIONS ON THE BACK OF THIS ORDER.**

This order shall be effective until you no longer need treatment for TUBERCULOSIS.

If you fail to follow these orders, court proceedings may be initiated against you as dictated by State law. After a hearing, the Court may order you to be hospitalized at The Texas Center for Infectious Diseases in San Antonio or another facility. The Court also has the option to order you to go to treatment at a health clinic. The court proceedings could also include having you placed in the custody of the County Sheriff until the hearing.

Signed this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_.

Health Authority of \_\_\_\_\_ City/County  
or Director, Public Health Region \_\_\_\_\_

-----  
Please sign in the space provided below to show that you received these orders and understand them.

I hereby acknowledge that I received a copy of these orders and understand them.

Signed \_\_\_\_\_ Date \_\_\_\_\_  
(client's signature)

Witness \_\_\_\_\_ Date \_\_\_\_\_



Instructions for Client

Client's Name \_\_\_\_\_ Date \_\_\_\_\_

Physician's Name \_\_\_\_\_

- 1. Keep all appointments given to you by clinical staff.  
Several appointments will be necessary to be sure your treatment is working. The treatment for tuberculosis is usually for six or more months. It is very important for you to keep all of the appointments made for you.

\_\_\_\_\_  
(client's initials)

- 2. Be sure you take your medicine for the treatment of your tuberculosis as your doctor or other clinic staff tells you. This means you must: keep all appointments at the clinic or other locations that have been discussed with you; take your medication as advised; provide sputum, urine or blood specimen as requested; report changes in your health; report when you move from where you live now and provide information about those with whom you spend a lot of time.

\_\_\_\_\_  
(client's initials)

- 3. Come to the Public Health Department Clinic or be at an agreed place and time to take Directly Observed Therapy (DOT). DOT is a way we can be sure that you take all the medication needed to cure your tuberculosis. Taking DOT means that a health care worker will meet you at a scheduled time and place and give you your medication as ordered by the doctor. Location for DOT \_\_\_\_\_ / \_\_\_\_\_. DOT will give you the best chance to cure your TB.

\_\_\_\_\_  
(client's initials) (location) (client's initials)

- 4. Do not return to work or school until authorized by your clinic physician. \_\_\_\_\_  
(client's initials)

- 5. Do not allow anyone other than those living with you or health department staff into your home until authorized.

\_\_\_\_\_  
(client's initials)

- 6. Do not leave your home unless authorized by your clinic physician. \_\_\_\_\_  
(client's initials)

- You are or may be capable of spreading TB to others and must remain in your home or in a place where you will not expose others to the TB germ. When you take your TB medicines, you may quickly decrease the likelihood of spreading TB to others. Your doctor will decide when this occurs at your follow-up appointments.

\_\_\_\_\_  
(client's initials) (physician's signature) (date)

- You may attend school and/or go to work \_\_\_\_\_  
(client's initials) (physician's signature) (date)

- 7. Special orders \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
(client's initials)



**Guidelines for Home and Hospital Isolation of Infectious Tuberculosis Patients\*\*\***

TB Patient Characteristics at Diagnosis	Current Isolation and Release Criteria	Guidelines for Adults and Children with Adult Type Disease*
Sputum Acid Fast Bacilli (AFB) smear positive, and/or NAA positive or patient suspected of having active TB.	Hospitalized under inpatient airborne isolation or home isolation and being released to: <ul style="list-style-type: none"> <li>• General hospitalization, or</li> <li>• Outpatient congregate setting, or</li> <li>• Home or setting with high-risk contacts</li> </ul>	Discharge from airborne isolation patient <i>must</i> meet all the following criteria: <ol style="list-style-type: none"> <li>1) Have received standard multidrug anti-TB therapy for at least 2 weeks if original AFB smear positive OR on therapy for 5-7 days if original AFB smear was negative</li> <li>2) Demonstrated adherence to treatment (DOT)</li> <li>3) Demonstrated clinical improvement</li> <li>4) Have 3 consecutive negative AFB smears collected at least 8 hours apart with at least 1 early morning specimen</li> <li>5) Have no risk factors for drug resistance</li> </ol>
Sputum AFB smear negative and TB is not suspected, NAA testing if done is negative and/or another diagnosis is likely	Hospitalized under inpatient airborne isolation and being released to: <ul style="list-style-type: none"> <li>• General hospitalization</li> <li>• Return to school, or</li> <li>• Return to work, or</li> <li>• Allowed to travel on public transportation</li> </ul>	Discharge from airborne isolation patient <i>must</i> meet all the following criteria: <ol style="list-style-type: none"> <li>1) Have 3 consecutive negative AFB smears collected at least 8 hours apart with at least 1 early morning specimen</li> <li>2) TB is not likely and another diagnosis is identified</li> </ol>
Sputum AFB smear negative and TB is suspected or confirmed through NAA testing	Hospitalized under inpatient airborne isolation or home isolation and being released to return to normal activities including: <ul style="list-style-type: none"> <li>• General hospitalization</li> <li>• Return to school, or</li> <li>• Return to work, or</li> <li>• Allowed to travel on public transportation</li> </ul>	Discharge from home isolation patient <i>must</i> meet all the following criteria: <ol style="list-style-type: none"> <li>1) Have received standard multidrug anti-TB therapy for at least 5-7 days</li> <li>2) Demonstrated adherence to treatment (DOT)</li> <li>3) Demonstrated clinical improvement</li> <li>4) Have 3 consecutive negative AFB smears collected at least 8 hours apart with at least 1 early morning specimen</li> <li>5) Have no risk factors for drug resistance</li> </ol>
TB MDR/ or XDR confirmed infection	Hospitalized under inpatient airborne isolation or home isolation and being released to return to normal activities including: <ul style="list-style-type: none"> <li>• Return to school, or</li> <li>• Return to work, or</li> <li>• Allowed to travel on public transportation</li> </ul>	Discharge from home isolation patient <i>must</i> meet all the following criteria: <ol style="list-style-type: none"> <li>1) Receiving and tolerating appropriate multidrug anti-TB regimen</li> <li>2) Demonstrated adherence to treatment (DOT)</li> <li>3) Demonstrated clinical improvement</li> <li>4) Have 3 consecutive negative AFB cultures*</li> </ol> *Expert opinion varies; some experts satisfied with negative smears

A TB suspect or case may be released from hospital to home setting if there are no high risk individuals in the home even if they do not meet the criteria for release from isolation. Clinical judgment and consultation with public health is needed.

**Guidelines for Home and Hospital Isolation of Infectious Tuberculosis Patients**

Frequently Asked Questions	Factors that Predict Likely Transmission of TB	References
<p>My patient is on home isolation. He has asked if he can go out as long as he wears a mask. What should I say?</p> <p>Patients should stay home unless they have a medical appointment then they should wear a mask. Patients may engage in outdoor activities such as walking.</p> <p>What if the patient cannot produce sputum – how do we tell if the patient has converted to smear or culture negative?</p> <p>Every effort should be made to obtain sputum including induced sputum through respiratory therapy. However, a few patients cease to produce sputum before conversion to smear or culture negative can be confirmed. For these patients, you will need to use clinical judgment such as symptom resolution and CXR improvement.</p> <p>What if the patient is non adherent with home isolation but is adherent with DOT?</p> <p>Most states have legislation to obtain a legal order that covers both isolation and adherence to treatment. If the patient is documented non adherent with home isolation, check the legal authority you have in your jurisdiction to enforce isolation.</p> <p>What if the patient remains smear positive but cultures come back negative?</p> <p>As long as <u>cultures</u> are negative the specimens contain nonviable organisms. The mycobacteria are dead and not capable of spreading disease. The patient may be released from isolation.</p>	<p>Release from isolation may involve judgment calls on the part of the public health authority. These are the factors to take into account when considering whether or not a patient is non-infectious:</p> <p><u>Anatomical site</u> Pulmonary, laryngeal or pleural TB disease - infectious; laryngeal tends to be the most infectious</p> <p>Sputum bacteriology Positive culture and AFB smear indicates more efficient transmission than if positive culture and negative smear</p> <p><u>Radiographic findings</u> Cavities on chest radiographs and extensive infiltrates are associated with more transmission than noncavitary chest radiographs and limited disease</p> <p><u>Behaviors that increase transmission</u> Frequent coughing Poor cough etiquette Singing High sociability of the index patient Behavior such as shouting</p> <p><u>Age</u> Children aged &lt; 10 years old are unlikely to transmit TB unless the CXR is similar to adult type disease (especially cavitary)</p> <p><u>HIV status</u> HIV positive patients are as infectious as non-HIV positive patients</p> <p><u>Administration of effective treatment/Adherence to treatment and DOT</u> The exact rate of decrease in viable mycobacterial organisms cannot be predicted. Some patients with severe disease will remain smear and culture positive after several weeks of treatment. Treatment with both isoniazid and rifampin is associated with a more rapid conversion of smears and cultures to negative.</p>	<p><i>Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis: Recommendations from the National Tuberculosis Controllers Association and CDC.</i> Centers for Disease Control and Prevention. MMWR: December 16, 2005; Volume 54 (RR-15); p1-37.</p> <p><i>Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings.</i> Centers for Disease Control and Prevention. MMWR: December 30, 2005; Volume 54 (RR17).</p>  <p><b>Heartland National TB Center</b> 2303 SE Military Drive San Antonio, Texas 78223 1-800-TEX-LUNG (1-800-839-5864) <a href="http://www.HeartlandNTBC.org">www.HeartlandNTBC.org</a></p>

\*Cavitary infiltrate

\*\*Clinical assessment and judgment should always be applied with each individual patient\*\*

\*\*\*Individuals who are returning to work or live in environments with immunocompromised individuals (neonates, HIV+, transplant recipients, etc.) should be considered individually; more conservative measures should be considered.

## ANSWERS

**A. Should this patient be admitted to the hospital and placed in an airborne infection isolation room (AIIR)?**

- 4) Yes, he should be admitted and isolated in AIIR.
- a. With a 4+ AFB-positive smear, he is clearly ill and needs hospitalization in AIIR. Many emergency departments have isolation guidelines and with hemoptysis, cavitary chest X-ray, and risk factors of alcohol and drug use. He would meet the criteria in most hospitals for admission to an AIIR.

Reference:

- 1- NTC 2007

**B. What is the appropriate response for the request to discharge?**

- 3) Document the patient information and inform the physician that the patient does not meet the standard for discharge because of the high-risk home setting (children < 4 years old and patient AFB-smear positive).
- a. This patient does not meet the criteria for discharge from hospitalization to home with high-risk contacts: he has not had 3 consecutive negative smears and no documentation of clinical improvement.

References:

- 2 - CDC 2005a
- 3 - CDC 2005b
- 4 - HNTC 2009

**C. What is the appropriate response to the physician's request?**

- 2) Discuss with the physician that discharge should still be delayed until 3 negative smears are received and/or home arrangements can be made.
- a. Often public health departments are pressured to agree to discharge patients because of hospital costs and difficult-to-manage patients. Pediatric contacts are at high risk for developing disseminated TB disease once infected. Advocating for their protection is a critical role for public health nurses in this scenario.

References:

- 2 - CDC 2005a
- 3 - CDC 2005b
- 4 - HNTC 2009

**D. What is the most important task of this hospital visit?**

- 1) Have the patient sign an Isolation and Treatment Agreement for directly observed therapy.
- a. This is the most critical public health action. If the patient is non-adherent with isolation or treatment, having a signed agreement facilitates legal action, if needed. Most programs have a standard agreement used for all patients.

Reference:

- 5 - TDSHS 2004

ANSWERS (continued)

**E. What should be done at this point?**

- 2) Ask the wife's assistance in locating the patient.
  - a. This is called a "proxy" interview. This is a useful strategy in locating a missing patient.

Reference:

- 6 - CDC 2008

**F. What recommendation should be made to the administrator of the health department clinic managing the patient?**

- 3) Seek a court order based on non-adherence to isolation, non-adherence with instructions to avoid alcohol, and non-adherence with DOT.
  - a. This is a tough judgment call, but balancing the needs of the patient vs. protecting the health of the public must be weighed carefully. Depending on your state, a court order could be for out-patient DOT or in-patient treatment. Not all states move this fast, so it is important to know your jurisdictional and/or state's rules for these circumstances. Typically health departments should seek the "least restrictive" option. Starting the court order process as a precaution will send the message to the patient that you are serious and will not tolerate non adherent behavior.

Reference:

- 7 - MDHSS 2006

## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for TB patients who require isolation or confinement.

- 1 Francis J. Curry National Tuberculosis Center (CNTC 2007). *Tuberculosis Infection Control: A Practical Manual for Preventing TB, Appendix J – Respiratory Isolation of Pulmonary Tuberculosis*. Accessed at: [http://www.nationaltbcenter.edu/TB\\_IC/docs/ICC\\_book.pdf](http://www.nationaltbcenter.edu/TB_IC/docs/ICC_book.pdf) on 3/24/2009.
- 2 Centers for Disease Control and Prevention (CDC 2005a). *Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis: Recommendations from the National Tuberculosis Controllers Association and CDC*. MMWR: December 16, 2005; 54 (RR 15); p1-37. Accessed at <http://www.cdc.gov/mmwr/pdf/rr/rr5415.pdf> on 3/29/2009.
- 3 Centers for Disease Control and Prevention (CDC 2005b). *Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings*. MMWR: December 30, 2005; 54 (RR17). Accessed at <http://www.cdc.gov/mmwr/pdf/rr/rr5417.pdf> on 3/29/2009.
  - Page 16, Managing Patients Who Have Suspected or Confirmed TB Disease: General Recommendations
  - Page 19, Initiation of Treatment
  - Page 40-44, Estimating the Infectiousness of a TB Patient
- 4 Heartland National TB Center (HNTC 2009). *Preventing TB Transmission – Guidelines for Home and Hospital Isolation, March 2009 (DRAFT)*.
- 5 Texas Department of State Health Services (TDSHS 2004). *TB-410: Order to Implement and Carry Out Measures For a Client with Tuberculosis, August 2004*. Accessed at <http://www.dshs.state.tx.us/idcu/disease/tb/forms/> on 3/24/2009.
- 6 Centers for Disease Control and Prevention (CDC 2008). *Self Study Modules on Tuberculosis, #4: Effective TB Interviewing for Contact Investigation: Proxy Interviews, May 2008*. Accessed at [http://www.cdc.gov/tb/pubs/interviewing/selfstudy/module4/4\\_4.htm](http://www.cdc.gov/tb/pubs/interviewing/selfstudy/module4/4_4.htm) on 3/24/2009.
- 7 Missouri Department of Health and Senior Services (MDHSS 2006). *Courtforce Handbook, September 2006*. Accessed at <http://www.dhss.mo.gov/TBManual/Chap9.pdf> on 3/24/2009.



## CASE STUDY #3

# ***TB Suspect and Extrapulmonary TB***

## TB Suspect and Extrapulmonary TB

A 20-year-old woman was identified as a contact of a patient with Acid Fact Bacilli (AFB) sputum smear positive pulmonary TB. Her tuberculin skin test (TST) was read as 6 mm induration. The patient had emigrated from the Marshall Islands to the United States in 2001. She denied any prior exposure to TB. A TST placed for school 2 years prior had a reading of 0 mm induration (negative). She denied any symptoms of cough, weight loss, fatigue, night sweats, or fever. She was 5'3" and weighed 86 pounds. She reported she weighed about 100 pounds last time she was checked.

### A. What is the next step?

- 1) Nothing, she is TST negative with an induration of less than 10 mm.
- 2) Schedule her for a chest radiograph (CXR), collection of a natural or induced sputum, and an office visit with a provider.
- 3) Wait and repeat the TST in 8-10 weeks.
- 4) Educate her about symptoms and tell her to call if she develops them.

Her CXR report read "opacification of the lower half of the left hemithorax reflective of a moderate-sized left pleural effusion and/or atelectasis (accumulation of pleural fluid that causes incomplete exhalation or chest expansion) ". She had normal lab values and no significant findings on medical exam. She was HIV negative. She could not provide a spontaneous sputum specimen.

### B. What are her risk factors for TB disease?

- 1) New positive TST.
- 2) < 10 % ideal body weight and unintentional weight loss.
- 3) Recent close contact with active TB case.
- 4) All of the above.

Her physician forwarded all her medical information to the local health department and then called to seek information on TB diagnosis and treatment regimens.

### C. What is the best response for the physician?

- 1) It is likely that this close contact has primary active TB disease – offer to arrange for induced sputum testing times three at the health department, provide guidance on treatment regimens from the *CDC TB Treatment Guidelines*, and provide contact information for tuberculosis consultation services.
- 2) It does not sound like typical active TB and the physician is probably overreacting. Tell the physician you will arrange for a repeat office visit in 8 – 10 weeks to repeat the symptom screening and CXR.
- 3) It is possible that this close contact has extrapulmonary TB disease which is not infectious – provide the physician guidance on treatment regimens from the *CDC TB Treatment Guidelines*, and contact information for physician consultation services.
- 4) It is unlikely that the patient has active TB. Offer to get one sputum specimen just in case.

Further evaluation found sputa obtained from induction were all AFB-smear negative. The physician prescribed a daily regimen of 300 mg isoniazid (INH), 600 mg rifampin (RIF), 1500 mg pyrazinamide (PZA), 1200 mg ethambutol (EMB), and vitamin B6 50 mg for two weeks.



**D. What should the nurse handling the case do next?**

- 1) Fill order of TB medications as soon as possible and make an appointment for the patient to start medications.
- 2) Do not fill the order of TB medications since her smears are AFB negative and TB will probably be ruled out in the near future.
- 3) Check medication doses to make sure they are appropriate for a patient that weighs 86 pounds.

The physician revised the prescription for the appropriate doses for a patient weighing 86 pounds. The patient began daily TB therapy by directly observed therapy (DOT). The sputum culture grew *M. tuberculosis* and was susceptible to all first line TB drugs. A CT scan was performed after 3 weeks of treatment and the report read "hilar adenopathy, volume loss, pleural thickening and a moderate pleural effusion on the left, and patchy infiltrates in the right middle and right upper lobe." A repeat CXR done on the same date as the CT scan was interpreted as normal.

**E. Should this patient be regarded as infectious? What additional actions are required?**

- 1) This patient could potentially be infectious and high priority contacts should be evaluated.
- 2) This patient is not infectious since her sputum was AFB-smear negative.
- 3) This patient is not infectious since she has only extrapulmonary TB.
- 4) This patient is not infectious since her sputum had to be induced.

**F. What should be included on the surveillance form to report this TB case?**

- 1) TB suspect – close contact to an active TB case.
- 2) A secondary disease case – Confirmed pulmonary TB.
- 3) A secondary disease case – Confirmed pulmonary and extrapulmonary (pleural and lymphatic) TB.
- 4) A secondary disease case – Confirmed extrapulmonary TB (pleural and lymphatic TB).

**Discussion Questions**

1. What are the TB disease and Latent TB Infection (LTBI) reporting requirements for your agency? Your state?
2. What mechanism or forms are required by your agency to report TB cases?
3. What are the follow-up steps required by your agency/state now that have you identified a secondary case of tuberculosis?

## ANSWERS

**A. What is the next step?**

- 2) Schedule her for a chest X-ray (CXR) and office visit with a provider.
  - a. This patient is considered TST positive with a TST > 5 mm and known recent contact with an infectious TB case. Patients identified with active TB during contact investigations are asymptomatic up to 50% of the time. This is one of the great benefits of a contact investigation — early identification of TB disease. Early detection of TB disease catches patients before they are infectious and is an important goal of TB programs. The lack of symptoms should not be used to rule out TB disease.

Reference:

- 1 - CDC 2005 page 17, Figure 7

**B. What are her risk factors for TB disease?**

- 4) All of the above
  - a. Exposure to a smear positive case, TST skin test conversion, CXR showing a pleural effusion, and weight about 10 pounds less than normal is a classic presentation of active TB in a contact.

Reference:

- 2 - CNTC 2007 Figure 2.3

**C. What is the best response for the physician?**

- 1) It is likely that this close contact has primary active TB disease – offer to arrange for induced sputum testing X3 at the health department and provide guidance on treatment regimens from the *CDC TB Treatment Guidelines* and contact information for physician consultation services.
  - a. Primary TB can happen in any part of the lung. It is often in the lower lobes and associated with a pleural effusion and/or hilar adenopathy.
  - b. Sputum smears are usually negative in these types of patients but cultures are positive up to 40% of the time. It is important to always order three sputum specimens for smears and cultures and induce if needed.

References:

- 2 - CNTC 2007 Figure 2.3
- 3 - ATS 2000 pages 1378-1379

**D. What should the nurse handling the case do next?**

- 3) Check medication doses to make sure they are appropriate for a patient that weighs 86 pounds.
  - a. Anti-TB medications are prescribed by weight. Patients who are on dosages that are too high are at greater risk of adverse drug reactions including drug-induced liver injury. Patients on insufficient doses risk a poor response to therapy or the development of drug resistance.

Reference:

- 4 - CDC –2003a Tables 3, 4, and 5

**ANSWERS (continued)****E. Should this patient be regarded as infectious? What additional actions are required?**

- 1) This patient could potentially be infectious and high priority contacts should be evaluated.
  - a. Forty percent of patients with pleural TB have positive sputum cultures. They need isolation and a contact investigation should be initiated.

Reference:

- 5 - CDC 2005

**F. What should be included on the surveillance form to report this TB case?**

- 3) A secondary disease case – Confirmed pulmonary and extrapulmonary (pleural and lymphatic) TB.
  - a. In patients with a pleural effusion, an associated infiltrate is commonly noted by CT scan, although in plain films this is obscured by the pleural fluid. If a thoracentesis is performed and a repeat CXR taken, then the infiltrate may be visible once the fluid is removed. Pleural effusions are almost always unilateral unless the patient has a serious immune deficiency.
  - b. CT scans of the chest can help to define the extent of disease. A plain film of the chest can be misleading and, in this case, the repeat film was reported as normal despite the significant abnormalities noted on the CT scan. Be cautious of a CXR report that shows rapid resolution of previously abnormal findings.

References:

- 3 - ATS 2000 pages 1378-1379
- 6 - CDC 2009

## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for TB patients who present with extrapulmonary findings.

- 1 Centers for Disease Control and Prevention (CDC 2005). *Guidelines for the Investigation of Persons with Infectious TB*. MMWR: December 16, 2005; 54 (RR15); p1-55. Accessed at <http://www.cdc.gov/mmwr/pdf/rr/rr5415.pdf> on 3/24/2009.
  - Figure 7 on page 17 is an algorithm for the “Evaluation, treatment, and follow-up of immunocompetent adults and children aged  $\geq$  5 years (high- and medium-priority contacts)”
- 2 Francis J. Curry National Tuberculosis Center (CNTC 2007). *Radiographic Manifestations of Tuberculosis: A Primer for Clinicians. Second Edition*. Accessed at <http://www.nationaltbcenter.edu/products/tbradiographic.cfm> on 3/24/2009.
  - Figure 2.3 on page 2-6 is a chest radiograph and description of “Primary TB in an Adult”
- 3 American Thoracic Society (ATS 2000). *Diagnostic Standards and Classification of Tuberculosis in Adults and Children*. American Journal of Respiratory Critical Care; Volume 16; pp 1376–1395. Accessed at: <http://www.cdc.gov/tb/pubs/PDF/1376.pdf> on 3/24/2009.
  - “Pulmonary TB” on pages 1378-1379 describes symptoms, physical findings, and radiographic findings of pulmonary TB
- 4 Centers for Disease Control and Prevention (CDC 2003a). *Treatment of Tuberculosis*. MMWR: June 20, 2003; 52 (RR11); p1-77. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr5211.pdf> on 3/14/2009.
  - Table 3 on pages 4 and 5 summarizes the “Doses of antituberculosis drugs for adults and children”
  - Table 4 on page 5 suggest “Pyrazinamide doses, using whole tablets, for adults weighing 40-90 kilograms”
  - Table 5 on page 5 suggest “Ethambutol doses, using whole tablets, for adults weighing 40 – 90 kilograms”
- 5 Centers for Disease Control and Prevention (CDC 2005). *Controlling TB in the United States*. MMWR: November 4, 2005; 54 (RR12); p1-88. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr5412.pdf> on 3/31/2009.
  - Page 37 “Steps of a Contact Investigation, Setting priorities” discusses the need for a contact investigation with pleural TB infections
- 6 Centers for Disease Control and Prevention (CDC 2009). *CDC Tuberculosis Surveillance Data: Report of a Verified Case of Tuberculosis (RVCT) Instruction Manual*. Version 1, June 2009. Accessed at <ftp://ftp.cdc.gov/pub/software/TIMS/2009%20RVCT%20documentation/rvct%20training%20Materials/RVCT%20Instruction%20Manual.pdf> on May 21, 2010.
  - Pages 54-55 describe how to record the information on the anatomical site of the patient’s TB disease (pulmonary and/or extrapulmonary TB)

## CASE STUDY #4

# ***Working with Private Providers to Manage Clinical TB***

## Working with Private Providers to Manage Clinical TB

A 52-year-old Hispanic female presented in January 2006 with left upper quadrant abdominal pain. An abdominal and chest x-ray series revealed a density in the left upper lung; there was no hilar, mediastinal or axillary adenopathy. She denied cough, fever or night sweats. She had no prior history of tuberculosis. She immigrated to the US from Mexico 20 years ago and on occasion returned there to visit family. She is diabetic and a non-smoker. A private medical provider referred her to the local public health department where a tuberculin skin test (TST) was done and was found to be positive with an induration of 25 mm.

### A. What is the most significant issue suggesting active TB disease in this patient's history?

- 1) Left upper quadrant abdominal pain.
- 2) Left upper lung density.
- 3) History of immigration from Mexico.
- 4) Diabetes.

### B. What is the next action as a public health nurse?

- 1) Collect three sputa for acid-fast bacilli (AFB) smear and culture.
- 2) Refer patient back to her private physician with documentation of the TST result.
- 3) Identify this patient's contacts and place patient in home isolation.
- 4) Get an order to start patient on latent TB infection (LTBI) treatment.

Her three sputa were AFB smear and culture negative for *M. tuberculosis*. A CT scan revealed a 2.4 cm slightly irregular cavitary mass in her left upper lobe. After the negative cultures, she was referred back to the health department with a prescription for a 9 month course of isoniazid (INH) and vitamin B6.

### C. What is the health department's next step in management of this patient?

- 1) Order INH and begin case management of this LTBI case.
- 2) Provide INH directly observed therapy (DOT) as this patient is high risk for progressing to TB disease.
- 3) Provide all 9 months of INH so the patient's ability to complete treatment is optimized while traveling back and forth to Mexico.
- 4) Encourage the prescribing physician to obtain a consultation from a TB expert before commencing LTBI treatment.

The patient was started on INH because the private physician and health department concluded the patient had LTBI. After completion of six months of LTBI treatment, she received a follow-up CT which showed a thick-walled cavitary lesion. She was referred for a thoracotomy and surgical removal of the mass. A left upper lobectomy was performed which showed a 4 cm cavitary lesion with no evidence of malignancy. The cavitary lesion had focal extension into the surrounding bronchiole. A direct smear of the tissue removed was AFB 2+ positive; *M. tuberculosis* was isolated by culture within 9 days. The patient's physician diagnosed old granulomatous disease. The patient had an unremarkable surgical recovery; she was discharged with diabetic medication and referred to the local health department to resume her INH and B6 and complete the last 3 months of treatment.

**D. What should the local health department do?**

- 1) Assure that patient continues INH as prescribed.
- 2) Discontinue treatment – her LTBI was cured by removal of the diseased lesion.
- 3) Continue INH treatment until susceptibilities are completed.
- 4) Stop INH treatment and refer this patient to an expert in TB diagnosis and treatment through the state health department. Obtain drug susceptibilities on the lobectomy specimen.

The state TB public health department reclassified this patient as a TB case. They also took charge of the case and referred the patient to a physician experienced with TB diagnosis and treatment. Per recommendation from a TB expert, three repeat sputa were obtained by the local health department and all were AFB smear and culture negative. The physician immediately began 4-drug regimen with isoniazid, rifampin, pyrazinamide, and ethambutol (RIPE) as recommended by the TB expert because her drug susceptibilities subsequently showed the isolate to be sensitive to all first line drugs.

The state TB controller contacted the local health department as he was concerned that inappropriate treatment could result in the case becoming drug resistant.

**E. What public health actions should the health department suggest?**

- 1) Meet with physicians involved and provide TB educational material.
- 2) No action is needed – this patient is being treated for active TB as a precaution.
- 3) Establish a procedure in the local health department for working more effectively with private medical providers in the community.
- 4) Send letters of reprimand to all physicians involved and report them to the state medical licensing board.
- 5) 1) and 3) are both good suggestions.

**Discussion Questions**

1. What is your health department's policies concerning working with private providers?
2. What is your health department's policies concerning seeking TB expert consultations?
3. Does your state have a policy for "taking charge" of a TB case that is being handled incorrectly? What are the jurisdictional rules for your health department and at the state level?

## ANSWERS

**A. What is the most significant issue suggesting active TB disease in this patient's history?**

- 2) Left upper lung density.
  - a. When there is a radiographic manifestation that is worrisome for active disease, a more aggressive attempt at a diagnosis should be made.

Reference:

- 1- CDC 2008

**B. What is the next action as a public health nurse?**

- 1) Collect three sputa for acid-fast bacilli (AFB) smear and culture.
  - a. Sputum examination by AFB smear and culture is indicated when the patient has an abnormal CXR or respiratory symptoms. Three sputa should be collected at least 8 hours apart and at least one should be an early morning specimen.

Reference:

- 2 - CDC 2006

**C. What is the health department's next step in management of this patient?**

- 4) Encourage the prescribing physician to obtain a consultation from a TB expert before commencing LTBI treatment.
  - a. Usually if radiographic stability can be determined over 3 months and sputum cultures are negative a diagnosis of LTBI can be made. A worsening CXR may indicate "clinical TB." Consultation with an expert in the treatment of TB is recommended for patients who have such radiographs. In this case the cavitory lesion is a very worrisome indication of an active process. If possible additional diagnostic studies should be considered to exclude active TB, other infectious processes, and malignancy.

Reference:

- 3 - CDC 1997 pages 40-41

**D. What should the local health department do?**

- 4) Stop INH treatment and refer this patient to an expert in TB diagnosis and treatment through the state health department.
  - a. When active TB is suspected or confirmed, it is best to start the standard four drug anti-TB therapy (isoniazid, rifampin, pyrazinamide, and ethambutol or RIPE) pending the result of cultures and drug susceptibilities. Treatment of active disease with a single drug leads to resistance to the drug.

Reference:

- 4 - CDC 2003 page 6, Figure 1

**E. What public health actions should the health department suggest?**

- 5) 1) and 3) are both good suggestions.
  - a. Meet with physicians involved and provide TB education material.
  - b. Establish a procedure in the local health department for working more effectively with private medical providers in the community.

Reference:

- 5 - UMDNJ 2003 pages 30-31



## REFERENCES

These references are designed to assist in case management and advocacy when a local health department works with a private provider and must educate the provider on the optimal care for their TB patient.

- 1 Centers for Disease Control and Prevention (CDC 2008). *The Difference Between Latent TB Infection (LTBI) and Active TB Disease*. October 2008. Accessed at: <http://www.cdc.gov/tb/pubs/tbfactsheets/LTBlandActiveTB.pdf> on 3/24/2009.
- 2 Centers for Disease Control and Prevention (CDC 2006). *Infection Control in Health Care Settings*. April 2006. Accessed at <http://www.cdc.gov/tb/pubs/tbfactsheets/ichcs.pdf> on 3/24/2009.
- 3 Centers for Disease Control and Prevention (CDC 1997). *Case Definitions for Infectious Conditions Under Public Health Surveillance*. MMWR: May 2, 1997; 46 (RR 10); p40-41. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr4610.pdf> on 3/24/2009.
- 4 Centers for Disease Control and Prevention (CDC 2003). *Treatment of Tuberculosis*. MMWR: June 20, 2003; 52 (RR11); p1-77. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr5211.pdf> on 3/14/2009.
  - Figure 1 on page 6 provides a “Treatment algorithm for tuberculosis”
- 5 New Jersey Medical School Global Tuberculosis Institute (UMDNJ 2003). *Treating the Patient with Tuberculosis: Guidelines for Collaborating with Community Physicians*. Accessed at: [www.umdnj.edu/globaltb/downloads/products/collaborating.pdf](http://www.umdnj.edu/globaltb/downloads/products/collaborating.pdf) on 3/24/2009.
  - Pages 30 and 31 “Summary: When Collaboration Fails”



## CASE STUDY #5

# ***TB Suspect and Pott's Disease***

## TB Suspect and Pott's Disease

An 80-year-old man presented to his local physician for evaluation of a 1-year history of increasing back pain that did not respond to physical therapy or nonsteroidal anti-inflammatory agents.

The patient was born in the US and had never traveled abroad. He lived in an apartment with his wife of 50 years. Three years previously, at a routine clinic visit, he was found to have a reactive tuberculin skin test (TST) (size of induration not recorded) and a subsequent negative chest radiograph (CXR). He was prescribed isoniazid (INH), which he took for 3 months. The patient was generally healthy until developing back pain in the past year.

On physical exam the patient appeared to be a well elderly male. He was afebrile. His lungs were clear. There was mild to moderate degenerative joint disease of his hands and feet. Although his back pain was localized to the lumbosacral area, examination of the back was unremarkable. Rectal examination indicated a mildly enlarged prostate gland.

### A. His private provider wrote the following orders. Which ONE raises concern?

- 1) The physician conducts a thorough medical history.
- 2) The physician obtains a complete blood cell count (CBC) and erythrocyte sedimentation rate (ESR).
- 3) The physician orders X-rays of the lumbosacral spine.
- 4) The physician treats the back pain with 10 days of anti-inflammatory therapy and orders the patient to return in 2 months.

The patient returned with continued complaints of back pain. There was no fever. The physical examination was unchanged.

Laboratory and other results:

- CBC, serum chemistries, and urinalysis are normal
- PSA is 6.1 mg/ml (normal range: 0-4)
- ESR is moderately elevated at 88 mm/hr (normal range 0-20)
- CXR is normal
- Lumbosacral spine films reveal an erosive process at L2-L3 involving and crossing the disc space
- TST was repeated and measured 2 mm of induration

The physician diagnosed Latent TB Infection (LTBI), prescribed 300 mg isoniazid (INH) daily for 9 months, and referred his patient to your health department for LTBI treatment.

### B. What should be done now?

- 1) Do not fill the prescription because active TB has not been ruled out; consult with your health department physician or a TB expert regarding a concern for active TB.
- 2) Fill the prescription and strategize with the patient on methods to promote adherence this time.
- 3) Do not fill the prescription because the patient has a track record for non-adherence with INH.
- 4) Request twice weekly therapy of 900 mg INH so you can directly observe the patient and insure that he completes treatment this time.

The patient had no symptoms apart from back pain, and reaffirmed having taken INH for an uncertain period 3 years previously. The CT scan confirmed the finding of a destructive process at L2-L3 with a small paravertebral soft tissue mass. The urologic evaluation (including prostate biopsy) revealed benign prostatic hypertrophy (BPH) with no evidence of malignancy. After consultation with the health department physician, the private physician called the patient and informed him that he needed to come in to the hospital for a vertebral biopsy to determine the reason for his back pain and the abnormality of his spine.

The vertebral biopsy revealed osteomyelitis and caseating granulomata. The smear of the biopsy was positive for Acid Fast Bacilli (AFB). Mycobacterial cultures were sent, but the results would not be available for several weeks. Routine bacterial and fungal cultures were negative. The physician prescribed INH, rifampin (RIF), pyrazinamide (PZA), ethambutol (EMB), and vitamin B6 daily for two weeks, then twice weekly by directly observed therapy (DOT).

**C. What is the next step in the management of this patient?**

- 1) During the patient education session, offer HIV Opt Out testing as part of the routine testing for baseline levels.
- 2) Inform the physician that this patient should not be under DOT as he is not infectious.
- 3) Educate patient that TB treatment will be completed in 6 months.
- 4) Discuss the anti-TB drug regimen with the physician as the patient is likely too old to tolerate the 4-drug regimen.

**D. The patient returns for his first monthly follow-up visit. What should NOT be done at this time?**

- 1) Ask patient if he is experiencing any fatigue, anorexia, nausea, vomiting, dark urine, persistent abdominal discomfort, tingling in his extremities, vision problems.
- 2) Ask patient about his back symptoms.
- 3) Obtain liver function tests.
- 4) Order a lumbosacral spine CT scan or MRI scan.

After six-months, the patient returned for his follow-up visit. He had been adherent with DOT, but had missed the last two monthly visits to see his physician. He stated that it was very difficult for him to travel the 12 blocks to the clinic.

**E. What should NOT be done at this visit?**

- 1) Ask patient if he is experiencing any side effects from his anti-TB medications.
- 2) Ask patient about his back symptoms.
- 3) Obtain liver function tests.
- 4) Urge the physician to discontinue treatment as the patient has completed 6-months of therapy and the physician visits are proving problematic.

## ANSWERS

**A. His private provider wrote the following orders. Which ONE raises concern?**

- 4) The physician treats the back pain with 10 days of anti-inflammatory therapy and orders the patient to return in 2 months.
- a. This action is not appropriate, particularly since he has not responded to anti-inflammatory agents to date. With a history of a positive TST, extrapulmonary TB should be ruled out. TB of the bone and joint was the third most common form of extrapulmonary TB in the United States in 2007. TB of the vertebrae is diagnosed in about 40% of bone TB cases. Also known as "Pott's Disease", the infection typically affects the thoracic and lumbar regions and delays in diagnosis can result in severe debilitation. Advocating for more aggressive diagnostic efforts is needed.

Reference:

- 1 - CDC 2008a Table 27

**B. What should be done now?**

- 1) Do not fill the prescription because active TB has not been ruled out.
- a. This patient could have Pott's Disease or TB of the vertebrae. Further testing is needed to rule out active TB disease before prescribing INH. INH treatment alone in a patient with active disease could result in INH-resistant TB disease.

Reference:

- 2 - CDC 2008b

**C. What is the next step in the management of this patient?**

- 1) During your patient education session, offer HIV Opt Out testing as part of the routine testing for baseline levels.
- a. All active TB patients should undergo HIV testing and counseling.

Reference:

- 3 - CDC 2008c

**D. The patient returns for his first monthly follow-up visit. What should NOT be done at this time?**

- 4) Order a lumbosacral spine CT scan or MRI scan.
- a. Because radiographic resolution can be slow, 1 month is too early to expect significant improvement.

Reference:

- 4 - Jain 2007

**E. What should NOT be done at this visit?**

- 4) Urge the physician to discontinue treatment as the patient has completed 6 months of anti-TB therapy and the physician visits are proving problematic.
- a. Although there is no clear consensus on optimal treatment duration for bone TB, experts typically recommend at least 9 months of treatment.

Reference:

- 5 - HNTC 2008

## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for TB patients who have Pott's Disease.

- 1 Centers for Disease Control and Prevention (CDC 2008a). *Reported Tuberculosis in the United States, 2007*. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. September 2008. Accessed at <http://www.cdc.gov/tb/surv/2007/pdf/fullreport.pdf> on 3/25/2009.  
– Table 27 on Page 48 shows the distribution of extrapulmonary TB cases
- 2 Centers for Disease Control and Prevention (CDC 2008b). *The Difference Between Latent TB Infection (LTBI) and Active TB Disease*. October 2008. Accessed at <http://www.cdc.gov/tb/pubs/tbfactsheets/LTBlandActiveTB.pdf> on 3/24/2009.
- 3 Centers for Disease Control and Prevention (CDC 2008c). *Recommendations for Human Immunodeficiency Screening in TB Clinics*. April 2008. Accessed at <http://www.cdc.gov/tb/pubs/tbfactsheets/HIVscreening.pdf> on 3/25/2009.
- 4 Jain, AK and Dhammi, IK (Jain 2007). "Tuberculosis of the Spine: A Review." *Clinical Orthopedics & Related Research*, Volume 460; p39-49.
- 5 Heartland National TB Center (HNTC 2008). *Tuberculosis Treatment Guidelines 2003; A Pocket Guide*. Revised December 31, 2007. Accessed at [http://www.heartlandntbc.org/products/tuberculosis\\_treatment\\_guidelines\\_2003.pdf](http://www.heartlandntbc.org/products/tuberculosis_treatment_guidelines_2003.pdf) on 3/25/2009.





# CASE STUDY #6

## ***Pediatric TB***

## Pediatric TB

A 15-year-old high school student presented to a specialty clinic with bronchitis, frequent cough, hemoptysis, weight loss, fatigue, and anemia. He had been symptomatic for about six months. Tuberculosis was suspected and a tuberculin skin test (TST) was placed and read at 25 mm induration. Sputum smears were positive with numerous Acid Fast Bacilli (AFB). His chest radiograph (CXR) showed extensive right upper lobe infiltrates and multiple cavitory lesions. When the pediatric pulmonologist initially saw this patient and suspected active TB, the 15 year old was accompanied by his mother and 5 month old brother. The infant appeared healthy with no signs and symptoms of TB. The pulmonologist immediately reported the 15 year old and infant brother to the local public health department.

### A. In regards to the infant brother, which is the most appropriate response by the local health department?

- 1) The infant is not symptomatic and in no immediate danger.
- 2) The infant may be infected with TB, but it is premature to react until the older brother is confirmed to actually have active TB.
- 3) The infant most probably has had household contact with an active TB case – this is an urgent public health matter and the infant should receive a PA and lateral CXR, physical exam, and TST as soon as possible.
- 4) The infant most probably has been exposed to active TB – schedule an appointment for a TST.

### B. Which statement is most accurate in regards to infants and children exposed to TB?

- 1) Infants and children are very prone to developing symptoms of active TB.
- 2) At least half of infants and children diagnosed with active TB are found in contact investigations and are not symptomatic at time of diagnosis.
- 3) Infants and children with active TB are very infectious because of increased upper respiratory secretions.
- 4) Infants and children are very resilient and do not typically develop severe forms of active TB.

The public health nurse visited the home of the teenager and infant and placed TSTs on all the household members including the infant. The nurse and the mother worked together to schedule a chest radiograph (PA and lateral views) and physical exam for the infant that same week. In 48 hours the nurse returned to the home and read all the TST's. Everyone in the household (mom, dad, 9 year old brother and 12 year old brother) was TST positive. The infant was TST negative.

### C. What should the nurse do at this point?

- 1) Cancel the chest radiograph appointment since the infant is TST negative and chest radiographs are traumatic for infants.
- 2) Keep the chest radiograph appointment since a negative TST in 5 month old infants does not rule out infection.
- 3) Postpone the chest radiograph appointment until the older brother is confirmed to have TB.
- 4) Review signs and symptoms of TB and only do a chest radiograph if the infant becomes symptomatic.

The public health nurse called the morning of the appointment for the infant's CXR and mom said she could not make the appointment because she had no gas in her car and could not afford the gas for the appointment. She was not concerned because the infant appeared to be fine.

**D. How should the nurse handle this situation?**

- 1) Agree with mom and instruct her to call if the infant should develop symptoms.
- 2) Agree with mom and say that you will check on the infant next week.
- 3) Hotline mom to Family Services for child endangerment.
- 4) Assist mom in either funds for gas or other transportation so she can make the appointment.

The chest radiograph was performed and the infant had a significant right middle lobe infiltrate and decreased breath sounds on the right. The pediatric pulmonologist performed a bronchoscopy and diagnosed endobronchial TB – a rare form of TB that affects the bronchials and often occludes bronchial tubes. The physician immediately prescribed treatment for active TB disease and directly observed therapy (DOT). The treatment was the standard 4-drug regimen – isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), and ethambutol (EMB) in pediatric doses with instructions to crush the pills and mix in applesauce. One of the other nurses at the health department said she had never heard of a 5 month-old receiving EMB because of the potential for the drug to cause diminished visual acuity.

**E. What should the health department do?**

- 1) Do not worry about it – the doctor is experienced in pediatric TB and knows what he/she is doing.
- 2) Assess the infant's visual acuity before treatment.
- 3) Check the CDC guidelines and the source case's drug susceptibility test results.

The health department administrator was concerned about how much time and effort it was taking to treat this family for Latent TB Infection (LTBI) and active TB disease, and the strain it was causing on the rest of the health department's programs. The mom had been responsible and obviously cared very much for the children and wanted them to get better. The administrator suggested that the mom could be trusted to do the DOT for the baby and the rest of the family.

**F. What is the best response?**

- 1) Agree with the administrator – the needs of this family must be balanced with the rest of the priorities at the health department.
- 2) Explain to the administrator that directly observed therapy is a priority for children and the health department is responsible for assuring that the infant and his older brother complete treatment.
- 3) Train mom to do DOT and provide a method for documentation – if there are any problems then return to using health department staff for DOT.
- 4) Suggest continuing DOT through the initial phase of treatment and then allow the mom to monitor therapy for the continuation phase of treatment.

## ANSWERS

**A. In regards to the infant brother, which is the most appropriate response by the local health department?**

- 3) The infant most probably has had household contact with an active TB case – this is an urgent public health matter and the infant should receive a CXR, physical exam, and TST as soon as possible.
- Age less than 5 years is one of the most important factors in prioritizing contacts. TB disease is more likely to disseminate in younger children, the incubation period is shorter, and disease tends to be more severe with higher mortality rates (e.g. TB meningitis).
  - The CXR should be ordered at the same time as a TST. A TST can be falsely negative in young children < 6 months old so both posterior-anterior (PA) and lateral CXRs are needed to exclude active disease before prescribing window period prophylaxis.
  - Although a negative TST does not rule out active disease, a positive TST can be seen in children just a few months old and should be ordered.

References:

- 1 - CDC 2005 Figures 2 and 5
- 2 - CDC 2003

**B. Which statement is most accurate in regards to infants and children exposed to TB?**

- 2) At least half of infants and children diagnosed with active TB are found in contact investigations and are not symptomatic at time of diagnosis.
- Children may appear asymptomatic, have abnormal chest radiographs, and progress very quickly to more fatal forms of TB (e.g. TB meningitis). Therefore, a contact less than 5 years old is not considered fully evaluated until they receive a PA and lateral CXR and physical exam, as well as a TST.

Reference:

- 1 - CDC 2005 Figure 5

**C. What should the nurse do at this point?**

- 2) Keep the chest radiograph appointment since a TST is not reliable in 5 month old infants.
- A chest radiograph and physical exam is needed to rule out active TB in this infant even if the TST induration is less than 5 mm in diameter.

Reference:

- 1 - CDC 2005 Figure 5

**D. How should the nurse handle this situation?**

- 4) Assist mom in either funds for gas or other transportation so she can make the appointment.
- Transportation is often a barrier to complying with TB appointments. Health departments should have some assistance available to enable their clients to comply with medical appointments and be willing to provide them as needed. Some health departments provide gas cards or vouchers for taxi or bus fares, and others will allow employees to transport clients.
  - CDC guidelines recommend that this child be seen within 5 days of being identified as a contact to an active TB case.

References:

- 3 - CDC 1999
- 1 - CDC 2005 page 9 Table 3

## ANSWERS (continued)

**E. What should the health department do?**

- 3) Check the CDC guidelines and the source case's drug susceptibility test results.
  - a. There are comprehensive guidelines for treating pediatric TB in the 2003 CDC Treatment statement. EMB was thought to be contraindicated in children due to concerns for diminished visual acuity. However, more recent recommendations indicate that 15 – 20 mg/kg/day can be safely used even in children too young for routine visual acuity testing.

References:

- 2 - CDC 2003
- 4 - UMDNJ 2007
- 5 - CNTC 2007

**F. What is the best response?**

- 2) Explain to your administrator that directly observed therapy (DOT) is a priority for children and the health department is responsible for assuring that the infant and his older brother complete treatment.
  - a. DOT is strongly emphasized for infants and children. DOT should be conducted by the health department staff and not be delegated to a parent. The health department staff may either administer the medications directly or observe a parent administering them, whatever is more acceptable for the child.

Reference:

- 3 - CDC 1999

## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for pediatric TB patients.

- 1 Centers for Disease Control and Prevention (CDC 2005). *Guidelines for the Investigation of Persons with Infectious TB*. MMWR: December 16, 2005; 54 (RR15); p1-55. Accessed at <http://www.cdc.gov/mmwr/pdf/rr/rr5415.pdf> on 3/24/2009.
  - Figure 2 on page 12 is an algorithm for the “Prioritization of contacts exposed to persons with Acid Fast Bacilli (AFB) sputum smear-positive or cavitory tuberculosis (TB) cases”
  - Figure 5 on page 15 is an algorithm for the “Evaluation, treatment, and follow-up of tuberculosis (TB) contacts aged <5 years”
  - Table 3 on page 9 indicates “Time frames for initial follow-up of contacts of persons exposed to tuberculosis (TB)”
- 2 Centers for Disease Control and Prevention (CDC 2003). *Treatment of Tuberculosis*. MMWR: June 20, 2003; 52 (RR11); p1-77. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr5211.pdf> on 3/14/2009.
  - Section 8.2, pages 55-56 provide an overview of treating TB in children and adolescents
- 3 Centers for Disease Control and Prevention (CDC 1999). *Self Study Modules on Tuberculosis, #9: Patient Adherence to Tuberculosis Treatment*. Accessed at <http://www.cdc.gov/tb/pubs/ssmodules/pdfs/9.pdf> on 3/25/2009.
  - Pages 54 – 60 describe the use of incentives and enablers to improve adherence
  - Pages 60 – 62 provide guidelines to promote adherence with adolescents and children
- 4 New Jersey Medical School Global Tuberculosis Institute (UMDNJ 2007). *Treatment of Tuberculosis: Standard Therapy for Active Disease in Children 2007*. A pocket sized guide. Accessed at <http://www.umdnj.edu/globaltb/downloads/products/pediatricdrugcard%20.pdf> on 3/25/2009.
- 5 Francis J. Curry National Tuberculosis Center (CNTC 2007). *Radiographic Manifestations of Tuberculosis: A Primer for Clinicians. Second Edition*. 2007. Accessed at <http://www.nationaltbcenter.edu/products/tbradiographic.cfm> on 3/24/2009.
  - Page 2-11 and Figure 2-8 describe tracheobronchial disease

CASE STUDY #7

***Mycobacterium bovis TB***

## ***Mycobacterium bovis* TB**

A 27-year-old Hispanic female was admitted to the hospital with a fever of 104°F, a two week history of abdominal swelling, decreased appetite, and body aches. She was anemic with a hemoglobin of 10.4 (normal for females is 12.1 to 15.1 g/dl); liver functions were within normal limits, an erythrocytic sedimentation rate (ESR) was 70 (normal  $\leq 20$ ) and a CA125 (ovarian cancer marker) was 438 (normal  $< 21$ ). A CT scan of the chest, abdomen and pelvis revealed large bilateral pleural effusions and multiple intrathoracic lymph nodes (pericardial, cardiophrenic angle, and para esophageal); the largest measuring 1.2 x 0.8 cm. Ascites, omental caking, and thickening of the mesenteric vessels were present in the abdomen. Multiple lymph nodes were also present (paraortic, aortocaval and iliac). Large bilateral ovarian masses with lobular contours were noted as well as concentric thickening of the distal sigmoid and proximal rectum. A tuberculin skin test (TST) was negative and three sputa were smear negative for Acid Fast Bacilli (AFB).

### **A. What evidence suggests that TB can be ruled out at this point?**

- 1) The CT scan is not consistent with the typical presentation for active TB.
- 2) This patient has ovarian cancer as evidenced by the elevated CA 125.
- 3) TST is negative and AFB smears are both negative.
- 4) TB cannot be ruled out at this point.

A diagnostic laparoscopy revealed approximately 1000cc of serosanguinous ascitic fluid. The abdominal and pelvic cavities were inflamed and there were areas in the pelvis consistent with phlegmon (purulent inflammation and infiltration of connective tissue). Bowel to bowel adhesions and shortening of the mesentery were present. The ovaries were not visualized due to the adhesions and the peritoneal inflammation. Frozen section of an abdominal lymph node revealed granulomatous inflammation.

The patient had had two abdominal surgeries during the previous year to address symptoms of abdominal pain. The initial surgery was a laparoscopic cholecystectomy. Six months later she presented with pain and pelvic fluid and underwent a laparoscopic appendectomy. Adhesions were present around the appendix and site of the prior gall bladder procedure. Cytology was negative for malignancy and granulomas were noted in the appendix.

Her family history revealed that her mother had had recurrent ovarian carcinoma and there was a distant family history of tuberculosis. She had visited Mexico frequently as a child but not recently.

### **B. What makes you suspect that this patient might have TB?**

- 1) Pathology reports of granulomas.
- 2) Family history of TB.
- 3) Travel history to Mexico.
- 4) All of the above.

The patient was identified as a TB suspect and started on treatment with isoniazid (INH), rifampin (RIF), pyrazinamide (PZA) and ethambutol (EMB). She was subsequently discharged home to directly observed therapy (DOT). Her fever improved over the initial weeks of therapy and the ascites resolved.



Two months later, the lab reported PZA resistance and identified her isolate as *Mycobacterium bovis* (*M. bovis* is intrinsically resistant to PZA and strongly suspected as a causative agent with mono-resistance to PZA). The PZA was discontinued but the other mycobacterial drugs were continued for the normal course of treatment.

**C. What are the public health implications for the nurse case manager of a patient with *M. bovis*?**

- 1) *M. bovis* is a nontuberculosis mycobacterium (NTM), so is not infectious and not a public health issue.
- 2) *M. bovis* is zoonotic and not prone to human to human transmission.
- 3) *M. bovis* infections result from consumption of unpasteurized cow's milk (e.g. fresh cheese from Mexico) or human-to-human airborne transmission.
- 4) *M. bovis* does not cause human disease so this must be a lab error.

Once the patient was discharged from the hospital, a home visit revealed the patient had been purchasing fresh cheese from a local grocer that imports authentic Mexican food. At the time of the visit, there was some leftover *Queso Fresco* in the refrigerator. Upon further interview with the patient, it was noted that she had made no recent trips to Mexico and had no other identifiable risk factors for *M. tuberculosis*.

**D. What should the person conducting the home visit do next?**

- 1) Obtain a sample of the cheese and test for *M. bovis*
- 2) Take a bite of the cheese to see if it tastes funny.
- 3) Throw out the cheese immediately and admonish the patient to only eat "American" food because Mexican food is unclean.
- 4) Assume patient is hiding something because of her culture.

The state laboratory identified *M. bovis* in the cheese sample obtained from the patient.

**E. At a meeting with the county health director what should be done?**

- 1) Contact the grocer to prevent further sale of *Queso Fresco*.
- 2) Conduct active surveillance for other cases of *M. bovis*.
- 3) Conduct health care provider education and public health education in the community in the appropriate language.
- 4) All of the above.

Active surveillance of hospital records revealed that a 7-year-old was admitted with abdominal pain and tenderness, weight loss, fever, and chronic diarrhea. The health department intervened immediately and conducted a case history of the patient that revealed a history of consumption of fresh cheese from the same grocer. Stool cultures were collected and were culture positive for *Mycobacterium bovis*. The new patient was treated for *M. bovis* infection. An option is to have the two *M. bovis* isolates genotyped to confirm that they are from the same source and to confirm the same transmission source.

**Discussion Questions:**

1. Does your available TB laboratory offer *Mycobacterium bovis* identification? Can it test food products for evidence of the organism? If not, where can you get the testing done? Where would you go to have isolates of *M. bovis* genotyped?
2. Does your TB program have an active surveillance protocol in place? What are the steps to follow and what groups do you work with?

# TOOLS

## CASE STUDY #7

# ***Mycobacterium bovis TB***

### CONTENTS:

- 1 *Active Surveillance from Program Operations Guidelines for STD Prevention, Surveillance and Data Management.* Division of STD Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Centers for Disease Control and Prevention. August 16, 2007.

## Active Surveillance

*Active surveillance* involves outreach by the public authority, such as regular telephone calls or visits to laboratories, hospitals, and providers to stimulate reporting of specific diseases. As it places intensive demands on resources, implementation of active surveillance should be limited to brief or sequential periods of time and for specific purposes. It is a reasonable method of surveillance for:

- conditions of particular importance - to document a suspected outbreak, or to augment timely disease intervention or epidemiologic investigation (e.g., for congenital syphilis in certain jurisdictions *AND suspected M. bovis infection due to contaminated food-added by Heartland*);
- episodic validation of representativeness of passive reports and as a departure point for enhancing completeness and timeliness of reporting (e.g., lab visitation programs to ensure all reactors reported);
- diseases targeted for elimination or eradication (e.g., *tuberculosis – added by Heartland*).

Operationally, active surveillance includes visits or telephone calls to such key reporting sources as clinicians or laboratories by public health authorities on a regular or episodic basis to elicit (or verify) case reports and/or reviewing medical records and other alternative sources to identify diagnoses that may not have been reported. It is generally employed when it is expected that more disease is in the community than is shown in the passive surveillance systems\*.

### Recommendation

- Tuberculosis prevention programs should develop active surveillance protocols to be initiated when there is a suspected outbreak of disease, when an evaluation of the surveillance system is occurring, or in other instances when active surveillance is appropriate (e.g., elimination and eradication campaigns).

From: *Program Operations Guidelines for STD Prevention, Surveillance and Data Management*. Division of STD Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Centers for Disease Control and Prevention. August 16, 2007. Accessed at <http://www.cdc.gov/STD/Program/surveillance/4-PGsurveillance.htm> on 4/30/2009. Note: *M. bovis* and tuberculosis examples added by Heartland National TB Center.

\* Passive surveillance is the most common form of surveillance and relies on standardized reporting forms or cards provided by or available through the state or local health departments. These completed forms are returned to the health department when cases of disease are detected. The term passive is used to convey the idea that health authorities take no action while waiting for report forms to be submitted. Passive reporting systems are generally less costly than other reporting systems, data collection is not burdensome to health officials, and the data may be used to identify trends or outbreaks if providers and laboratories report. Limitations include non-reporting or under-reporting, which can affect representativeness of the data and thus lead to undetected trends and undetected outbreaks.

## ANSWERS

**A. What evidence suggests that TB can be ruled out at this point?**

- 4) TB cannot be ruled out at this point.
- A tuberculin skin test (TST) may be done at the time of initial evaluation, but a negative TST does not exclude the diagnosis of active tuberculosis.

References:

- 1 - Friedman 1994

**B. What makes you suspect that this patient might have TB?**

- 4) All of the above
- All of the above are risk factors for TB. The “hallmark” of TB in pathology reports is the presence of granuloma. Granulomas are basically an accumulation of macrophages and T-lymphocytes.

References:

- 1 - Friedman 1994

**C. What are the public health implications for the nurse case manager of a patient with *M. bovis*?**

- 3) *M. bovis* infections result from consumption of unpasteurized cow’s milk (e.g. fresh cheese from Mexico), human-to-human airborne transmission, or infected cow-to-human transmission.
- Tuberculosis (*M. bovis*) can infect the GI tract after ingested organisms penetrate normal mucosa.
  - M. bovis* infections typically result from ingestion of *M. bovis* infected milk products.
  - 20-30% of patients with intestinal TB have concurrent active pulmonary disease.
  - Human-to-human transmission has been documented in patients with pulmonary *M. bovis*.
  - If a cow has *M. bovis* lesions in its lungs, these can be aerosolized and spread via the air to humans having close contact with the animals, such as dairy workers.

References:

- 2 - Evans 2007
- 3 - EDCP 2005a
- 4 - EDCP 2005b
- 5 - EDCP 2005c
- 6 - NZMH 2001

**D. What should the person conducting the home visit do next?**

- 1) Obtain a sample of the cheese and test for *M. bovis*.
- It is possible to test cheese for *M. bovis* at most state TB laboratories; it may be done in the food testing branch or the regular mycobacterial section. You may need this confirmation to take appropriate public health action.

References:

- 7 - Harris 2007

ANSWERS (continued)

**E. At a meeting with the county health director what should be done?**

- 4) All of the above.
- a. These are all important public health actions. In particular, raising the index of suspicion among local health care providers may help reduce delays in diagnosis.
  - b. Also consider the importance of media (TV, radio, newspapers, local Spanish language publications) to help get the information out to the public.
  - c. This may also be an appropriate posting on EPI-X (Epidemic Information Exchange). Check with your state TB program.

References:

- 5 - EDCP 2005c
- 8 - CDC 2007
- 9 - CDC 2009

## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal care for patient's infected with *Mycobacterium bovis*.

- 1 Friedman, Lloyd (1994). Tuberculosis Current Concepts and Treatment. CRC Press, Boca Raton, Florida; copyright 1994, p. 28.
- 2 Evans, JT, EG Smith, et al. (2007). *Cluster of human tuberculosis caused by Mycobacterium bovis: evidence for person-to-person transmission in the UK*. Lancet; Volume 369 (9569); p.1270-6.
- 3 Maryland Department of Health and Mental Hygiene, Office of Epidemiology and Disease Control Programs (EDCP 2005a). *Bovine Tuberculosis from Consuming Unpasteurized (Raw Milk) Products (Bovine TB): M. bovis Tuberculosis - Patient Information*. November 2005. Accessed at [http://www.edcp.org/tb/pdf/Bovine\\_Patientfactsheet.pdf](http://www.edcp.org/tb/pdf/Bovine_Patientfactsheet.pdf) on 3/19/09. Also available in Spanish at [http://www.edcp.org/tb/pdf/BovinePatientfactsheet\\_SPL.pdf](http://www.edcp.org/tb/pdf/BovinePatientfactsheet_SPL.pdf)
- 4 Maryland Department of Health and Mental Hygiene, Office of Epidemiology and Disease Control Programs (EDCP 2005b). *Don't get sick from eating or drinking raw (unpasteurized) milk, cheese or milk products...Important news about bovine TB (bovine tuberculosis)*. Patient Education Handout. November 2005. Accessed at <http://www.edcp.org/tb/pdf/BovineTB106WIC.pdf> on 3/19/09. Also available in Spanish at <http://www.edcp.org/tb/pdf/BovineTBSpanishWIC.pdf>
- 5 Maryland Department of Health and Mental Hygiene, Office of Epidemiology and Disease Control Programs (EDCP 2005c). *Maryland DHMH Advisory: Mycobacterium bovis (M. bovis) tuberculosis in Maryland - Healthcare Provider Information*. December 2005. Accessed at [http://www.edcp.org/tb/pdf/Bovine\\_Providersfactsheet\\_5.pdf](http://www.edcp.org/tb/pdf/Bovine_Providersfactsheet_5.pdf) on 3/19/09.
- 6 New Zealand Ministry of Health (NZMH 2001). *Mycobacterium bovis Data Sheet*. May 2001. Accessed at <http://www.nzfsa.govt.nz/science/data-sheets/mycobacterium-bovis.pdf> on 3/30/2009.
- 7 Harris, NB, et al. (2007). *Recovery of Mycobacterium bovis from Soft Fresh Cheese Originating in Mexico*. Applied Environmental Microbiology; Volume 73 (3); p.1-25-1028.
- 8 Centers for Disease Control and Prevention (CDC 2007). *Program Operations Guidelines for STD Prevention, Surveillance and Data Management*. Centers for Disease control and Prevention, Division of STD Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. August 16, 2007. Accessed at <http://www.cdc.gov/STD/Program/surveillance/4-PGsurveillance.htm> on 4/30/2009.
- 9 Centers for Disease Control and Prevention (CDC 2009). *Learn More About Epi-X*. Accessed at <http://www.cdc.gov/epix/#1> on 4/30/2009.





CASE STUDY #8

***TB  
and  
Tumor Necrosis Factor-alpha Treatment***



## TB and Tumor Necrosis Factor-alpha Treatment

A 55-year-old female emigrated from El Salvador to Texas in the mid 1980's. She was employed by a poultry processing plant in Texas for 15 years. She was diagnosed with rheumatoid arthritis and prescribed prednisone 20 mgs twice daily, methotrexate and Humira [adalimumab-a tumor necrosis factor alpha (TNF- $\alpha$ ) antagonist agent].

### A. Should she receive any evaluation for TB before starting these medications?

- 1) No, the dose of prednisone is not high enough to be a concern.
- 2) No, if she has Latent Tuberculosis Infection (LTBI) it is probably from an infection many years ago and is no longer a concern.
- 3) Yes, she should receive a single-step tuberculosis skin test (TST) and medical evaluation for TB.
- 4) Yes, she should undergo two-step TST testing and medical evaluation for TB.

This patient did not undergo any TB evaluation prior to starting TNF- $\alpha$  antagonist treatment. Six months later she was evaluated for gastrointestinal upset, cough, shortness of breath, fatigue, chills, headaches, persistent fever, and a 16 pound weight loss. No diagnosis was made. The patient stopped her Humira and left the state to visit family in Virginia. Two months later in Virginia she was hospitalized with generalized weakness, cough, and shortness of breath. A TST was negative.

### B. Can TB be ruled out by the negative TST?

- 1) No, the TST may not be reactive due to immune suppression related to drug treatment and active TB disease.
- 2) No, Bacillus Calmette-Guérin (BCG) has protected the patient from TB and caused a false negative TST.
- 3) Yes, since the immune suppressive treatment stopped two months ago, there should be no lingering effect on the TST.
- 4) Yes, there is probably some other infectious process going on.

### C. What should be the next step?

- 1) Restart TNF- $\alpha$  antagonist treatment; the abrupt stop in treatment probably caused the symptoms.
- 2) Do not restart TNF- $\alpha$  antagonist treatment until TB has been ruled out. Admit patient to an Airborne Infection Isolation Room (AIIR) and obtain specimens for Mycobacteriology testing.
- 3) Discharge patient with contact information for the local health department.
- 4) Send her back to Texas.

A chest radiograph and CT scan revealed interstitial infiltrates throughout both lungs primarily affecting the upper lobes. An ultrasound-guided lung biopsy revealed a positive Acid Fast Bacilli (AFB) smear and the culture grew *Mycobacterium tuberculosis*. She was placed on isoniazid (INH), rifampin (RIF), ethambutol (EMB), pyrazinamide (PZA), and azithromycin. She was reported to the local health department in Virginia. The nurse in the Virginia local health department started management of the case.

**D. What are the appropriate actions for the nurse to take with this case?**

- 1) Immediately make direct contact with the patient's close contacts in Texas.
- 2) Contact the Texas Department of State Health Services through the Virginia State Health Department to report the case.
- 3) Maintain patient confidentiality and do not let anyone know this patient has TB.
- 4) Ask the patient's permission to contact the Texas Department of State Health Services.

The patient successfully completed 6 months TB treatment under directly observed therapy (DOT) by the nurse at the local health department in Virginia. Upon completion, the nurse completed the Interjurisdictional Follow-up Form with complete follow-up and treatment details and sent it to the Texas Department of State Health Services, TB Control Program.

**Discussion Questions:**

1. What are your department/agency's procedures to communicate TB cases to other jurisdictions (in state, across states, out of the country)?
2. Does your department/agency have a protocol for managing TB patients on TNF- $\alpha$  antagonist treatment? Do you have patient and provider educational materials on this topic?

# TOOLS

## CASE STUDY #8

# ***TB and Tumor Necrosis Factor-alpha Treatment***

### CONTENTS:

- 1 Heartland National TB Center (HNTC 2009). *Guidelines: Tuberculosis and Tumor Necrosis Factor Alpha (TNF- $\alpha$ ) Antagonists, March 2009 (DRAFT).*
- 2 National TB Controllers Association (NTCA 2002a). Interjurisdictional TB Notification Form. March 2002.
- 3 National TB Controllers Association (NTCA 2002b). Interjurisdictional TB Notification Follow-up Form. May 2002.

## TUMOR NECROSIS FACTOR-ALPHA (TNF-ALPHA) ANTAGONISTS AND THE INCREASED RISK OF TUBERCULOSIS

### What is tumor necrosis factor-alpha (TNF-alpha)?

- A potent cytokine that is an important mediator of the body's response to infection
- Promotes inflammation and tissue destruction in rheumatic/immune mediated diseases.
- Plays a central role in the initial host response to infection and granuloma formation.

### What are TNF-alpha antagonists?

- Medications that work to oppose the tissue's destructive effects of TNF-alpha
- They are used to treat diseases such as rheumatoid arthritis, Crohn's disease, psoriatic arthritis, juvenile rheumatoid arthritis and ankylosing spondylitis.
- TNF-alpha antagonists often provide an impressive improvement (in treated diseases).

### Which TNF-alpha antagonists are used in the U.S.?

DRUG	INDICATIONS
Infliximab (Remicad)	Rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, Crohn's Disease, ulcerative colitis
Adalimumab (Humira)	Rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, Crohn's Disease
Certolizumab (Cimzia)	Rheumatoid arthritis, Crohn's Disease
Etanercept (Enbrel)	Rheumatoid arthritis, psoriatic arthritis, psoriasis, sarcoidosis
Certolizumab (Cimzia)	Rheumatoid arthritis, Crohn's Disease
Golimumab (Simponi)	Rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis

### Why do they increase the risk of TB?

- Granuloma formation is crucial to the host's ability to contain and control TB infection.
- In tuberculosis, these drugs inhibit macrophage activation, recruitment of inflammatory cells, granuloma formation, and maintenance of the granuloma integrity.
  - Antibodies against TNF-alpha cause increased susceptibility to *M. tuberculosis* in mouse models. Patients treated with TNF-alpha antagonists have an increased risk of tuberculosis.



### What can be done to decrease the risk of TB when using these agents?

- Carefully screen all candidates prior to prescribing TNF-alpha antagonists
  - Identify risk factors for TB exposure
  - Screen for evidence of LTBI, and exclude active TB
- Educate patients about the risk of opportunistic infections, especially TB
- Instruct patients to report symptoms of an infectious disease:
  - Fever, malaise, cough, local or generalized pain
- Consult a physician knowledgeable about the risk of infections in patients receiving these and other immunosuppression regimens
- Be aware the onset of TB may be subtle, but disease can escalate and disseminate quickly.
- A routine chest radiograph may appear normal; miliary infiltrates may only be visible on chest C.T.

### What does CDC recommend before starting?



## TUMOR NECROSIS FACTOR-ALPHA (TNF-ALPHA) ANTAGONISTS AND THE INCREASED RISK OF TUBERCULOSIS

### What additional recommendations are there?

- An interferon gamma release assay (IGRA) QuantiFERON-Gold In-tube or the TSPot TB can be used to screen perspective TNF-alpha antagonist recipients
- See *MMWR* 2010; 59 (RR-5): 1-25 for guidelines
- Two step TST testing at baseline has not been specifically recommended by CDC; although recent case reports and post-licensure surveillance in Spain note improved accuracy (Gomez-Reino (2007) Arthritis and Rheumatism 57(5):576-761)
- Repeat testing periodically for TB infection even if TST or IGRA is initially negative
- Starting TNF-alpha antagonist therapy may improve immune response
- Some patients may acquire tuberculosis infection after TNF-alpha therapy is initiated (Fuchs, Clin Rheum 2008)

### When can TNF-alpha antagonists be started after a diagnosis of latent TB infection?

- Treatment for L TBi (e.g. Isoniazid for nine months) should start **BEFORE** TNF- alpha antagonist treatment is initiated.
- CDC recommends considering postponing TNF-alpha antagonist treatment until completion of L TBi treatment (*MMWR* 2004; 53 (RR-30))
- More recent publications suggest delaying TNF-alpha antagonist treatment until one month after the start of L TBi treatment (Furst, Annals of the Rheumatic Diseases, 66 (Suppl 3): ii2-22)

### What if a patient who is on one of these agents develops signs or symptoms of an infectious disease?

- Evaluate thoroughly for both routine and opportunistic infectious disease processes
- If a plain radiograph is normal in a patient with cough, shortness of breath or unexplained fever, a chest CT should be strongly considered
- Collect sputum for mycobacterial smear and culture as well as for other opportunistic pathogens including fungi
- Stop the TNF-alpha antagonist therapy until a diagnosis is made
- Most TB experts prefer that TB be treated until it is under control, cultures are negative, and patients are tolerating their TB medicines prior to reintroducing the TNF-alpha antagonist

### What is the typical course of TB in patients taking these agents?

- TB progresses rapidly in TNF-alpha antagonist recipients
- Median duration of onset was 12 weeks after initiating TNF-alpha antagonist treatment in the initial 57 patients reported
- TB is much more likely to be extrapulmonary and disseminated
- In the initial 70 reports to the FDA Adverse Reporting System, 56% of the TB cases were extrapulmonary and 24% were disseminated disease (Keane, NEJM 345 (15) 1098)
- For patients not receiving TNF-alpha antagonists extrapulmonary is reported in only 15-20% and disseminated in 1-2% of TB cases reported annually (CDC Surveillance Reports 2009)
- TB is more likely to result in death.
- 12/17 patients (70%) died (Keane)
- ~5% of TB cases reportedly annually are diagnosed at death or died during treatment (CDC Surveillance Reports 2009)

### Are there concerns other than the risk of TB?

- Yes, other opportunistic infections have also been reported including viral, bacterial, fungal and protozoal infection
- The increased risk of fungal infections seems to be of extra concern
- Immune Reconstitution Inflammatory Syndrome (IRIS) reactions may occur with improvement in immune function when the TNF-alpha antagonist is stopped and TB therapy started
- IRIS reactions may be especially severe
- IRIS reaction may improve with reinstitution of the TNF-alpha antagonist (Wallis, CID 2009, 48:1429), steroid, or anti-inflammatory agents

### How should patients taking these agents be monitored?

- All TNF-alpha antagonist recipients should be monitored carefully for any signs or symptoms of infectious disease.
- Pursue TB diagnosis as the potential cause of any febrile or respiratory illness (CDC 2005).

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### Interjurisdictional TB Notification Follow-up

- 30-day status:  located  
 Interim  not located  
 Final

Date Notification Received \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

**Return follow-up form to:**

Name \_\_\_\_\_ Fax number \_\_\_\_\_  
 Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_  
 Jurisdiction \_\_\_\_\_ Phone number \_\_\_\_\_

Patient name \_\_\_\_\_ Date of birth \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
Last First M.I.

Sex  Male  Female

**Case:** Indicate reason therapy stopped and outcome date \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Send F/U2 to reporting jurisdiction RVCT# \_\_\_\_\_

Completed

Moved to: address \_\_\_\_\_  
 city \_\_\_\_\_ county \_\_\_\_\_ state \_\_\_\_\_  
 Telephone ( ) \_\_\_\_\_

- Lost (after initially located)  Never located  Uncooperative or refused  
 Not TB  Died  Other: \_\_\_\_\_

**Suspect/Source Case Finding:**

- Verified\* by lab  Verified\* by clinical definition  
 Verified\* by provider diagnosis  Not verified  
 Other: \_\_\_\_\_

\*If verified, and referring jurisdiction will submit the RVCT, complete Case outcome above

**Contact (send local contact form, if follow-up performed):**

- No follow-up performed  Never located  
 Evaluated:  Class II  Class III  Class IV  No infection  
 Started treatment  Continuing treatment  
 Completed treatment  Other: \_\_\_\_\_

**LTBI/Convertors:**

- No follow-up performed  Never located  Started treatment  
 Continuing treatment  Completed treatment  Other: \_\_\_\_\_

Comments: \_\_\_\_\_

Person completing form \_\_\_\_\_ Date completed \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

## ANSWERS

**A. Should she receive any evaluation for TB before starting these medications?**

- 4) Yes, she should undergo two-step TST testing (or an Interferon Gamma Release Assay {IGRA}) and medical evaluation for TB.
- Individuals who are being treated with TNF- $\alpha$  antagonist agents for illnesses such as Crohn's disease, rheumatoid arthritis, and psoriasis have a significantly increased risk for progression to active TB if they are infected at time of treatment. These patients also exhibit significantly higher mortality from TB disease.
  - Two-step testing would be indicated here, as a single test only identifies more recent infection with TB, while a two-step test would assess for remote infection. Since she immigrated 15 years ago, two-step testing would certainly be indicated to ensure an accurate baseline. See Tool #1, HNTC TNF Antagonist and Patient TB Assessment.
  - Use of the new Interferon Gamma Release assays (QuantiFERON-TB Gold test [QFT-G] or T-SPOT.TB test [T-Spot]) as a replacement for a two-step TST is an acceptable method to test for TB infection. These tests may be used to identify persons likely to benefit from treatment, including persons who are at increased risk for progression to active tuberculosis if infected such as persons who are receiving TNF- $\alpha$  antagonist agents.

References:

- 1 - CDC 2004
- 2 - HNTC 2009
- 6 - CDC 2010  
-Box 2 page 3 and Page 10

**B. Can TB be ruled out by the negative TST?**

- 1) No, the TST may not be reactive due to immune suppression related to drug treatment and active TB disease.
- The immune suppressive effects of TNF- $\alpha$  antagonist treatment last for 2 - 8 weeks following discontinuation of therapy. Also, patients with active TB disease may be TST negative 20 % of the time.
  - A TST may not be helpful in diagnosis of LTBI or disease in patients on >10-15 mgs of prednisone per day or on other immunosuppressive drugs. CDC has recommended that a TST of 5 mm should be considered positive in anyone with rheumatoid arthritis, as rheumatoid arthritis is associated with decreased responsiveness to a TST.

References:

- 2 - HNTC 2009

## ANSWERS continued

**C. What should be the next step?**

- 1) Do not restart TNF- $\alpha$  antagonist treatment until TB has been ruled out. Admit patient to an Airborne Infection Isolation Room (AIIR) and obtain specimens for Mycobacteriology testing.
  - a. If active TB disease develops during TNF- $\alpha$  antagonist therapy, the TNF- $\alpha$  antagonist should be discontinued, at least until the antituberculous regimen has been started and the patient's condition has improved. The optimal time for resuming TNF- $\alpha$  antagonist therapy is undetermined.
  - b. A complete evaluation for TB should include: physical exam, onset and duration of symptoms, TST, bacteriology, and CXR.

References:

- 2 - HNTC 2009
- 3 - Furst 2007

**D. What are the appropriate actions for the nurse to take with this case?**

- 2) Contact the Texas Department of State Health Services through the Virginia State Health Department to report this case.
  - a. Interstate communication is essential to coordinate the investigation surrounding this case, particularly in the event it may involve a worksite such as a poultry plant. As tuberculosis is a reportable public health condition, you do not need to have the patient provide permission to share information.

References:

- 4 - NTCA 2002a
- 5 - NTCA 2002b

## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for TB patients who are also taking TNF- alpha antagonists.

- 1 Centers for Disease Control and Prevention (CDC 2004). *Tuberculosis Associated with Blocking Agents Against Tumor Necrosis Factor-Alpha --- California, 2002—2003*. MMWR: August 5, 2004; 53 (RR30); p683-686. Accessed at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5330a4.htm> on 3/31/2009.
- 2 Heartland National TB Center (HNTC 2009). *Guidelines: Tuberculosis and Tumor Necrosis Factor Alpha (TNF- $\alpha$ ) Antagonists, March 2009 (DRAFT)*.
- 3 Furst, DE, FC Breedveld, et al. (2007). *Consensus Statement: Updated consensus statement on biological agents for the treatment of rheumatic diseases, 2007*. Annals of the Rheumatic Diseases 2007; Volume 66, Supplement 3; pii2-22.
- 4 National TB Controllers Association (NTCA 2002a). Interjurisdictional TB Notification Form. March 2002. Accessed at [http://tbcontrollers.org/docs/IJ\\_Form\\_Page1.pdf](http://tbcontrollers.org/docs/IJ_Form_Page1.pdf) on 3/31/09.
- 5 National TB Controllers Association (NTCA 2002b). Interjurisdictional TB Notification Follow-up Form. May 2002. Accessed at [http://tbcontrollers.org/docs/IJ\\_Form\\_Page2\\_Followup.pdf](http://tbcontrollers.org/docs/IJ_Form_Page2_Followup.pdf) on 3/31/09.
- 6 Centers for Disease Control and Prevention (CDC 2010). *Updated Guidelines for Using Interferon Gamma Release Assays to Detect Mycobacterium tuberculosis Infection — United States, 2010*. MMWR: 2010; 59 (RR-5); 1-25. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr5905.pdf> on December 17, 2010.

## CASE STUDY #9

# ***Positive Tuberculin Skin Test (TST) in a Pregnant Woman***

## Positive Tuberculin Skin Test (TST) in a Pregnant Woman

A 25-year-old woman, 22 weeks pregnant with her second child, was referred from a prenatal clinic to the local public health department with a 40 mm induration from a tuberculin skin test (TST). Routine prenatal screening tests showed she was Hepatitis B surface antigen (HepBsAg) positive and Hepatitis C antibody negative. The patient stated that her last TST, done 3 years ago when she was pregnant with her first child, was negative. She was otherwise healthy and lived with her child in an apartment.

The patient had emigrated from China 4 years previously and did not know if she had received the Bacilli Calmette-Guerin (BCG) vaccine as a child, although an examination revealed a scar on her right arm consistent with BCG vaccination.

### **A. At the first appointment at the health department, what should be done?**

- 1) Do nothing, because patient has evidence of prior BCG vaccination.
- 2) Inquire about signs and symptoms of TB.
- 3) Order a chest radiograph (CXR), but delay until after delivery.
- 4) Discourage further evaluation for Latent TB Infection (LTBI) or TB because of pregnancy.

The patient underwent a CXR with abdominal shielding. The report indicated a solitary, calcified granuloma in the right upper lobe; she declined HIV testing.

### **B. Of the following actions, what should NOT be done?**

- 1) Review with her the difference between LTBI and TB disease.
- 2) Give the patient prescriptions for one month each of isoniazid (INH) and vitamin B6.
- 3) Counsel patient regarding signs and symptoms of TB disease.
- 4) Instruct patient to schedule an appointment for three months postpartum for further evaluation for treatment of LTBI. (There is a greater risk of INH-induced hepatotoxicity during the first 3 months postpartum.)

The patient did not keep her postpartum appointment. The health department called the patient, asked about signs and symptoms of TB during the call, and rescheduled her appointment. The patient finally returned to the clinic for treatment of LTBI three months after her first missed appointment. She was breastfeeding her newborn at that time and again declined HIV testing.

### **C. Which of the following actions would NOT be appropriate?**

- 1) Inquire about signs and symptoms of TB disease.
- 2) Order liver function tests (LFTs), order a new CXR since it has been more than 6 months since her last one, and begin INH treatment.
- 3) Defer treatment of LTBI until breastfeeding is completed.
- 4) Schedule a return visit appointment for one month. The patient started on INH treatment for LTBI.

Her monthly LFTs remained within normal limits (LFTs drawn monthly due to increased risk of hepatotoxicity because she is HepBsAg positive and post-partum). She was adherent with therapy for eight months.

**D. What should be done at the next clinic visit?**

- 1) Discharge the patient from your clinic, she is close enough to being done with treatment.
- 2) Revisit your recommendation for HIV counseling and testing.
- 3) Inform the patient she should be followed with annual chest X-rays.
- 4) Inform the patient that she should not have any more children because her LTBI is too risky.

ANSWERS

**A. At the first appointment at the health department, what should be done?**

- 2) Inquire about signs and symptoms of TB.
  - a. It is important to do a careful assessment and rule out any possibility of active TB.
  - b. TB experts recommend ignoring a history of BCG vaccination when interpreting a TST reaction and in deciding on treatment for Latent TB Infection (LTBI).

Reference:

- 1 - CDC 2000

**B. Of the following actions, what should NOT be done?**

- 2) Give the patient prescriptions for one month each of isoniazid (INH) and vitamin B6.
  - a. Because the patient is not a documented TST converter within the past 2 years, has had no recent exposure to TB, and no documented HIV infection, treatment of LTBI should be deferred until after the immediate postpartum period (3 – 4 months).

References:

- 2 - CPFNTC 2005
- 3 - HNTC 2007

**C. Which of the following actions would NOT be appropriate?**

- 3) Defer treatment of LTBI until breastfeeding is completed.
  - a. Further delay in treatment of her LTBI may result in a missed opportunity to treat. There are no data to suggest adverse effects in babies who are breastfed by mothers taking INH.
  - b. INH-induced hepatotoxicity is a greater risk in the 3 months postpartum.

Reference:

- 1 - CDC 2000 pages 34-35

**D. What should be done at the next clinic visit?**

- 2) Revisit your recommendation for HIV counseling and testing.
  - a. It is appropriate to offer HIV testing again, as it was refused previously.

Reference:

- 4 - CDC 2008



## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for pregnant woman who have Latent Tuberculosis Infection (LTBI).

- 1 Centers for Disease Control and Prevention (CDC 2000). *Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection*. June 9, 2000. MMWR: 49 (RR 6); p1-51. Accessed at <http://www.cdc.gov/MMWR/PDF/rr/rr4906.pdf> on 3/26/2009.
  - Pages 34–35 have specific information on LTBI in pregnancy.
- 2 Charles P. Felton National Tuberculosis Center (CPFNTC 2005). *Treatment of LTBI in Pregnancy and Postpartum*. January 2005. Accessed at [http://www.harlemtbcenter.org/Assets/web\\_docs/LTBI%20Pregnancy%20wall%20chart%202005.pdf](http://www.harlemtbcenter.org/Assets/web_docs/LTBI%20Pregnancy%20wall%20chart%202005.pdf) on 3/27/2009. Fact Sheet.
- 3 Heartland National TB Center (HNTC 2007). *Evaluation of Pregnant Patient at Risk for TB*. December 31, 2007. Accessed at [http://www.heartlandntbc.org/products/evaluation\\_of\\_pregnant\\_patient\\_at\\_risk\\_for\\_tb.pdf](http://www.heartlandntbc.org/products/evaluation_of_pregnant_patient_at_risk_for_tb.pdf) on 3/27/2009. Algorithm sheet.
- 4 Centers for Disease Control and Prevention (CDC 2008). *Recommendations for Human Immunodeficiency Screening in TB Clinics*. April 2008. Accessed at <http://www.cdc.gov/tb/pubs/tbfactsheets/HIVscreening.pdf> on 3/25/2009. Fact Sheet.



CASE STUDY #10

***Positive Tuberculin Skin Test  
in a Foreign Born Male***

## Positive Tuberculin Skin Test in a Foreign Born Male

A 29-year-old man with a positive tuberculin skin test (TST) is referred to the local health department from the local hospital Emergency Department (ED) because of concern about possible “active TB.” Five days earlier he had presented to the ED complaining of “stomach pain for one day” without fever or chills. The patient admitted to consumption of up to fifth of a bottle of rum and smoking one pack of cigarettes daily for the past ten years. He stated that he “has TB” and takes no medication, but further questioning clarified that he meant his TST was positive. In the ED, the chest radiograph (CXR), physical examination, and complete blood count were normal. The patient expressed a desire to be admitted to an alcohol detoxification unit, was given an antacid, and referred to the local health department.

In the clinic, the patient reported that his TST was positive last year during a pre-employment screening for work in the Environmental Services Department of a local hospital. He described a severe reaction with blistering. He was prescribed isoniazid (INH), but took it for only a few days because he felt it made him “sick” when he was drinking alcohol.

**Patient History:** the patient was born in South Africa and immigrated to the US two years ago. He was single, with four children living back in South Africa. The patient’s father was treated for pulmonary TB in South Africa in 1981. He was unable to provide any information as to the type of treatment his father received. He had no other known contacts with TB. He reported no prior TST results. He had no significant medical history. He reported testing negative for human immunodeficiency virus (HIV) infection two years ago. He was not taking any medications routinely.

**Physical Examination:** The patient was of normal weight and height. He was afebrile and his blood pressure was 110/70 mm Hg. No adenopathy was noted. He had clear breath sounds with no abnormal chest findings. Cardiac S1 S2 sounds were normal. A scar was noted on the left forearm from the previously mentioned TST and another on the right upper arm likely from a prior Bacilli Calmette-Guerin vaccination.

### A. What should be the next course of action?

- 1) Inquire further about TB history, perform physical examination, and review CXR film obtained in the ED.
- 2) Explain to the patient the need to draw blood for liver function tests (LFTs), hepatitis serology, and also encourage the patient to undergo HIV testing.
- 3) Set up a referral to an alcohol treatment program.
- 4) All of the above.

The patient returned after two weeks. The CXR taken in the ED was reviewed and was normal. The medical examination revealed no evidence of extrapulmonary TB. He declined HIV and hepatitis serology testing. Baseline laboratory results were:

- Alkaline Phosphatase was 89 IU/L (normal 39 – 117 IU/L)
- Total Bilirubin was 0.4 mg/dL (normal 0.0 – 1.5 mg/dL)
- AST (SGOT) was 21 units/L (normal 0 – 37 units/L)

- ALT (SGPT) was 10 units/L (normal 0 – 40 units/L)
- Total Protein was 6.9 g/dL (normal 6.5 – 8.0 g/dL)
- Albumin was 4.5 g/dL (normal 3.9 – 4.8 g/dL)

**B. Given this information, what should be done next?**

- 1) Advise against Latent TB Infection (LTBI) treatment; it is too risky given his history of alcohol consumption.
- 2) Refer for directly observed therapy (DOT) of isoniazid (INH) 900 mg and 50 mg vitamin B6 twice-weekly for a planned 9-month course.
- 3) Give patient prescription for daily INH (300 mg) for two months with an 8-week follow-up appointment.
- 4) Discuss relevant barriers to completing treatment, noting that if he even has one drink of alcohol, he could die.

Due to budget constraints and staff shortage at the health department, the patient was allowed to self-administer his TB medication. The patient returned to the clinic after 4 weeks for his regularly scheduled visit and to pick up his next month's supply. He reported he had been taking his medications as instructed.

**C. What should be done at this clinic visit?**

- 1) Ask about signs and symptoms of hepatotoxicity (i.e. evidence of loss of appetite, nausea, vomiting, fatigue, pruritis, persistent abdominal discomfort, dark urine, or tingling in the extremities, and examine the patient's sclera for evidence of jaundice and the abdomen for tenderness) and draw blood for liver function tests (LFTs).
- 2) Rely on the patient's symptom review and as long as that is negative, do not order LFTs.
- 3) Instruct patient that as long as he is asymptomatic, he can wait to return in 3 months for a follow-up visit.
- 4) Discontinue INH treatment for LTBI.

Results of the LFTs drawn at that first monthly follow-up visit at the health department:

- AST (SGOT) - 250 units/L (normal 0 – 37 units/L)
- ALT (SGPT) - 200 units/L (normal 0 – 40 units/L)

**D. Based on these results, what should the health department do?**

- 1) Call patient and instruct him to stop INH immediately and schedule an appointment as soon as possible.
- 2) Call patient to discuss results.
- 3) Do nothing; file results in chart.
- 4) The elevated liver enzymes indicate that he has likely been drinking, call patient immediately to reinforce importance of ceasing all alcohol use during treatment.

The patient denied any symptoms of hepatotoxicity but admitted to alcohol abuse in the past few weeks. He agreed to stop drinking and understood the importance of stopping INH treatment at least until his liver enzymes return to normal. He stated he will resume substance abuse treatment and hoped to be able to resume INH treatment.

After several weeks of successful substance abuse treatment, LFTs were repeated and the results were:

- AST (SGOT) - 32 units/L (normal 0 – 37 units/L)
- ALT (SGPT) - 15 units/L (normal 0 – 40 units/L)

**E. At this point, this patient should be counseled to do what?**

- 1) Resume INH treatment with careful monitoring of LFTs and symptoms.
- 2) Never take INH again as he is allergic to it.
- 3) Never take INH again as the risk of developing TB disease does not outweigh the risk of hepatotoxicity.
- 4) Resume INH treatment and provide him a three month supply.

There were no other problems during treatment. After 9 months, the patient returned to the clinic having completed a 9-month course of treatment for LTBI.

**F. During the last visit, you should be sure to do all but which of the following?**

- 1) Educate patient regarding signs and symptoms of active TB and counsel him to see a health care provider for evaluation should he experience them.
- 2) Inform patient of the recommendation to have an annual CXR.
- 3) Provide patient with documentation of his completion of treatment for LTBI.
- 4) Counsel patient he should not receive anymore TSTs in the future.

## ANSWERS

**A. What should be the next course of action?**

- 4) All of the above.
- A CXR excludes active pulmonary TB. A targeted physical examination identifies any evidence of extrapulmonary TB.
  - Baseline LFT results and hepatitis serology are essential in assessing the risks of initiating treatment for LTBI and the frequency of subsequent monitoring if placed on treatment.
  - Co-infection with HIV significantly increases the risk of a person with LTBI progressing to active TB.
  - The patient appears motivated as evidenced by his expressed desire to enter rehabilitation. Treatment of his alcohol abuse will support his adherence to treatment of his LTBI.

References:

- 1 - CDC 1998
- 2 - CDC 2000
- 3 - CDC 2008

**B. Given this information, what should be done next?**

- 2) Refer for directly observed therapy (DOT) of isoniazid (INH) 900 mg and 50 mg vitamin B6 twice-weekly for a planned 9-month course.
- This is the best option if the service is available from the local health department. It is particularly appropriate for patients at greater risk of non-adherence with treatment.

Reference:

- 4 - CPFNTC 2005

**C. What should be done at this clinic visit?**

- 1) Ask about signs and symptoms of hepatotoxicity (i.e. evidence of loss of appetite, nausea, vomiting, fatigue, pruritis, persistent abdominal discomfort, dark urine, or tingling in the extremities, and examine the patient's sclera for evidence of jaundice and the abdomen for tenderness) and draw blood for LFTs.
- This patient should undergo LFT testing as he has risk factors for hepatotoxicity.

Reference:

- 6 - HNTC 2007

**D. Based on these results, what should the health department do?**

- 1) Call patient and instruct him to stop INH immediately and schedule an appointment as soon as possible.
- Enzyme levels greater than five times baseline indicate that this patient is experiencing hepatotoxicity and treatment should be stopped immediately.

References:

- 5 - TAS 2006
- 6 - HNTC 2007

ANSWERS (continued)

**E. At this point, this patient should be counseled to do what?**

- 1) Resume INH treatment with careful monitoring of LFTs and symptoms.
  - a. This patient should be monitored carefully, including adherence to substance abuse treatment, LFTs, and symptoms of hepatotoxicity.

Reference:

- 5 - ATS 2006
- 6 - HNTC 2007

**F. During the last visit, you should be sure to do all but which of the following?**

- 2) Inform patient of the recommendation to have an annual chest X-ray.
  - a. Not indicated unless symptoms of TB disease develop.

Reference:

- 7 - UMDNJ 2007



## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for latent tuberculosis patients.

- 1 Centers for Disease Control and Prevention (CDC 1998). *Recommendations for Prevention and Control of TB Among Foreign-Born Persons*. MMWR: September 18, 1998; 47 (RR 16); p1-30. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr4716.pdf> on 3/26/2009.
- 2 Centers for Disease Control and Prevention (CDC 2000). *Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection*. American Thoracic Society. MMWR: June 9, 2000; 49 (RR 6): p1-51. Accessed at <http://www.cdc.gov/MMWR/PDF/rr/rr4906.pdf> on 3/26/2009.
- 3 Centers for Disease Control and Prevention (CDC 2008). *Tuberculosis Elimination – BCG Vaccine November 2008*. Accessed at <http://www.cdc.gov/tb/pubs/tbfactsheets/BCG.pdf> on 3/25/2009.
- 4 Charles P. Felton National Tuberculosis Center (CPFNTC 2005). *Adherence to Treatment for Latent Tuberculosis Infection: A Manual for Health Care Providers*. Accessed at [http://www.harlemtbcenter.org/Assets/web\\_docs/Harlem-LTBI%20Adherence6.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Harlem-LTBI%20Adherence6.pdf) on 3/26/2009.
- 5 Saukkonen, JJ, et al. (ATS 2006). *An Official ATS Statement: Hepatotoxicity of Antituberculosis Therapy, March 2006*. American Journal of Respiratory & Critical Care Medicine; Volume 174(8); p935-52. Accessed at <http://ajrccm.atsjournals.org/cgi/content/full/174/8/935> on 3/31/2009.
- 6 Heartland National TB Center (HNTC 2007). *Assessing and Managing the Risk of Liver Disease in the Treatment of LTBI. Revised 12/31/2007*. Accessed at [http://www.heartlandntbc.org/products/assessing\\_and\\_managing\\_the\\_risk\\_of\\_liver\\_disease\\_in\\_the\\_treatment\\_of\\_ltbi.pdf](http://www.heartlandntbc.org/products/assessing_and_managing_the_risk_of_liver_disease_in_the_treatment_of_ltbi.pdf) on 3/26/2009.
- 7 New Jersey Medical School Global Tuberculosis Institute (UMDNJ 2007). *Patient's TB Testing and Treatment Record (LTBI Card), July 2007*. Accessed at <http://www.umdnj.edu/globaltb/downloads/products/LTBICardProduct.pdf> on 3/26/2009.



# CASE STUDY #11

## ***Latent Tuberculosis Infection in a Homeless Man***

\*Content and references in this case study have been revised and updated to include  
12-dose (3HP) regimen 7.23.2012

To download a copy of the updated case study please go to  
[http://www.heartlandntbc.org/products/case\\_studies\\_tb\\_ncm\\_training\\_tools.pdf](http://www.heartlandntbc.org/products/case_studies_tb_ncm_training_tools.pdf)



### Latent Tuberculosis Infection in a Homeless Man

A 45-year-old man was referred to the local health department clinic from a nearby shelter for homeless men. The shelter's intake protocol required that residents present evidence that they had been evaluated for Latent TB Infection (LTBI) and possible TB disease. The patient reported that he stayed at four different shelters and with a friend during the past year, but wanted to find more permanent housing. He also stated that he has had repeated tuberculin skin tests (TSTs) in the past which were always positive, but was never treated. However, he would not be allowed to stay in the shelter unless he showed evidence of his test result and/or documentation that he does not have TB disease.

**Patient History:** the patient was born in the US and he has a history of psychiatric illness; he had not held a steady job for years. The patient shared that he was currently taking medication for a psychiatric condition. He denied other chronic illnesses and denied substance abuse.

**Physical Examination:** a middle-aged man of average weight; no abnormal findings.

#### A. What should the clinic do next?

- 1) Explain the purpose of TB screening and the importance of preventing TB disease
- 2) Inquire about signs and symptoms of TB
- 3) Place a TST using the Mantoux method (since no documentation existed from previous TSTs), and give patient an appointment to return in two days for TST reading; collect locating information for the patient in the event he does not return for the TST reading. OR draw blood for an Interferon Gamma Release Assay (QuantiFERON-TB Gold test [QFT-G] or T-SPOT.TB test [T-Spot]) as a replacement for the TST if the clinic has access to this methodology.
- 4) All of the above

The patient returned to the clinic with several new shelter residents that had been referred for screening. His TST reaction was read as 15 mm indurations. No records of a previous TST or chest radiograph (CXR) had been found. The patient reported his last CXR was about seven months ago and it was "just fine."

#### B. What should be done for the patient at this point?

- 1) Delay ordering a CXR because he already had one in the last year
- 2) Explain the risk of exposure to TB in congregate settings and the importance of continued cooperation in his diagnostic evaluation; send patient for a current CXR
- 3) Prescribe a one-month supply of LTBI medication
- 4) Recommend against any further follow-up once you ascertain that he does not have TB disease; LTBI treatment in homeless is rarely successful

The patient returned to the clinic. He thought about the previous discussion and expressed willingness to "take the standard treatment, but doesn't want to spend the next year taking pills." He agrees that directly observed therapy (DOT) and appointments are best for him. His CXR was read as normal. The patient is started on once weekly INH-RPT (3HP) LTBI treatment regimen.\*

**C. Of the following, what should the clinic NOT do?**

- 1) Identify potential barriers to treatment adherence and discuss adherence strategies
- 2) Talk him out of LTBI treatment if he uses alcohol or other drugs
- 3) Check with the health department's rule for reporting TST results and LTBI treatment in homeless patients
- 4) Offer HIV counseling and testing

The patient did not keep his third follow-up appointment and could not be located. A few months later the patient presented to the same clinic and stated he discontinued the isoniazid (INH) and Rifapentine (RPT) for about 4 months because of stomach pain.

**D. What should the clinic do for this patient who has interrupted his LTBI treatment?**

- 1) Count the first two weeks as completed and restart INH-RPT treatment where he left off.
- 2) Do not restart treatment, as this patient is unreliable.
- 3) Initiate treatment of patient with a new 12 dose Rifapentine-Isoniazid regimen. The patient will need to begin as if starting over which will include a symptom screen, baseline LFTs and a repeat CXR.\*
- 4) Warn the patient that erratic treatment could cause INH-resistant/ Rifapentine (rifamycin) resistant TB disease and admonish him to be more responsible.

12 weeks after restarting INH/Rifapentine treatment, the patient kept most of his clinic appointments and had not reported any signs and symptoms of hepatotoxicity. His follow-up appointments were uneventful, except he had missed two doses/appointments according to health department records. Although his treatment lasted 12 weeks, records tallied at each visit indicated he completed 10 out of 12 doses of INH-RPT.\*

**E. What is the next step for this patient?**

- 1) Congratulate him on completing 12 weeks of treatment and do not mention the incomplete doses, they are not important
- 2) Tell the patient he has missed too many doses and must start treatment over
- 3) Tell the patient that unfortunately his erratic treatment has put him at risk for developing INH-resistant active TB
- 4) Set two more appointments for the patient to receive the final two doses of his treatment regimen\*

The patient returned for his final appointments/doses and he successfully completed the full course (12 doses) of INH/RPT treatment for LTBI.

**F. What should be done to finish out management and care of this patient (can select more than one)?**

- 1) Give patient a letter or card documenting completion of LTBI treatment.
- 2) Instruct patient of potential signs and symptoms of TB disease and give him information on where to go if he develops signs and symptoms.
- 3) Order a follow-up chest X-ray.
- 4) Instruct the patient that he is allergic to TST and he should never have one again.

## ANSWERS

### A. What should the clinic do next?

- 4) All of the above
  - a. It is important to ask about clinical signs and symptoms of TB to assess the possibility of TB disease and need for further diagnostic evaluation.
  - b. If documentation of his previous TST results is not readily available, it is best to proceed with placement of a TST at this time.
  - c. Use of the new Interferon Gamma Release assays (QuantiFERON-TB Gold test [QFT-G] or T-SPOT. TB test [T-Spot]) as a replacement for a TST is an acceptable method to test for TB infection. An IGRA is preferred for testing persons from groups that historically have low rates of returning to have TSTs read such as homeless persons and substance users. The use of IGRAs for such persons can increase test completion rates, so control efforts can focus on those most likely to benefit from further evaluation and treatment.
  - d. Successful patient education will enable him to accept and invest in his future evaluation and treatment plan. It is important to collect information on how to successfully contact the patient for follow-up; especially homeless individuals. Inquire about a physical location where he may be found, a telephone number where a message could be left, etc.

References:

- 1 - CDC 2005
- 2 - CDC 2000
- 3 - UMDNJ 2005
- 5 - CDC 2010

### B. What should be done for the patient at this point?

- 2) Explain the risk of exposure to TB in congregate settings and the importance of continued cooperation in his diagnostic evaluation.
  - a. He is at risk and lost to follow-up. Education helps build trust and ensure follow-up and future treatment adherence.

Reference:

- 3 - UMDNJ 2005

### C. Of the following, what should the clinic NOT do?

- 2) Inquire about alcohol and other drug use and talk him out of LTBI treatment if he uses either.
  - a. He will need to be instructed on the problems of taking drugs and/or alcohol during treatment; however he has expressed a desire to undergo treatment and should be encouraged to do so.

Reference:

- 3 - UMDNJ 2005



## ANSWERS (continued)

**D. What should the clinic do for this patient who has interrupted his antituberculosis medications?**

- 3) Initiate treatment of patient with a new 12 dose Rifapentine-Isoniazid regimen. The patient will need to begin as if starting over which will include a symptom screen, baseline LFTs and a repeat CXR\*
- a. A 12-week course (12 doses) of INH-RPT treatment must be completed within 16 weeks of initiating therapy. Thus, after 4 months of treatment interruption, LTBI patients are advised to begin a new 12 week treatment regimen. The patient should be thoroughly counseled that treatment must be restarted, and not just continued from the point he was lost to follow-up. However, the patient should not begin LTBI treatment until TB disease and hepatotoxicity have been ruled out again.\*

Reference:

- 6 - CDC 2011\*

**E. What is the next step for this patient?**

- 4) Set two more appointments for the patient to receive the final two doses of his treatment.\*
- a. Although the patient has completed 12 weeks of INH-RPT treatment, the dose count indicates he has ingested only 10 doses out of a planned 12 doses of INH-RPT. The patient must ingest at least 11 of the 12 doses for treatment to be considered complete. If the patient is willing to receive 12 doses within 16 weeks allowed for completion, therapy should be continued.\*

References:

- 6-CDC 2011\*
- 7- NEJM 2011\*

**F. What should be done to finish out management and care of this patient?**

- 1) Give patient a letter or card documenting completion of LTBI treatment.
- a. This patient's lifestyle suggests that he will be screened and evaluated for TB in the future. He should understand that he will likely always have a positive TST, so he does not need to undergo repeat TST testing.
- b. A laminated completion card would be ideal for this patient, as it will be easy to carry and waterproof. The completion card will communicate to future public health workers that he has a previous positive TST and has already undergone successful LTBI treatment.
- c. Instruct patient of potential signs and symptoms of TB disease and give him information on where to go if he develops signs and symptoms.

References:

- 1 - CDC 2005
- 4 - UMDNJ 2007

## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for latent tuberculosis patients.

- 1 Centers for Disease Control and Prevention (CDC 2005). Guide for Primary Health Care Providers: Targeted TB Testing and Treatment of Latent TB infection. Accessed at <http://www.cdc.gov/tb/pubs/LTBI/pdf/TargetedLTBI05.pdf> on 3/27/2009.
- 2 Centers for Disease Control and Prevention (CDC 2000). Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection. American Thoracic Society. MMWR: June 9, 2000; 49 (RR 6); p1-51. Accessed at <http://www.cdc.gov/MMWR/PDF/rr/rr4906.pdf> on 3/26/2009.
  - Table 7 on page 24 has a summary of TST positivity by risk group
  - Page 32-33 “Completion of Treatment” has specific information on determining whether treatment is completed based on dose counts
- 3 New Jersey Medical School Global Tuberculosis Institute (UMDNJ 2005). What You Need to Know about TB Infection. Accessed at [http://www.cdc.gov/tb/pubs/pamphlets/TB\\_infection.pdf](http://www.cdc.gov/tb/pubs/pamphlets/TB_infection.pdf) on 3/26/2009.
- 4 New Jersey Medical School Global Tuberculosis Institute (UMDNJ 2007). Patient’s TB Testing and Treatment Record (LTBI Card), July 2007. Accessed at <http://www.umdnj.edu/globaltb/downloads/products/LTBICardProduct.pdf> on 3/26/2009.
- 5 Centers for Disease Control and Prevention (CDC 2010). Updated Guidelines for Using Interferon Gamma Release Assays to Detect Mycobacterium tuberculosis Infection — United States, 2010. MMWR: 2010; 59 (RR-5); 1-25. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr5905.pdf> on December 17, 2010.
- 6 Centers for Disease Control and Prevention (CDC 2011). Recommendations for Use of an Isoniazid-Rifapentine Regimen with Direct Observation to Treat Latent Mycobacterium tuberculosis Infection — United States, 2011. MMWR: 2011;\*
- 7 The New England Journal of Medicine (NEJM 2011). Three Months of Rifapentine and Isoniazid for Latent Tuberculosis Infection. N ENGL J MED, 2011 365:203\*

CASE STUDY #12

***Latent Tuberculosis Infection  
in an HIV-Positive Man***

## Latent Tuberculosis Infection in an HIV-Positive Man

A 64-year-old man returned to the local health department clinic for his HIV test results. The patient was born in Puerto Rico, but has lived in the United States for the past 17 years. His current girlfriend was dying of AIDS and he appeared distressed. His medical records showed a history of hypertension, peptic ulcer, and cirrhosis. He was taking medication for his ulcer, as well as anti-hypertension medications. The patient reported occasional alcohol consumption. His physical exam revealed a tall, thin man. He was afebrile and his blood pressure was 130/90 mm Hg. His lungs were clear. And an abdominal examination revealed no organomegaly. He was HIV seropositive.

### A. His clinic visit should include all but which ONE of the following actions?

- 1) Offer HIV post-test counseling.
- 2) Inquire about signs and symptoms of active TB.
- 3) Perform anergy skin testing.
- 4) Plant a tuberculin skin test (TST) using the Mantoux method OR perform an Interferon Gamma Release Assay (QuantiFERON-TB Gold test [QFT-G] or T-SPOT.TB test [T-Spot]).

The TST was 7 mm induration. The patient seemed to have difficulty understanding the importance of his HIV status, the meaning of Latent TB Infection (LTBI) and his risk of developing TB. His chest X-ray revealed no evidence of active TB or cardiomegaly.

### B. What is the next step in the care of this patient?

- 1) Place the patient in respiratory isolation.
- 2) Check the patient for signs and symptoms of hepatotoxicity and obtain blood for liver function tests (LFTs) if he is symptomatic.
- 3) Explain that if he does not undergo treatment for LTBI he will die of HIV/TB.
- 4) Offer 9 months of isoniazid (INH), pending LFT results.

His baseline liver enzyme results came back:

- AST (SGOT) - 104 units/L (normal 0-37 units/L)
- ALT (SGPT) - 127 units/L (normal 0-40 units/L)
- Total Bilirubin - 1.0 mg/dL (normal 0.3-1.0 mg/dL)

### C. Since he has elevated liver enzymes at baseline, what is the next step?

- 1) Discuss patient's history of alcohol use and current alcohol intake (one-month recall).
- 2) Give patient prescription for 3 month supply of INH and pyridoxine (vitamin B6).
- 3) Immediately refer the patient to an alcohol treatment program.
- 4) Give patient prescription for 1 month supply of INH only if he signs a liability waiver.

The patient reported that he had been taking INH and B6 daily with no problems. He was in your clinic for a follow-up visit after 2 weeks to review his hepatitis test results. His serologies indicated that he has no active Hepatitis B or C.

**D. What should be done in the case management of this patient now?**

- 1) Discuss strategies to maintain adherent behavior.
- 2) Perform a brief physical assessment, checking for evidence of hepatotoxicity or other side effects.
- 3) Obtain blood for LFTs.
- 4) All of the above.

Five days later, the patient called and complained of abdominal pain which he attributed to the anti-tuberculosis medication.

**E. Which of the following is NOT the appropriate nursing action?**

- 1) Tell the patient to stop taking his INH at once and return to the clinic.
- 2) Ask the patient about other signs and symptoms of hepatotoxicity: nausea, vomiting, change in color of urine or stool, change in color of eyes, problems eating.
- 3) Instruct the patient to keep taking his INH and come to the clinic in 4 days if abdominal pain persists.
- 4) Document the phone conversation.

The patient came back into the clinic complaining of constipation and fatigue and undergoes a blood draw for liver enzyme testing (LFTs). The patient was instructed to return for follow-up when the LFT results are available which he did within two days. At that time, he reported that the abdominal pain and constipation have resolved though he was still experiencing fatigue. His test results are:

- AST (SGOT) - 72 units/L (normal 0-37 units/L)
- ALT (SGPT) - 79 units/L (normal 0-40 units/L)
- Total Bilirubin - 0.7 mg/dL (normal 0.3-1.0 mg/dL)

**F. What should be done for this patient now?**

- 1) Tell patient to restart daily INH and B6.
- 2) Repeat patient education about side effects associated with this regimen and document.
- 3) Instruct patient to return in one month for follow-up visit.
- 4) Give patient prescription for daily INH and B6 (one month supply minus remaining doses from original prescription)

The patient completed three months of treatment for LTBI. The most recent laboratory results showed elevated values, however the patient had no complaints. The patient reported that his girlfriend died 3 weeks ago and that he had been begun drinking alcohol again.

- AST (SGOT) - 151 units/L (normal 0-37 units/L)
- ALT (SGPT) - 98 units/L (normal 0-40 units/L)
- Total Bilirubin - 0.9 mg/dL (0.3-1.0 mg/dL)

**G. At this point, what is the most appropriate response?**

- 1) Discontinue INH treatment, it is too risky for this patient.
- 2) Discuss grieving issues and better coping strategies (other than drinking) and make referral as needed.
- 3) Explain the patient's LTBI can progress to active TB causing him to die of HIV complications.
- 4) Admit the patient to the hospital as the liver enzyme results indicate he is at risk for permanent damage.

The patient continued adhering to monthly medical visits and his LFTs improved from those at the 3-month visit. He reported a high-level of adherence. Based on the patient's report, the provider calculated that the patient has taken at least 270 doses of his medications. He appeared to be in good health and reported no problems adhering to INH treatment. He said he had stopped drinking alcohol more than three months ago and had joined a survivor's support group. LFTs from the preceding months showed steady improvement.

- AST (SGOT) - 85 units/L (normal 0-37 units/L)
- ALT (SGPT) - 92 units/L (normal 0-40 units/L)
- Total Bilirubin - 1.0 mg/dL (normal 0.3-1.0 mg/dL)

**H. Of the following, what is NOT an appropriate step in the case management of this patient?**

- 1) Instruct the patient to be aware of the potential signs and symptoms of active TB and provide this education in writing.
- 2) Inform the patient that he will not need future TB skin tests and provide documentation.
- 3) Inform the patient that he is protected against TB for life.
- 4) Inform the patient of the need for chest X-rays every six months for the next two years.

## ANSWERS

**A. His clinic visit should include all but which ONE of the following actions?**

- 3) Perform anergy skin testing.
- a. Anergy testing is no longer recommended as a routine clinical practice. Epidemiological review of anergy testing practices indicated that results are often unreliable and difficult to interpret.

Reference:

- 1 - CDC 2000

**B. What is the next step in the care of this patient?**

- 4) Offer 9 months of isoniazid (INH) pending LFT results.
- a. A nine month daily INH regimen is the recommended treatment of LTBI, he is at very high risk because he is HIV positive. If resources are available, consider offering directly observed therapy for his INH treatment.

References:

- 2 - CPFNTC 2002
- 3 - CDC 2007

**C. Since he has elevated liver enzymes at baseline, what is the next step?**

- 1) Discuss patient's history of alcohol use and current alcohol intake (one-month recall).
- a. The patient's history of cirrhosis, reported alcohol consumption, and elevated LFTs indicate the need to understand the patient's alcohol use. If clinically indicated, the patient should be offered treatment or supportive services for alcohol abuse. Hepatitis serologies, repeat AST, and repeat Total Bilirubin tests are also recommended.

Reference:

- 4 - HNTC 2009

**D. What should be done in the case management of this patient now?**

- 4 All of the above.
- a. A conversation about adherence strategies and barriers, side effects of medication, and liver enzyme monitoring are all important actions for this visit. Although it has only been two weeks, the elevated baseline results indicate that liver enzymes should be watched closely during LTBI treatment.
- b. If initial liver enzymes are elevated more than 2 times normal, then LFTs should be monitored at least weekly for any indication of more liver damage.

Reference:

- 4 - HNTC 2009

**E. Which of the following is NOT the appropriate nursing action?**

- 3) Instruct the patient to keep taking his INH and come to the clinic in 4 days if abdominal pain persists.
- a. The patient's risk factors and symptoms he attributes to the INH make it too risky to continue the INH therapy without a medical evaluation.

Reference:

- 4 - HNTC 2009

ANSWERS (continued)

**F. What should be done for this patient now?**

- 4) Give patient prescription for daily INH and B6 (one month supply minus remaining doses from original prescription).
  - a. LFTs and clinical evaluation indicate that the patient can resume INH therapy with no increased risk of side effects. Given the patient complaints (stomach ache, constipation, fatigue); it makes sense to review side effects associated with INH. Always document any health education. Patients taking daily INH for LTBI should be monitored monthly or as needed.

References:

- 4 - HNTC 2009
- 5 - CDC 2008

**G. At this point, what is the most appropriate response?**

- 2) Discuss grieving issues and better coping strategies (other than drinking) and make referrals as needed.
  - a. This patient is showing signs of ineffective coping and grieving. Addressing his immediate concerns should be a priority before discussing his issues with INH adherence. Referrals to HIV support groups and grief counseling are typically available through the health department or social services.

Reference:

- 6 - CPFNTC 2005

**H. Of the following, what is NOT an appropriate step in the case management of this patient?**

- 3) Inform the patient that he is protected against TB for life.
  - a. Nine-month treatment with INH is 90% effective at preventing progression from LTBI to active TB disease. However, the possibility of re-infection exists and the patient has a weakened immune system. If exposed to infectious TB again, retreatment for LTBI would be indicated if there is evidence of transmission of TB to other persons in the same environment.

Reference:

- 7 - UMDNJ 2007



## REFERENCES

These references are designed to assist in case management and advocacy for promoting the optimal management of care for latent tuberculosis patients.

- 1 Centers for Disease Control and Prevention (CDC 2000). *Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection*. American Thoracic Society. MMWR: June 9, 2000; 49 (RR-6); p1-51. Accessed at <http://www.cdc.gov/MMWR/PDF/rr/rr4906.pdf> on 3/26/2009.
  - Page 11 has specific information on anergy testing in HIV-positive patients
- 2 Charles P Felton National TB Center (CPFNTC 2002). *Treatment of Latent TB Infection, September 2002*. Accessed at [http://www.harlemtbcenter.org/Assets/web\\_docs/Harlem-LTBI.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Harlem-LTBI.pdf) on 3/26/2009
- 3 Centers for Disease Control and Prevention (CDC 2007). *Tuberculosis Facts – TB and HIV, October 2007*. Accessed at [http://www.cdc.gov/tb/pubs/tbfactsheets/tbandhiv\\_eng.pdf](http://www.cdc.gov/tb/pubs/tbfactsheets/tbandhiv_eng.pdf) on 3/27/2009.
- 4 Heartland National TB Center (HNTC 2009). *Limiting Liver Toxicity in the HIV-Positive Patient with Latent Tuberculosis Infection*. Accessed at [www.heartlandntbc.com/products/limiting\\_liver\\_toxicity\\_in\\_the\\_HIV\\_positive\\_patient\\_with\\_ltbi.pdf](http://www.heartlandntbc.com/products/limiting_liver_toxicity_in_the_HIV_positive_patient_with_ltbi.pdf) on 6/7/2010.
- 5 Centers for Disease Control and Prevention (CDC 2008). *Tuberculosis Facts: You Can Prevent TB, October 2008*. Accessed at [http://www.cdc.gov/tb/pubs/tbfactsheets/prevention\\_eng.pdf](http://www.cdc.gov/tb/pubs/tbfactsheets/prevention_eng.pdf) on 3/27/2009.
- 6 Charles P. Felton National Tuberculosis Center (CPFNTC 2005). *Adherence to Treatment for Latent Tuberculosis Infection: A Manual for Health Care Providers*. Accessed at [http://www.harlemtbcenter.org/Assets/web\\_docs/Harlem-LTBI%20Adherence6.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Harlem-LTBI%20Adherence6.pdf) on 3/26/2009.
- 7 New Jersey Medical School Global Tuberculosis Institute (UMDNJ 2007). *Patient's TB Testing and Treatment Record (LTBI Card), July 2007*. Accessed at <http://www.umdnj.edu/globaltb/downloads/products/LTBICardProduct.pdf> on 3/26/2009.
- 8 Centers for Disease Control and Prevention (CDC 2010). *Updated Guidelines for Using Interferon Gamma Release Assays to Detect Mycobacterium tuberculosis Infection — United States, 2010*. MMWR: 2010; 59 (RR-5); 1-25. Accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr5905.pdf> on December 17, 2010.



# APPENDICES



## Appendix A

### List of Heartland Webinars (years 2010 and 2011) on accompanying CDs

#### **2010**

Handling Mental Illness in the TB Patient - March 26, 2010, Dr. Adriana Vasquez

Webinar Series on TB Management of the HIV Patient, Dr. Lisa Armitige and Dr. Barbara Seaworth

Part 1: Diagnosis - July 27, 2010, Dr. Lisa Armitige

Part 2: Treatment - August 3, 2010, Dr. Lisa Armitige

Part 3: Special Topics - August 17, 2010, Dr. Barbara Seaworth

Contact Investigation - August 26, 2010, Jessica Quintero, BAAS

#### **2011**

Understanding *M. bovis* - February 2, 2011, Dr. Philip LoBue

Webinar Series on Behavioral Aspects of Substance Abuse and the Impact on Managing TB

Part 1: Kinds of Substance Abuse and Understanding Common Traits of an Addict - May 5, 2011, Karina Forrest-Perkins, MAHR, LADC

Part 2: Substance Abuse and Mental Illness - May 12, 2011, Karina Forrest-Perkins, MAHR LADC

Part 3: Practical Strategies - May 19, 2011, Dr. Lisa Armitige, Dawn Farrell, RN, BSN, Jessica Waguespack, CHES

Understanding the Tuberculin Skin Test: A Primer for Non-TB Staff - September 8, 2011, Diana Fortune, RN, BSN

Managing TB in the Dialysis Patient - September 28, 2011, Dr. Marcos Burgos and Diana Fortune, RN, BSN



## Appendix B

### Suggested Library of Tuberculosis Educational Resources

**NOTE:** Links are provided in order to download and/or print the items listed, but Heartland has no control over content and status of the web connections. Please refer to each specific website for any changes and updates.

#### **Centers for Disease Control and Prevention; Division of TB Elimination (DTBE)**

Home page: <http://www.cdc.gov/tb/>

**Self-Study Modules on Tuberculosis:** <http://www.cdc.gov/tb/education/ssmodules/default.htm>

Self-Study Modules on Tuberculosis, 1 - 5 (Course #SS3035), October 2008

- *Introduction:* <http://www.cdc.gov/tb/education/ssmodules/pdfs/Introduction.pdf>
- *Module 1: Transmission and Pathogenesis of Tuberculosis*  
<http://www.cdc.gov/tb/education/ssmodules/pdfs/Module1.pdf>
- *Module 2: Epidemiology of Tuberculosis*  
<http://www.cdc.gov/tb/education/ssmodules/pdfs/Module1.pdf>
- *Module 3: Targeted Testing and the Diagnosis of Latent Tuberculosis Infection and Tuberculosis Disease*  
<http://www.cdc.gov/tb/education/ssmodules/pdfs/Module3.pdf>
- *Module 4: Treatment of Latent Tuberculosis Infection and Tuberculosis Disease*  
<http://www.cdc.gov/tb/education/ssmodules/pdfs/Module4.pdf>
- *Module 5: Infectiousness and Infection Control*  
<http://www.cdc.gov/tb/education/ssmodules/pdfs/Module5.pdf>
- *Glossary:* <http://www.cdc.gov/tb/education/ssmodules/pdfs/Glossary.pdf>

Self-Study Modules 6 - 9

- *Introduction:* [http://www.cdc.gov/tb/education/ssmodules/intro6\\_9.pdf](http://www.cdc.gov/tb/education/ssmodules/intro6_9.pdf)
- *Module 6: Contact Investigations for Tuberculosis*  
<http://www.cdc.gov/tb/education/ssmodules/module6/ss6contents.pdf>
- *Module 7: Confidentiality in Tuberculosis Control*  
<http://www.cdc.gov/tb/education/ssmodules/module7/ss7contents.pdf>
- *Module 8: Tuberculosis Surveillance and Case Management in Hospitals & Institutions*  
<http://www.cdc.gov/tb/education/ssmodules/module8/ss8contents.pdf>
- *Module 9: Patient Adherence to Tuberculosis Treatment*  
<http://www.cdc.gov/tb/education/ssmodules/module9/ss9contents.pdf>
- *Glossary:* <http://www.cdc.gov/tb/education/ssmodules/glos%206-9.pdf>

**CDC DTBE Fact Sheets:** <http://www.cdc.gov/tb/publications/factsheets/default.htm>

#### **General Information**

- *TB - General Information:* <http://www.cdc.gov/tb/publications/factsheets/general/tb.pdf>
- *The Difference Between Latent TB Infection and Active TB Disease:*  
<http://www.cdc.gov/tb/publications/factsheets/general/LTBlandActiveTB.pdf>
- *Tuberculosis Information for Employers in Non-Healthcare Settings:*  
[http://www.cdc.gov/tb/publications/factsheets/general/nonhealthcare\\_employers.pdf](http://www.cdc.gov/tb/publications/factsheets/general/nonhealthcare_employers.pdf)
- *Tuberculosis Information for International Travelers:* <http://www.cdc.gov/tb/publications/factsheets/general/tbtravelinfo.pdf>
- *Tuberculosis Facts Series*
  - *TB Can Be Treated:* [http://www.cdc.gov/tb/publications/factseries/cure\\_eng.pdf](http://www.cdc.gov/tb/publications/factseries/cure_eng.pdf)
  - *Exposure to TB:* [http://www.cdc.gov/tb/publications/factseries/exposure\\_eng.pdf](http://www.cdc.gov/tb/publications/factseries/exposure_eng.pdf)
  - *TB and HIV/AIDS:* [http://www.cdc.gov/tb/publications/factseries/tbandhiv\\_eng.pdf](http://www.cdc.gov/tb/publications/factseries/tbandhiv_eng.pdf)
  - *You Can Prevent TB:* [http://www.cdc.gov/tb/publications/factseries/prevention\\_eng.pdf](http://www.cdc.gov/tb/publications/factseries/prevention_eng.pdf)
  - *Testing for TB:* [http://www.cdc.gov/tb/publications/factseries/skintest\\_eng.pdf](http://www.cdc.gov/tb/publications/factseries/skintest_eng.pdf)

### Vaccines & Immunizations

- *BCG Vaccine*: <http://www.cdc.gov/tb/publications/factsheets/prevention/BCG.pdf>

### Drug-Resistant Tuberculosis

- *Multidrug-Resistant Tuberculosis (MDR TB)*: <http://www.cdc.gov/tb/publications/factsheets/drtb/mdrtb.pdf>
- *Extensively Drug-Resistant Tuberculosis (XDR TB)*: <http://www.cdc.gov/tb/publications/factsheets/drtb/xdrtb.pdf>
- *CDC's Role in Preventing Extensively Drug-Resistant Tuberculosis (XDR TB)*: <http://www.cdc.gov/tb/publications/factsheets/drtb/cdcandxdrtb.pdf>

### Testing and Diagnosis

- *Tuberculosis Facts Series*
  - *TB Can Be Treated*: [http://www.cdc.gov/tb/publications/factseries/cure\\_eng.pdf](http://www.cdc.gov/tb/publications/factseries/cure_eng.pdf)
  - *Testing for TB*: [http://www.cdc.gov/tb/publications/factseries/skintest\\_eng.pdf](http://www.cdc.gov/tb/publications/factseries/skintest_eng.pdf)
- *Recommendations for Human Immunodeficiency Virus (HIV) Screening in Tuberculosis (TB) Clinics*: <http://www.cdc.gov/tb/publications/factsheets/testing/HIVscreening.pdf>
- *QuantiferON®-TB Gold Test*: <http://www.cdc.gov/tb/publications/factsheets/testing/QFT.pdf>
- *Tuberculin Skin Testing*: <http://www.cdc.gov/tb/publications/factsheets/testing/skintesting.pdf>
- *Diagnosis of Tuberculosis Disease*: <http://www.cdc.gov/tb/publications/factsheets/testing/diagnosis.pdf>
- *Targeted Tuberculin Testing and Interpreting Tuberculin Skin Test Results*: <http://www.cdc.gov/tb/publications/factsheets/testing/skintestresults.pdf>

### Treatment

- *Tuberculosis Facts Series*
  - *TB Can Be Treated*: [http://www.cdc.gov/tb/publications/factseries/cure\\_eng.pdf](http://www.cdc.gov/tb/publications/factseries/cure_eng.pdf)
- *Treatment of Latent TB Infection*: <http://www.cdc.gov/tb/publications/factsheets/treatment/treatmentLTBI.pdf>
- *Treatment of Latent Tuberculosis Infection: Maximizing Adherence*: <http://www.cdc.gov/tb/publications/factsheets/treatment/LTBIadherence.pdf>
- *Treatment Options for Latent Tuberculosis Infection*: <http://www.cdc.gov/tb/publications/factsheets/treatment/LTBItreatmentoptions.pdf>
- *Treatment of Drug-Resistant Tuberculosis*: <http://www.cdc.gov/tb/publications/factsheets/treatment/drugresistanttreatment.pdf>
- *Treatment of Drug-Susceptible Tuberculosis Disease in Persons Not Infected with HIV*: <http://www.cdc.gov/tb/publications/factsheets/treatment/treatmentHIVnegative.pdf>
- *Treatment of Drug-Susceptible Tuberculosis Disease in HIV-Infected Persons*: <http://www.cdc.gov/tb/publications/factsheets/treatment/treatmentHIVpositive.pdf>

### Infection Control & Prevention

- *Tuberculosis Facts Series*
  - *You Can Prevent TB*: <http://www.cdc.gov/tb/publications/factsheets/prevention/rphcs.pdf>
- *Respiratory Protection in Health-Care Settings*: <http://www.cdc.gov/tb/publications/factsheets/prevention/rphcs.pdf>
- *Infection Control in Health-Care Settings*: <http://www.cdc.gov/tb/publications/factsheets/prevention/rphcs.pdf>
- *Tuberculosis Information for International Travelers*: <http://www.cdc.gov/tb/publications/factsheets/general/tbtravelinfo.pdf>

### Data and Statistics

- *A Global Perspective on TB*: [http://www.cdc.gov/tb/events/WorldTBDay/resources\\_global.pdf](http://www.cdc.gov/tb/events/WorldTBDay/resources_global.pdf)
- *The Revised Report of Verified Case of Tuberculosis*: <http://www.cdc.gov/tb/publications/factsheets/statistics/rvct.pdf>
- *The National Tuberculosis Indicators Project (NTIP)*: <http://www.cdc.gov/tb/publications/factsheets/statistics/NTIP.pdf>
- *National Tuberculosis Indicators Project (NTIP): Frequently Asked Questions*: <http://www.cdc.gov/tb/publications/factsheets/statistics/NTIPFAQs.pdf>
- *Tuberculosis Genotyping*: <http://www.cdc.gov/tb/publications/factsheets/statistics/genotyping.pdf>
- *TB Genotyping Information Management System (TB-GIMS)*: <http://www.cdc.gov/tb/publications/factsheets/statistics/TBGIMS.pdf>



**TB in Specific Populations**

- *Tuberculosis Information for Employers in Non-Healthcare Settings:*  
[http://www.cdc.gov/tb/publications/factsheets/general/nonhealthcare\\_employers.pdf](http://www.cdc.gov/tb/publications/factsheets/general/nonhealthcare_employers.pdf)
- *Tuberculosis Information for International Travelers:*  
<http://www.cdc.gov/tb/publications/factsheets/general/tbtravelinfo.pdf>

**TB & HIV**

- *Tuberculosis Facts Series*  
*TB and HIV/AIDS:* [http://www.cdc.gov/tb/publications/factseries/tbandhiv\\_eng.pdf](http://www.cdc.gov/tb/publications/factseries/tbandhiv_eng.pdf)
- *Recommendations for Human Immunodeficiency Virus (HIV) Screening in Tuberculosis (TB) Clinics:*  
<http://www.cdc.gov/tb/publications/factsheets/testing/HIVscreening.pdf>
- *Treatment of Drug-Susceptible Tuberculosis Disease in HIV-Infected Persons:*  
<http://www.cdc.gov/tb/publications/factsheets/treatment/treatmentHIVpositive.pdf>

**TB in African Americans**

- *The Stop TB in the African-American Community Flyer:*  
<http://www.cdc.gov/tb/topic/populations/TBinAfricanAmericans/tbflyer.pdf>

**Pregnant Women**

- *Tuberculosis and Pregnancy:* <http://www.cdc.gov/tb/publications/factsheets/specpop/pregnancy.pdf>

**Resources**

- *State TB Control Offices:* <http://www.cdc.gov/tb/publications/factsheets/specpop/pregnancy.pdf>

**CDC DTBE Guidelines:** <http://www.cdc.gov/tb/publications/guidelines/default.htm>

**Contact Investigations:**

- *Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis: Recommendations from the National Tuberculosis Controllers Association and CDC, December 2005:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5415a1.pdf>

**Control & Elimination:** [http://www.cdc.gov/tb/publications/guidelines/Control\\_Elim.htm](http://www.cdc.gov/tb/publications/guidelines/Control_Elim.htm)

- *Plan to Combat Extensively Drug-Resistant Tuberculosis, February 2009:* <http://www.cdc.gov/mmwr/pdf/rr/rr5803.pdf>
- *Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis: Recommendations from the National Tuberculosis Controllers Association and CDC, December 2005:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5415a1.htm>
- *Controlling Tuberculosis in the United States Recommendations from the American Thoracic Society, CDC, and the Infectious Diseases Society of America, November 2005:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5412a1.htm>
- *Progressing Toward Tuberculosis Elimination in Low-Incidence Areas of the United States, May 2002:*  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5105a1.htm>
- *Preventing and Controlling Tuberculosis Along the U.S.-Mexico Border Work Group Report, January 2001:*  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5001a1.htm>
- *Tuberculosis Elimination Revisited: Obstacles, Opportunities, and a Renewed Commitment (ACET), August 1999:*  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4809a1.htm>
  - *Essential Components of a Tuberculosis Prevention and Control Program (ACET), September 1995:*  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/00038823.htm>
  - *Tuberculosis Control Laws - United States, 1993, November 1993:*  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/00030715.htm>

**Drug-Resistant TB:** [http://www.cdc.gov/tb/publications/guidelines/MDR\\_TB.htm](http://www.cdc.gov/tb/publications/guidelines/MDR_TB.htm)

- *Report of Expert Consultations on Rapid Molecular Testing to Detect Drug-Resistant Tuberculosis in the United States, 2008:* <http://www.cdc.gov/tb/topic/Laboratory/rapidmoleculartesting/MoLDSTreport.pdf>
- *Plan to Combat Extensively Drug-Resistant Tuberculosis, February 2009:* [http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5803a1.htm?s\\_cid=rr5803a1\\_e](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5803a1.htm?s_cid=rr5803a1_e)
- *Treatment of Tuberculosis, June 2003:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5211a1.htm>  
- *Errata, January 2005:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5351a5.htm>
- *Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection, June 2000:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4906a1.htm>

**Infection Control & Prevention:** <http://www.cdc.gov/tb/publications/guidelines/infectioncontrol.htm>

- *Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings, December 2005:* [http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5417a1.htm?s\\_cid=rr5417a1\\_e](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5417a1.htm?s_cid=rr5417a1_e)  
- *Errata, September 2006:* <http://www.cdc.gov/tb/publications/reportsarticles/mmwr/Errata09-25-06.pdf>  
- *Additional FAQ's for Clarification of Recommendations in the Guidelines, September 2005:* <http://www.cdc.gov/tb/publications/reportsarticles/mmwr/Errata09-25-06.pdf>  
- *Appendix B. Tuberculosis (TB) Risk Assessment Worksheet: September 2006:* [http://www.cdc.gov/tb/publications/guidelines/AppendixB\\_092706.pdf](http://www.cdc.gov/tb/publications/guidelines/AppendixB_092706.pdf)
- *Guidelines for Environmental Infection Control in Health-Care Facilities, June 2003:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm>
- *The Role of BCG Vaccine in the Prevention and Control of Tuberculosis in the United States. (ACET and ACIP), April 1996:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/00041047.htm>

**Laboratory:** <http://www.cdc.gov/tb/publications/guidelines/Laboratory.htm>

- *Updated Guidelines for the Use of Nucleic Acid Amplification Tests in the Diagnosis of Tuberculosis, January 2009:* [http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5801a3.htm?s\\_cid=mm5801a3\\_e](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5801a3.htm?s_cid=mm5801a3_e)
- *National Plan for Reliable Tuberculosis Laboratory Services Using a Systems Approach, April 2005:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5406a1.htm>
- *New CDC Program for Rapid Genotyping of Mycobacterium tuberculosis Isolates, January 2005:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5402a6.htm>
- *Guide to the Application of Genotyping to Tuberculosis Prevention and Control, June 2004:* <http://www.cdc.gov/tb/programs/genotyping/manual.htm>
- *Update: Nucleic Acid Amplification Tests for Tuberculosis, July 2000:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4926a3.htm>

**TB & HIV:** [http://www.cdc.gov/tb/publications/guidelines/HIV\\_AIDS.htm](http://www.cdc.gov/tb/publications/guidelines/HIV_AIDS.htm)

- *Guidelines for the Prevention and Treatment of Opportunistic Infections Among HIV-Exposed and HIV-Infected Children, January 2009:* [http://www.cdc.gov/mmwr/preview/mmwrhtml/rr58e324a1.htm?s\\_cid=rr58e324a1\\_e](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr58e324a1.htm?s_cid=rr58e324a1_e)
- *Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents January 2009:* [http://www.cdc.gov/mmwr/preview/mmwrhtml/rr58e324a1.htm?s\\_cid=rr58e324a1\\_e](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr58e324a1.htm?s_cid=rr58e324a1_e)
- *Notice to Readers: Updated Guidelines on Managing Drug Interactions in the Treatment of HIV-Related Tuberculosis, February 2008:* [http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5704a4.htm?s\\_cid=mm5704a4\\_e](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5704a4.htm?s_cid=mm5704a4_e)
- *Managing Drug Interactions in the Treatment of HIV-Related Tuberculosis, December 2007:* [http://www.cdc.gov/tb/publications/guidelines/TB\\_HIV\\_Drugs/PDF/tbhiv.pdf](http://www.cdc.gov/tb/publications/guidelines/TB_HIV_Drugs/PDF/tbhiv.pdf)
- *Revised Recommendations for HIV Testing of Adults, Adolescents, and Pregnant Women in Health Care Settings, September 2006:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5514a1.htm>
- *Notice to Readers: Updated Guidelines for the Use of Rifamycins for the Treatment of Tuberculosis Among HIV-Infected Patients Taking Protease Inhibitors or Nonnucleoside Reverse Transcriptase Inhibitors, January 2004:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5302a6.htm>

**TB in Specific Populations:** <http://www.cdc.gov/tb/publications/guidelines/specpop.htm>

- *Prevention and Control of Tuberculosis in Correctional and Detention Facilities: Recommendations from CDC, July 2006:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5509a1.htm>
  - *Elderly Persons:* <http://www.cdc.gov/tb/publications/guidelines/Elderly.htm>
  - *Screening for Tuberculosis and Tuberculosis Infection in High-Risk Populations (ACET), September 1995:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/00038873.htm>
  - *Prevention and Control of Tuberculosis in Facilities Providing Long-Term Care to the Elderly, July 1990:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/00001711.htm>
- *Foreign-born:* <http://www.cdc.gov/tb/publications/guidelines/foreignborn.htm>
  - *Preventing and Controlling Tuberculosis Along the U.S.-Mexico Border Work Group Report January 2001:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5001a1.htm>
  - *Recommendations for Prevention and Control of Tuberculosis among Foreign-Born Persons, September 1998:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/00054855.htm>
- *Homeless: Prevention and Control of Tuberculosis Among Homeless Persons (ACET, April 1992):* <http://www.cdc.gov/mmwr/preview/mmwrhtml/00019922.htm>

**Testing & Diagnosis:** <http://www.cdc.gov/tb/publications/guidelines/Testing.htm>

- *Guidelines for Using the QuantiFERON-TB Gold Test for Detecting Mycobacterium tuberculosis Infection, United States, December 2005:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5415a4.htm>
- *Tuberculosis Associated with Blocking Agents Against Tumor Necrosis Factor - Alpha California, 2002–2003, August 2004:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5330a4.htm>
- *Timing of Tuberculosis Screening and Smallpox Vaccination - Recommendations for Using Smallpox Vaccine in a Pre-Event Vaccination Program, April 2003:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5207a1.htm>
- *Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection, June 2000:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4906a1.htm>
  - *Update: Adverse Event Data and Revised American Thoracic Society/CDC Recommendations Against the Use of Rifampin and Pyrazinamide for Treatment of Latent Tuberculosis Infection, 2003:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5231a4.htm>
  - *Update: Fatal and Severe Liver Injuries Associated with Rifampin and Pyrazinamide for the Treatment of Latent Tuberculosis Infection, and Revisions in American Thoracic Society/CDC Recommendations — United States, 2001:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5034a1.htm>
  - *Fatal and Severe Hepatitis Associated With Rifampin and Pyrazinamide for the Treatment of Latent Tuberculosis Infection — New York and Georgia, April 2000:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5015a3.htm>
- *Diagnostic Standards / Classification of TB in Adults and Children, April 2000:* <http://ajrccm.atsjournals.org/cgi/content/full/161/4/1376>
- *Recommendations of the Advisory Committee on Immunization Practices (ACIP): Use of Vaccines and Immune Globulins in Persons with Altered Immunocompetence, April 1993:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/00023141.htm>

**Treatment:** <http://www.cdc.gov/tb/publications/guidelines/Treatment.htm>

- *Treating Opportunistic Infections Among HIV-Exposed and Infected Children, December 2004:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5314a1.htm>
- *Tuberculosis Associated with Blocking Agents Against Tumor Necrosis Factor - Alpha – California, 2002–2003, August 2004:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5330a4.htm>

**Vaccines & Immunizations:** <http://www.cdc.gov/tb/publications/guidelines/Vaccines.htm>

- *General Recommendations on Immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the American Academy of Family Physicians (AAFP), February 2002:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5102a1.htm>
- *Development of new Vaccines for Tuberculosis, August 1998:* <http://www.cdc.gov/mmwr/preview/mmwrhtml/00054407.htm>

**CDC Reporting Information:**

- *Report of a Verified Case of Tuberculosis; Instruction Manual For New Form (2009)*:  
<http://ftp.cdc.gov/pub/software/tims/2009%20rvct%20documentation/rvct%20training%20materials/rvct%20instruction%20manual.pdf>

**Joint RTMCC Products Page:** <https://sntc.medicine.ufl.edu/rtmccproducts.aspx>; this is a searchable webpage that contains all the products available from each Regional Training and Medical Consultation Center (RTMCC). Products can be downloaded or printed straight from the webpage.

**Francis J. Curry National TB Center:** [http://www.nationaltbcenter.ucsf.edu/products/a-z\\_list.cfm](http://www.nationaltbcenter.ucsf.edu/products/a-z_list.cfm)

- *Drug-Resistant Tuberculosis: A Survival Guide for Clinicians, 2nd edition (Printed Book)*; first released in 2004, the Guide is a joint publication of CNTC and the Tuberculosis Control Branch of the California Department of Public Health. It contains information and user-friendly tools and templates for use by any clinician who participates in the management of patients with drug-resistant TB. The 10 chapters and 15 appendices cover major topics pertaining to epidemiology, diagnosis, treatment, medications, monitoring, special situations, adverse reactions, case management, legal issues, and treatment of contacts: [http://www.nationaltbcenter.ucsf.edu/drtb/docs/MDRTB\\_Web\\_Mar08.pdf](http://www.nationaltbcenter.ucsf.edu/drtb/docs/MDRTB_Web_Mar08.pdf)
- *Radiographic Manifestations of Tuberculosis: A Primer for Clinicians, Second Edition*; using a self-study format, this publication presents the physical principles of plain chest radiography, enabling clinicians to understand how chest radiographs are created and why normal anatomy and pathology may or may not be visualized using radiographs; gather information from the radiograph; and read and interpret chest radiographs for the presence of tuberculosis disease using standard terminology: [http://www.nationaltbcenter.ucsf.edu/radiographic/docs/Radiographic\\_Complete\\_2ndEd.pdf](http://www.nationaltbcenter.ucsf.edu/radiographic/docs/Radiographic_Complete_2ndEd.pdf)
- *Tuberculosis Drug Information Guide*; is derived from *Drug-Resistant Tuberculosis: A Survival Guide for Clinicians (2nd edition)* produced in 2008 by the Francis J. Curry National Tuberculosis Center (CNTC) and the State of California Department of Public Health, Tuberculosis Control Branch (CDPH). The information in this easy-to-use guide was updated in November 2009 and features information on all medications currently used to treat tuberculosis, both in the U.S. and internationally. For each drug (listed alphabetically), this guide includes information about the drug's activity against TB; dosing instructions; preparation and storage; pharmacokinetics; adverse reactions; contraindications; monitoring; wholesale cost; and patient instructions: <http://www.nationaltbcenter.ucsf.edu/tbdruginfo/docs/tbdruginfo.pdf>
- *Tuberculosis Infection Control: A Practical Manual for Preventing TB (Printed Book)*; this manual provides up-to-date information about the guidelines and regulations pertaining to TB infection control, methods of reducing the risk of TB infection, and facility-specific guidelines for reducing the risk and dealing with potential exposure: [http://www.nationaltbcenter.ucsf.edu/TB\\_IC/docs/ICC\\_book.pdf](http://www.nationaltbcenter.ucsf.edu/TB_IC/docs/ICC_book.pdf)

**Heartland National TB Center:** <http://www.heartlandntbc.org/products.asp>

- *Assessing and Managing the Risk of Liver Disease in the Treatment of LTBI*; one-page flow diagram for clinicians and health-care providers: [http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=assessing\\_and\\_managing\\_the\\_risk\\_of\\_liver\\_disease\\_in\\_the\\_treatment\\_of\\_ltbi.pdf&p=30](http://www.heartlandntbc.org/click_counter.asp?u_link=assessing_and_managing_the_risk_of_liver_disease_in_the_treatment_of_ltbi.pdf&p=30)
- *Characteristics of Second-Line Drugs for MTB*; one-page flow diagram for clinicians and health-care providers: [http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=card1\\_side\\_effects\\_drug\\_interactions.pdf&p=25](http://www.heartlandntbc.org/click_counter.asp?u_link=card1_side_effects_drug_interactions.pdf&p=25)
- *Evaluation of Pregnant Patient at Risk for TB*; one-page flow diagram for clinicians and health-care providers: [http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=evaluation\\_of\\_pregnant\\_patient\\_at\\_risk\\_for\\_tb.pdf&p=31](http://www.heartlandntbc.org/click_counter.asp?u_link=evaluation_of_pregnant_patient_at_risk_for_tb.pdf&p=31)
- *Impact of Poor Nutrition on TB Relapse*; pocket guide to aid in the clinical assessment of a patient's weight and nutritional status. Product highlights include a Body Mass Index (BMI) chart, clinical definitions, and nutritional formulas. Prints double-sided, flipchart orientation: [http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=bmi\\_card\\_oct\\_2008.pdf&p=44](http://www.heartlandntbc.org/click_counter.asp?u_link=bmi_card_oct_2008.pdf&p=44)
- *Plan de Cuidado para el Paciente con TB Multifarmaco Resistente*; Spanish-language version of MDR TB Care Plan: [http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=mdr\\_tb\\_care\\_plan\\_sp.pdf&p=46](http://www.heartlandntbc.org/click_counter.asp?u_link=mdr_tb_care_plan_sp.pdf&p=46)
- *MDR TB Care Plan*; one-page diagram for clinicians and health-care providers: [http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=mdr\\_tb\\_care\\_plan.pdf&p=33](http://www.heartlandntbc.org/click_counter.asp?u_link=mdr_tb_care_plan.pdf&p=33)
- *Model Tuberculosis Prevention Program for College Campuses*; manual for local or college health-care providers. Includes CD-ROM of sample forms and letters: [http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=model\\_tb\\_prevention\\_program\\_college\\_campuses.pdf&p=29](http://www.heartlandntbc.org/click_counter.asp?u_link=model_tb_prevention_program_college_campuses.pdf&p=29)

- *Limiting Liver Toxicity in the HIV-Positive Patient with Latent Tuberculosis Infection*; 3 fold brochure aimed at the identification and management of hepatotoxicity in HIV/TB coinfecting patients being treated for LTBI. The brochure contains information on LTBI in the context of HIV; hepatotoxicity, toxicity monitoring, and screening guidelines:  
[http://www.heartlandntbc.org/products/liver\\_toxicity.pdf](http://www.heartlandntbc.org/products/liver_toxicity.pdf)
- *TB at a Glance*; pocket-sized manual for clinicians and providers managing patients with active and latent tuberculosis:  
[http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=tb\\_at\\_a\\_glance.pdf&p=47](http://www.heartlandntbc.org/click_counter.asp?u_link=tb_at_a_glance.pdf&p=47)
- *Tuberculosis Adverse Drug Events*; 4-inch by 5-inch pocket guide for health-care providers:  
[http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=tuberculosis\\_adverse\\_drug\\_events.pdf&p=3](http://www.heartlandntbc.org/click_counter.asp?u_link=tuberculosis_adverse_drug_events.pdf&p=3)
- *Tuberculosis Medication Drug and Food Interactions*; 4-inch by 5-inch pocket guide for health-care providers:  
[http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=tuberculosis\\_medication\\_drug\\_and\\_food\\_interactions.pdf&p=36](http://www.heartlandntbc.org/click_counter.asp?u_link=tuberculosis_medication_drug_and_food_interactions.pdf&p=36)
- *Tuberculosis Treatment Guidelines – 2003*; 4-inch by 5-inch pocket guide for health-care providers:  
[http://www.heartlandntbc.org/click\\_counter.asp?u\\_link=tuberculosis\\_treatment\\_guidelines\\_2003.pdf&p=37](http://www.heartlandntbc.org/click_counter.asp?u_link=tuberculosis_treatment_guidelines_2003.pdf&p=37)

**New Jersey Medical School Global TB Institute:** <http://www.umdnj.edu/globaltb/productlist.htm>

- *Basic Epidemiology for Tuberculosis Program Staff*; this resource provides a background on basic epidemiology for tuberculosis program staff. The information in this guide will assist in analyzing and making practical use of data, assessing current and evolving trends in TB morbidity, identifying risk groups and determining where to allocate staff and resources:  
<http://www.umdnj.edu/globaltb/downloads/products/EpiBooklet.pdf>
- *Cultural Competency and Tuberculosis Care: A Guide for Self-Study and Self-Assessment*; this print resource was developed for the public health workforce and other healthcare providers. It is intended as a tool to begin to explore the knowledge, skills, and attitudes necessary for cultural competency in general, with a focus on TB control activities. The guide utilizes a culture general perspective and includes a self-assessment tool, teaching cases, and links to other cultural competency resources:  
<http://www.umdnj.edu/globaltb/downloads/products/Newsletter-7.pdf>
- *Designing a Drug-O-Gram: A Tool for Monitoring and Adjusting TB Therapy*; the most current TB treatment guidelines state that frequent monitoring of a patient's treatment regimen and response to treatment is critical and can be accomplished through use of a drug-o-gram. This electronic resource provides an interface for entering patient data to create a drug-o-gram. It includes a user's guide with instructions and teaching points:  
<http://www.umdnj.edu/globaltb/downloads/products/Drug%20Gram%20Users%20Guide.pdf>
- *Diagnosis and Treatment of Latent Tuberculosis Infection (Drug Card)*; this pocket-sized drug treatment card for clinicians provides information on diagnosis of latent tuberculosis infection and therapy options and recommendations for infected patients:  
<http://www.umdnj.edu/globaltb/downloads/products/lbtidrugcard.pdf>
- *Facility TB Profile: Working with Community Health Agencies to Strengthen LTBI Activities*; this resource will provide health departments with the ability to identify healthcare facilities in the community where targeted TB testing and treatment of LTBI are likely to be most successful and efficient. Used in conjunction with another product, *Identifying Missed Opportunities for Preventing TB*, health departments should be able to make a compelling case for strengthening activities in specific target facilities in the community:  
<http://www.umdnj.edu/globaltb/downloads/products/facilitytb.pdf>
- *Guidelines for Initiating a School Based Directly Observed Therapy Program*; these guidelines provide direction to a health department for implementing school-based DOT for TB infection and disease. It outlines the advantages of school-based DOT, procedure for setting up a DOT program, follow-up with school nurses, planning for DOT outside of school and continuing a collaborative relationship between schools and TB programs:  
<http://www.umdnj.edu/globaltb/downloads/products/schoolbaseddot.pdf>
- *Guidelines for the Diagnosis of Latent Tuberculosis Infection for the 21st Century*; this scientific monograph, which was updated in 2008, discusses targeted tuberculin skin testing for latent TB infection as a strategic component of TB control. Specifically addressed are how to administer and interpret the tuberculin skin test with information about the test's specificity and sensitivity. There is also information about the QuantiFERON®- TB Gold In Tube test and tuberculin sensitivity with mycobacteria other than *M. tuberculosis*. This monograph is certified for continuing medical and nursing education through the completion of a post-test and evaluation located at the end of the document:  
<http://www.umdnj.edu/globaltb/downloads/products/guideltbi.pdf>



- *Identifying Missed Opportunities for Preventing TB: A Resource for TB Programs*; this manual is to be used with active TB cases to document the extent to which cases could have been prevented. The methodology identifies providers who served the patient prior to the TB diagnosis and points at which the provider failed to carry out targeted testing and treatment of LTBI recommendations. A questionnaire supplementing routine TB surveillance data is also included:  
<http://www.umdnj.edu/globaltb/downloads/products/Missed%20Opportunities.pdf>
- *Implementing Legal Interventions for the Control of Tuberculosis*; this resource describes a process by which TB programs can effectively implement legal interventions to gain and maintain the adherence of their patients. Legal interventions are described as a method of last resort, to be implemented in the least restrictive environment possible while balancing the rights of the patient with those of the public. As such, the resource discusses elements that every TB treatment regimen should include, such as case management and the use of incentives and enablers. Included are teaching cases and sample letters that TB programs can adapt to suit local needs:  
<http://www.umdnj.edu/globaltb/downloads/products/Legal%20Interventions.pdf>
- *LTBI Card - Patient's TB Testing and Treatment Record*; this wallet-sized card provides LTBI patients with a permanent record of their tuberculin skin test, chest x-ray and treatment status. Patients can carry the card at all times and show it whenever they are seen by a new healthcare provider. This card is available in PDF format and MS Word and is in multiple languages:  
<http://www.umdnj.edu/globaltb/downloads/products/LTBICardProduct.pdf>
- *LTBI Program Implementation in a Substance Abuse Treatment Facility: A Case Study*; the New Jersey Medical School National Tuberculosis Center collaborated with a substance abuse treatment facility in northern New Jersey, the local health department (HD), and the state HD to develop and implement a plan to more efficiently carry out an on-site TB testing and treatment of LTBI program in an otherwise difficult-to-reach high risk population. This product documents our experience in conducting a detailed needs assessment, revising follow-up TB evaluation and treatment procedures, and developing an evaluation plan. The results after 6 months are presented, along with a list of keys to success:  
<http://www.umdnj.edu/globaltb/downloads/products/LTBI%20Implementation%20Product.pdf>
- *Management of Latent Tuberculosis Infection in Children and Adolescents: A Guide for the Primary Care Provider*; this handbook is a resource for primary care providers. Topics include targeted testing, risk assessment, and treatment of LTBI in children and adolescents. Originally developed in 2004, this product was updated in 2009 to include the most recent recommendations found in the American Academy of Pediatrics 2009 edition of the Report of the Committee on Infectious Diseases (Red Book):  
[http://www.umdnj.edu/globaltb/downloads/products/PediatricGuidelines%20\(Screen\).pdf](http://www.umdnj.edu/globaltb/downloads/products/PediatricGuidelines%20(Screen).pdf)
- *Mantoux Tuberculin Skin Testing - A Training Guide*; this training manual includes materials on TB fundamentals and administration, reading and interpretation of the Mantoux tuberculin skin test. It provides the methodology for training and educating staff. The manual includes lecture materials and teaching strategies for individual/group training, in addition to course participant materials:  
<http://www.umdnj.edu/globaltb/downloads/products/CompleteTrainingGuide.pdf>
- *Outpatient Infusion Therapy for Multidrug-Resistant Tuberculosis: A Practical Guide*; infusion therapy offers an important treatment option for multi-drug resistant tuberculosis (MDR-TB) when long-term injectable medications are required. This resource provides practical guidance relating to the proper use of ambulatory infusion therapy for the treatment of MDR-TB. The guide offers a rationale for providing outpatient infusion therapy for MDR-TB in a clinic setting and describes how to organize the clinic to provide the therapy. In addition, it contains a wall chart, which summarizes the daily tasks for providing infusion therapy:  
<http://www.umdnj.edu/globaltb/downloads/products/InfusionTherapy.pdf>
- *Performance Guidelines for Contact Investigation: The TB Interview*; this manual provides a structured plan for the training, development and evaluation of healthcare workers involved in contact investigation. It focuses on interview techniques and communication skills and provides data collection instruments for the provision of objective feedback to the interviewer:  
<http://www.umdnj.edu/globaltb/downloads/products/tbinterview.pdf>
- *Performance Guidelines: A Supervisor's Guide for the Development and Assessment of TB Field Investigation Skills*; this resource provides supervisors with methods for training and tools to assess a healthcare worker's field investigation skills including ability to set priorities, locate patients and provide motivation and education to ensure medical evaluation, utilize appropriate investigation techniques, and disposition investigations in a timely manner:  
<http://www.umdnj.edu/globaltb/downloads/products/performguide.pdf>

- *Planning & Implementing the TB Case Management Conference*; the case management conference provides a forum for networking, peer support and ongoing training to improve staff expertise in TB control interventions. This manual is a step-by-step guide for developing and conducting the case management conference. It includes guidelines for the conference coordinator, presenters and moderator in the form of “to-do” checklists, sample letters, presentation template, and evaluations: <http://www.umdny.edu/globaltb/downloads/planning&implementing/TBCaseMGT.pdf>
- *TB Interviewing for Contact Investigation: A Practical Resource for the Health Care Worker*; this resource set includes an interview checklist and detailed TB interview outline booklet. The checklist identifies the five components of a TB interview: pre-interview activities, introduction, information/education exchange, contact identification and conclusion; all are detailed in the outline: <http://www.umdny.edu/globaltb/downloads/products/tbinterviewing.pdf>
- *TB School Nurse Handbook*; this handbook contains practical guidance for providing school-based DOT for infection and disease and includes information on skin testing and treatment. It was designed as a quick reference for school nurses, and includes frequently asked questions and templates for documentation: <http://www.umdny.edu/globaltb/products/schoolnursehandbook.htm>
- *TB Simulated Patients: A Training Resource for the Contact Investigation Interview*; the manual describes the methods for utilizing patient scenarios for interviewing training and provides accompanying materials for the roles of the index patient, interviewer, and supervisor/observer. The patient roles encompass a variety of life circumstances to provide the interviewer with opportunities for multiple skills development. Also included are guidelines for the supervisor to develop training, evaluate, and provide feedback to new and experienced interviewers: <http://www.umdny.edu/globaltb/downloads/products/Simulated.pdf>
- *The Interview Checklist*; <http://www.umdny.edu/globaltb/downloads/products/checklist.pdf>
- *Treatment of Tuberculosis (TB) in Adult and Adolescent Patients Co-Infected with the Human Immunodeficiency Virus (HIV) (2007)*; this pocket-size drug treatment card for clinicians provides information on therapy options and recommendations for the co-infected patient including drug interactions and side effects: <http://www.umdny.edu/globaltb/products/hivpocketcard.htm>
- *Treatment of Tuberculosis: Standard Therapy for Active Disease in Adults & Adolescents (2009)*; this pocket-size drug treatment card for clinicians provides information on the standard therapy for active tuberculosis disease, including dosages, daily and intermittent regimens, side effects, treatment information, and visual depictions of first-line medications: <http://www.umdny.edu/globaltb/downloads/products/DrugCardAdult.pdf>
- *Treatment of Tuberculosis: Standard Therapy for Active Disease in Children & Adolescents (2009)*; this pocket-size drug treatment card for clinicians provides information on the standard anti-tuberculosis therapy for active disease in children, including dosages, daily and intermittent regimens, side effects, treatment information, and visual depictions of first-line medications: <http://www.umdny.edu/globaltb/downloads/products/pediatricdrugcard%20.pdf>
- *Tuberculosis Case Management for Nurses: Self-Study Modules*; these four self-study modules provide an overview of public health nursing and discuss the fundamentals of TB case management, leadership skills of the nurse case manager, and management of the pediatric patient. Each module contains review questions and references:
  - *Module 1: Overview of Public Health and Public Health Nursing*; <http://www.umdny.edu/globaltb/downloads/products/Nursing%20Module%201.pdf>
  - *Module 2: Fundamentals of Tuberculosis Case Management*; <http://www.umdny.edu/globaltb/downloads/products/Nursing%20Module%202.pdf>
  - *Module 3: Leadership Skills of the Nurse Case Manager*; <http://www.umdny.edu/globaltb/downloads/products/Nursing%20Module%203.pdf>
  - *Module 4: The Pediatric Patient*; <http://www.umdny.edu/globaltb/downloads/products/Nursing%20Module%204.pdf>
- *Tuberculosis Contact Investigations in Congregate Settings*; this resource is designed for use in the evaluation of contact investigations in congregate settings. The resource provides explanatory text and tools for assessing healthcare worker performance and skills as well as programmatic outcomes of contact investigations in congregate settings: <http://www.umdny.edu/globaltb/downloads/products/Contact%20Investigations.pdf>

- *Tuberculosis Education and the Congregate Setting Contact Investigation: A Resource for the Public Health Worker*; the TB education session is a vital part of the congregate setting contact investigation. This web-based resource will assist public health workers as they plan and conduct an effective TB education session in the congregate setting. Following the guidelines and using the PowerPoint® presentation provided, they can teach the lay audience what it needs to know about TB transmission, infection, disease, skin testing, and treatment. This resource includes: a complete, modifiable TB-education presentation, frequently asked questions about TB, specific to congregate setting contact investigations, TB vocabulary for lay audiences, pull-out TB fact sheet, and an education session evaluation form:  
<http://www.umdj.edu/globaltb/downloads/products/CongregateSetting.pdf>
- *Tuberculosis Field Investigation: A Resource for the Health Care Worker*; this resource describes the TB field investigation process including pre-investigation preparation, communication with individuals in the field, confidentiality, field safety, and working with community providers. A checklist to be used during field work is also included:  
<http://www.umdj.edu/globaltb/downloads/products/fieldinvestigation.pdf>
- *What You Need to Know About TB Infection*; pamphlet on basic TB infection:  
[http://www.cdc.gov/tb/publications/pamphlets/TB\\_infection.pdf](http://www.cdc.gov/tb/publications/pamphlets/TB_infection.pdf)
- *What Parents Need to Know About Tuberculosis (TB) Infection In Children*; this brochure provides parents with important information on tuberculosis infection in children. It is designed in a question and answer format with highlighted information for quick and easy readability. The information covered ranges from the definitions of tuberculosis (TB) infection and TB disease to diagnosis and treatment of TB infection. In addition, tips on treatment improving adherence are provided to ensure completion. The brochure can be distributed to parents of children with latent tuberculosis infection and can also be used by health care providers when providing education on LTBI to parents. This product is intended to be downloaded, printed and distributed at health department clinics or other locations where treatment of children with LTBI is provided. The brochure may be printed and distributed as is, or modified to include specific contact information for your clinic by: 1) typing or writing clinic information in the designated spot on the back of the brochure; 2) placing a label containing clinic information on the printed brochure; and 3) using Adobe Acrobat PDF Writer to electronically add clinic information to the brochure:  
<http://www.umdj.edu/globaltb/downloads/products/tbpedsbrochure.pdf>

**Southeastern National TB Center:** <http://sntc.medicine.ufl.edu/Products.aspx>

- *Country Guide - An Introduction*; this introduction provides an overview of the Country Guides. The Guides will help you employ a more culturally relativistic approach when working with foreign-born individuals:  
<http://sntc.medicine.ufl.edu/Files/Products/Intro.pdf>

Specific country guides:

*Brazil:* <http://sntc.medicine.ufl.edu/Files/Products/Country%20Guide%20-%20Brazil.pdf>

*Cambodia:* [http://sntc.medicine.ufl.edu/Files/Products/Cambodia\\_final.pdf](http://sntc.medicine.ufl.edu/Files/Products/Cambodia_final.pdf)

*China:* <http://sntc.medicine.ufl.edu/Files/Products/Country%20Guide%20-%20China.pdf>

*Colombia:* <http://sntc.medicine.ufl.edu/Files/Products/Country%20Guide%20-%20Columbia.pdf>

*Dominican Republic:* [http://sntc.medicine.ufl.edu/Files/Products/DomRepublic\\_final.pdf](http://sntc.medicine.ufl.edu/Files/Products/DomRepublic_final.pdf)

*Ecuador:* [http://sntc.medicine.ufl.edu/Files/Products/Equador\\_final.pdf](http://sntc.medicine.ufl.edu/Files/Products/Equador_final.pdf)

*El Salvador:* <http://sntc.medicine.ufl.edu/Files/Products/Country%20Guide%20-%20El%20Salvador.pdf>

*Guatemala:* <http://sntc.medicine.ufl.edu/Files/Products/Country%20Guide%20-%20Guatemala.pdf>

*Haiti:* <http://sntc.medicine.ufl.edu/Files/Products/Country%20Guide%20-%20Haiti.pdf>

*Honduras:* <http://sntc.medicine.ufl.edu/Files/Products/Honduras.pdf>

*India:* <http://sntc.medicine.ufl.edu/Files/Products/India.pdf>

*Indonesia:* <http://sntc.medicine.ufl.edu/Files/Products/Country%20Guide%20-%20Indonesia.pdf>

*Mexico:* <http://sntc.medicine.ufl.edu/Files/Products/Mexico.pdf>

*Myanmar (formerly Burma):*

<http://sntc.medicine.ufl.edu/Files/Products/Country%20Guide%20-%20Myanmar.pdf>

*Philippines:* <http://sntc.medicine.ufl.edu/Files/Products/Philippines.pdf>

*Somalia:* [http://sntc.medicine.ufl.edu/Files/Products/Somalia\\_final.pdf](http://sntc.medicine.ufl.edu/Files/Products/Somalia_final.pdf)

*Vietnam:* <http://sntc.medicine.ufl.edu/Files/Products/Vietnam.pdf>



- *Vivir a Todo Pulmon Users Guide: Educational Tools to Address Tuberculosis in Spanish-speaking, Foreign-born Communities*; this guide provides users with implementation information for the Vivir series of educational materials:  
<http://sntc.medicine.ufl.edu/Files/Products/VivirTodoPulmonUsersGuide121107%20-%20SMALL.pdf>

**Charles P. Felton National Tuberculosis Center at Harlem Hospital:** <http://www.harlemtbcenter.org>

- *Treatment of LTBI: Latent TB Infection in Children and Adolescents with Revised Guidelines for RIF and PZA*, 2002:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/LTBI%20wallchart-pediatrics.pdf](http://www.harlemtbcenter.org/Assets/web_docs/LTBI%20wallchart-pediatrics.pdf)
- *Infection in Children and Adolescents: Targeted Tuberculin Skin Testing and Treatment of Latent Tuberculosis*; Pediatric Tuberculosis Collaborative Group, December 2004:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/peds\\_supplement\\_2004.pdf](http://www.harlemtbcenter.org/Assets/web_docs/peds_supplement_2004.pdf)
- *Improving Completion Rates for Treatment of Latent TB Infection in Children and Adolescents*, 2004:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/Peds%20Manual%207.29.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Peds%20Manual%207.29.pdf)
- *Targeted Tuberculin Skin Testing and Treatment of Latent Tuberculosis Infection in Children and Adolescents: Frequently Asked Questions*, 2004:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/PEDS\\_FAQ\\_booklet.pdf](http://www.harlemtbcenter.org/Assets/web_docs/PEDS_FAQ_booklet.pdf)
- *Tuberculin Skin Test: Pediatric & Adolescent Risk Assessment Questionnaire*:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/Pediatrics%20poster.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Pediatrics%20poster.pdf)
- *Screening Children & Adolescents for LTBI: A Pocket Card*, 2004:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/PediatricsCard.pdf](http://www.harlemtbcenter.org/Assets/web_docs/PediatricsCard.pdf)
- *Pediatric Calendar for Completion of LTBI Treatment*:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/Peds%20Calendarfinal.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Peds%20Calendarfinal.pdf)
- *Treatment of Latent TB Infection: Revised Guidelines for RIF and PZA*, 2003 (pocket card):  
[http://www.harlemtbcenter.org/Assets/web\\_docs/Harlem-LTBI.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Harlem-LTBI.pdf)
- *Treatment of Latent TB Infection in Pregnancy and Postpartum: Revised Guidelines for RIF and PZA*, 2005 (pocket card):  
[http://www.harlemtbcenter.org/Assets/web\\_docs/LTBI%20pregnancy%20\(PINK\).pdf](http://www.harlemtbcenter.org/Assets/web_docs/LTBI%20pregnancy%20(PINK).pdf)
- *Adherence to Treatment for Latent Tuberculosis Infection: A Manual for Health Care Providers*, 2005:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/Harlem-LTBI%20Adherence6.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Harlem-LTBI%20Adherence6.pdf)
- *Addressing HIV/AIDS Issues in TB Contact Investigation. 2004. Addressing HIV/AIDS Issues in TB Contact Investigation*, 2004:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/Harlem-HIV%20manual04.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Harlem-HIV%20manual04.pdf)
- *Peer Support for LTBI Treatment Adherence and Completion: Training Curriculum and Facilitator's Guide*, 2006:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/peersupport1.pdf](http://www.harlemtbcenter.org/Assets/web_docs/peersupport1.pdf)
- *Peer Support for LTBI Treatment Adherence; a Manual for Program Managers and Supervisors of Peer Workers*, 2003:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/ltbi%20peer%20manual.pdf](http://www.harlemtbcenter.org/Assets/web_docs/ltbi%20peer%20manual.pdf)
- *Latent Tuberculosis Infection: Seven Case Studies*, 2003:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/ltbi%20case%20studies.pdf](http://www.harlemtbcenter.org/Assets/web_docs/ltbi%20case%20studies.pdf)
- *Tuberculosis: Six Case Studies*, 1999:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/Cases.pdf](http://www.harlemtbcenter.org/Assets/web_docs/Cases.pdf)
- *Improving Treatment Completion for Latent Tuberculosis Infection Among Health Care Workers*, 1999:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/HCW.pdf](http://www.harlemtbcenter.org/Assets/web_docs/HCW.pdf)
- *Social Support Services for Tuberculosis Clients*, 1999:  
[http://www.harlemtbcenter.org/Assets/web\\_docs/SW.pdf](http://www.harlemtbcenter.org/Assets/web_docs/SW.pdf)

**Respiratory Protection Materials:**Occupational Health & Safety Administration (OSHA) Respiratory Policies

- *OSHA Health & Safety Topics: Tuberculosis:*  
<http://www.osha.gov/SLTC/tuberculosis/>
- *OSHA Respiratory Protection Statement Overview:*  
<http://www.osha.gov/SLTC/respiratoryprotection/index.html>
- *OSHA Respiratory Standard 1910.134:*  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_id=12716&p\\_table=standards](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=12716&p_table=standards)
- *OSHA Maintenance of medical evaluation and fit test records as required by the Respiratory Protection Standard (June 2009):* [http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=INTERPRETATIONS&p\\_id=27095](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=27095)
- *OSHA Training Standards Policy Statement (April 2007):*  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=INTERPRETATIONS&p\\_id=25658](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=25658)
- *OSHA Tuberculosis and Respiratory Protection: prohibition of enforcing annual fit testing requirements during 2005 fiscal year; enforcement of other 1910.134 provisions (December 2004):*  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=INTERPRETATIONS&p\\_id=24977](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=24977)
- *OSHA Tuberculosis and Respiratory Protection Statement: Interpretation (July 2004):*  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=INTERPRETATIONS&p\\_id=24895](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=24895)
- *OSHA Appendix A to Standard 1910.134: Fit Testing Procedures (Mandatory):*  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9780](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9780)
- *OSHA Appendix B-1 to Sec. 1910.134: User Seal Check Procedures (Mandatory):*  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9781](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9781)
- *OSHA Appendix B-2 to Sec. 1910.134: Respirator Cleaning Procedures (Mandatory):*  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9782](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9782)
- *OSHA Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory):*  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9783](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9783)
- *OSHA Appendix D to Sec. 1910.134 (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard:*  
[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9784](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9784)

**National Institute of Occupational Health and Safety (NIOSH)**

- *NIOSH and CDC TB Respiratory Protection Program in Health Care Facilities; Administrators Guide (1999):*  
<http://www.cdc.gov/niosh/docs/99-143/pdfs/99-143.pdf>

**World Health Organization:**

- *WHO Policy on TB Infection Control in Health-Care Facilities, Congregate Settings and Households, 2009:*  
[http://whqlibdoc.who.int/publications/2009/9789241598323\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241598323_eng.pdf)
- *Tuberculosis and Air Travel: Guidelines for Prevention and Control, Third Edition 2008:*  
[http://www.who.int/tb/publications/2008/WHO\\_HTM\\_TB\\_2008.399\\_eng.pdf](http://www.who.int/tb/publications/2008/WHO_HTM_TB_2008.399_eng.pdf)
- *Ethambutol efficacy and toxicity: literature review and recommendations for daily and intermittent dosage in children, 2006:* [http://whqlibdoc.who.int/hq/2006/WHO\\_HTM\\_TB\\_2006.365\\_eng.pdf](http://whqlibdoc.who.int/hq/2006/WHO_HTM_TB_2006.365_eng.pdf)
- *Dosing instructions for the use of currently available fixed-dose combination TB medicines for children, 2009:*  
[http://www.who.int/tb/challenges/interim\\_paediatric\\_fdc\\_dosing\\_instructions\\_sept09.pdf](http://www.who.int/tb/challenges/interim_paediatric_fdc_dosing_instructions_sept09.pdf)
- *International Standards for Tuberculosis Care, 2006:*  
[http://www.who.int/tb/publications/2006/istc\\_report.pdf](http://www.who.int/tb/publications/2006/istc_report.pdf)
- *The Patient's Charter for Tuberculosis Care, 2006:*  
[http://www.who.int/tb/publications/2006/patients\\_charter.pdf](http://www.who.int/tb/publications/2006/patients_charter.pdf)
- *Pathways to better diagnostics for tuberculosis: A blueprint for the development of TB diagnostics, 2009:*  
[http://www.stoptb.org/assets/documents/resources/publications/technical/BluePrintTB\\_annex\\_web.pdf](http://www.stoptb.org/assets/documents/resources/publications/technical/BluePrintTB_annex_web.pdf)

**CDC, Division of Global Migration and Quarantine (DGMQ):** <http://www.cdc.gov/ncpcid/dgmaq/index.html>

- *Factsheet: Legal Authorities for Isolation and Quarantine:*  
<http://www.cdc.gov/quarantine/pdfs/legal-authorities-isolation-quarantine.pdf>
- *Factsheet: CDC Global Tuberculosis Control Activities for U.S. Immigration, 2009:*  
<http://www.cdc.gov/immigrantrefugeehealth/exams/ti/panel/tuberculosis-panel-factsheet-global-control-activities.html>
- *CDC Immigration Requirements: Technical Instructions for Tuberculosis Screening and Treatment, 2009:*  
<http://www.cdc.gov/immigrantrefugeehealth/pdf/tuberculosis-ti-2009.pdf>
- *Tuberculosis Screening for International Adoptees Frequently Asked Questions (FAQs):*  
<http://www.cdc.gov/immigrantrefugeehealth/exams/adoptees-tuberculosis-screening-faq.html>
- *Immigrant and Refugee Health: Laws and Regulations, 2009:*  
<http://www.cdc.gov/immigrantrefugeehealth/laws-regulations.html>
- *Immigrant and Refugee Health - Domestic examination for newly arrived refugees: Guidelines and discussion of the history and physical examination:*  
<http://www.cdc.gov/immigrantrefugeehealth/pdf/guidelines-history-physical.pdf>
- *Technical Instructions for Panel Physicians, 2007:*  
<http://www.cdc.gov/immigrantrefugeehealth/exams/ti/panel/technical-instructions-panel-physicians.html>
- *Tuberculosis Technical Instructions for Civil Surgeons, 2008:*  
<http://www.cdc.gov/immigrantrefugeehealth/pdf/tb-ti-civil.pdf>
- *FAQs Tuberculosis Component of the Technical Instructions (TIs) for the Medical Examination of Aliens in the United States, 2008:*  
<http://www.cdc.gov/immigrantrefugeehealth/pdf/tb-ti-faq.pdf>
- *Specific Laws and Regulations Governing the Control of Communicable Diseases:*  
<http://www.cdc.gov/quarantine/SpecificLawsRegulations.html>

**Additional Resources from the Case Studies in Tuberculosis not listed above:**

- **CASE #1:** *Guidelines for the Treatment of Active Tuberculosis Disease;* California Department of Health Services/California Tuberculosis Control Association April 15, 2003; p1-34:  
<http://www.ctca.org/guidelines/IIA1treatmentactivetb.pdf>
- **CASE #2:** *TB-410: Order to Implement and Carry Out Measures For a Client with Tuberculosis,* August 2004; Texas Department of State Health Services:  
<http://www.dshs.state.tx.us/idcu/disease/tb/forms/>
- **CASE #2:** *Courtforce Handbook September 2006;* Missouri Department of Health and Senior Services:  
<http://www.dhss.mo.gov/TBManual/Chap9.pdf>
- **CASE #5:** *"Tuberculosis of the Spine: A Review."* Jain, AK and Dhammi, IK (Jain 2007), *Clinical Orthopedics & Related Research*, Volume 460; p39-49.
- **CASE #7:** *Tuberculosis Current Concepts and Treatment.* Friedman, Lloyd (1994), CRC Press, Boca Raton, Florida; copyright 1994, p. 28.
- **CASE #7:** *Cluster of human tuberculosis caused by *Mycobacterium bovis*: evidence for person-to-person transmission in the UK.* Evans, JT, EG Smith, et al. (2007). *Lancet*; Volume 369 (9569); p.1270-6.
- **CASE #7:** *Bovine Tuberculosis from Consuming Unpasteurized (Raw Milk) Products (Bovine TB): *M. bovis* Tuberculosis - Patient Information;* Maryland Department of Health and Mental Hygiene, Office of Epidemiology and Disease Control Programs November 2005: [http://www.edcp.org/tb/pdf/Bovine\\_Patientfactsheet.pdf](http://www.edcp.org/tb/pdf/Bovine_Patientfactsheet.pdf)  
Also available in Spanish at: [http://www.edcp.org/tb/pdf/BovinePatientfactsheet\\_SPL.pdf](http://www.edcp.org/tb/pdf/BovinePatientfactsheet_SPL.pdf)

- **CASE #7:** *Don't get sick from eating or drinking raw (unpasteurized) milk, cheese or milk products... Important news about bovine TB (bovine tuberculosis);* Maryland Department of Health and Mental Hygiene, Office of Epidemiology and Disease Control Programs, Patient Education Handout. November 2005:  
<http://www.edcp.org/tb/pdf/BovineTB106WIC.pdf>.  
Also available in Spanish at: <http://www.edcp.org/tb/pdf/BovineTBSpanishWIC.pdf>
- **CASE #7:** *Maryland DHMH Advisory: Mycobacterium bovis (M. bovis) tuberculosis in Maryland - Healthcare Provider Information;* Maryland Department of Health and Mental Hygiene, Office of Epidemiology and Disease Control Programs December 2005:  
[http://www.edcp.org/tb/pdf/Bovine\\_Providersfactsheet\\_5.pdf](http://www.edcp.org/tb/pdf/Bovine_Providersfactsheet_5.pdf)
- **CASE #7:** *Mycobacterium bovis Data Sheet;* New Zealand Ministry of Health (NZMH 2001). May 2001:  
<http://www.nzfsa.govt.nz/science/data-sheets/mycobacterium-bovis.pdf>
- **CASE #7:** *Recovery of Mycobacterium bovis from Soft Fresh Cheese Originating in Mexico.* Harris, NB, et al. (2007). *Applied Environmental Microbiology*; Volume 73 (3); p.1-25-1028.
- **CASE #7:** *Operations Guidelines for STD Prevention, Surveillance and Data Management.* Centers for Disease Control and Prevention, Division of STD Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, August 2007:  
<http://www.cdc.gov/STD/Program/surveillance/4-PGsurveillance.htm>
- **CASE #7:** *Learn More About Epi-X;* Centers for Disease Control and Prevention: <http://www.cdc.gov/epix/#1>
- **CASE #8:** *Consensus Statement: Updated consensus statement on biological agents for the treatment of rheumatic diseases, 2007.* Furst, DE, FC Breedveld, et al. (2007). *Annals of the Rheumatic Diseases* 2007; Volume 66, Supplement 3; pii2-22.
- **CASE #8:** *Interjurisdictional TB Notification Form;* National TB Controllers Association March 2002:  
[http://tbcontrollers.org/docs/IJ\\_Form\\_Page1.pdf](http://tbcontrollers.org/docs/IJ_Form_Page1.pdf)
- **CASE #8:** *Interjurisdictional TB Notification Follow-up Form;* National TB Controllers Association May 2002:  
[http://tbcontrollers.org/docs/IJ\\_Form\\_Page2\\_Followup.pdf](http://tbcontrollers.org/docs/IJ_Form_Page2_Followup.pdf)
- **CASE #10:** *An official ATS Statement: Hepatotoxicity of Antituberculosis Therapy, March 2006.* Saukkonen, JJ, et al. (ATS 2006). *American Journal of Respiratory & Critical Care Medicine*; Volume 174(8); p935 - 52:  
<http://ajrccm.atsjournals.org/cgi/content/full/174/8/935>

#### Miscellaneous Resources:

- *Health Care Language Services Implementation Guide;* with growing concerns about racial, ethnic, and language disparities in health and health care and the need for health care systems to accommodate increasingly diverse patient populations, language access services (LAS) have become more and more a matter of national importance. This guide will help you effectively plan, implement, and evaluate LAS within your organization. At the following website, you will need to register (no charge to register on US Dept of Health & Human Services website) to view and download the guide:  
<http://hclsig.thinkculturalhealth.org>
- *Cultural Competency Resource Guide;* TB-Education & Training Network 2009:  
<http://www.findtbresources.org/material/CCGuide.pdf>
- *National Standards on Culturally and Linguistically Appropriate Services (CLAS);*  
<http://minorityhealth.hhs.gov/templates/browse.aspx?lvl=2&lvlID=15>

#### You are also strongly urged to provide as a resource for your nursing staff the following:

- Your state's Tuberculosis Policies and Procedures
- Your state's TB Laboratory policies and ordering/reporting information
- Your state or institutional Standing Delegation Orders for tuberculosis
- Your institutional or departmental policies and procedures on tuberculosis including laboratory and clinical test policies and ordering/reporting information
- Your institution- or department-developed patient or staff education materials
- Reprints of pertinent journal articles on tuberculosis

Appendix C – Sample Training Schedule and Checklist

**Training Schedule and Checklist**  
**Heartland National TB Center: *Case Studies in Tuberculosis***

Program Name: \_\_\_\_\_

Trainee Name: \_\_\_\_\_

Start Date: \_\_\_\_\_ Due Date: \_\_\_\_\_

Case #	State Date	Completion Date	Grade	Notes
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Training Coordinator: \_\_\_\_\_  
Signature

\_\_\_\_\_  
 Date

Trainee: \_\_\_\_\_  
Signature

\_\_\_\_\_  
 Date





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