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## *To Contact Us*

### **Mailing address:**

**Heartland National TB Center**  
**2303 SE Military Drive**  
**San Antonio, TX 78223**

### **Telephone Number:**

**1-800-TEX-LUNG**  
**(800-839-5864)**

### **Fax Numbers:**

**Administration**  
**(210) 531-4590**  
**Medical Consultation**  
**(210) 531-4500**

**[www.HeartlandNTBC.org](http://www.HeartlandNTBC.org)**

## **A Focus on Infection Control**

In light of the H1N1 (swine flu) virus reaching pandemic status, the world has a heightened concern for the term infection control. Imagery of masked faces and desolate streets flashed across our television screens bring to mind past global outbreaks such as that of SARS and serve as a reminder of the public threat caused by infectious diseases. However for TB professionals such infection control precautions and the intricacies that they involve are all too familiar.

Occasionally a highly publicized case goes beyond the boundaries of the TB realm and into the public eye. While these incidents tend to fade quickly from the collective memory a few manage to give the community at large insight into the complexities that TB control efforts face. One such example is the 2006 case of a Russian man who moved to Arizona, later to be diagnosed with extensively drug-resistant TB. The 27 year old man who held dual citizenship in Russia and the U.S. contracted TB in Russia and received an unspecified treatment; however approximately a year later became symptomatic again and traveled to Phoenix. After his TB diagnosis in Phoenix, he was placed in a residence for homeless TB patients and instructed on appropriate infection control protection measures. Despite proper instruction the patient did not follow these precautions, claiming that such measures were not used in Russia, and exposed the public to an extremely difficult-to-treat strain of TB. Health officials were forced to obtain a court order allowing the patient to be locked up in the jail unit of a Phoenix hospital. Although not charged with a crime, he was placed in this unit because he was judged to be a menace to public health. This particular case brought the importance of infection control to the forefront of people's minds and also sparked an intense debate about legality and ethics of mechanisms used to protect public health. Within the TB field

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## HNTC Staff

### Medical Director

Barbara Seaworth, MD  
(210) 534-8857  
[barbara.seaworth@dshs.state.tx.us](mailto:barbara.seaworth@dshs.state.tx.us)

### Assistant Medical Director

David Griffith, MD  
(903) 877-7267  
UTHC Tyler  
[david.griffith@uthct.edu](mailto:david.griffith@uthct.edu)

### Executive Director

Stephanie Ott, CPM  
(210) 531-4542  
[stephanie.ott@uthct.edu](mailto:stephanie.ott@uthct.edu)

### Training and Product Development

Director, Education & Training  
Mary Long, MSPH  
(210) 531-4545  
[mary.long@uthct.edu](mailto:mary.long@uthct.edu)

### Education Specialist

Jessica Quintero  
(210) 531-4568  
[jessica.quintero@uthct.edu](mailto:jessica.quintero@uthct.edu)

### Web Site & Content

Coordinator  
Eddie McHam  
(210) 531-4520  
[eddie.mcham@uthct.edu](mailto:eddie.mcham@uthct.edu)

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this case also raised important questions about methods of providing adequate and complex treatment as well as education to patients at risk of noncompliance.

Although this type of case is rare, the scenario is not foreign to TB professionals who must rely regularly on a three-tier system which includes administrative, environmental, and personal infection control protection measures that are set in place to prevent the spread of infection. Infection is more likely to occur as additional components of the three-tier system are broken, thus if TB is suspected these precautions must be put in place until either TB is ruled out or the patient is determined non-infectious. The least drastic measure necessary coupled with adequate patient education is always preferable; however isolated confinement can be a necessary consequence to ensure that all three infection control tiers are in place.

General guidelines such as these are well known, however in this *TBeat* edition we would like to emphasize the specifics within the rules and the need for continued education and updates. These points are illustrated through the case presentation, teaching points, and corresponding infection control guideline table (*pages 6-11*).

### REFERENCES:

Centers for Disease Control and Prevention. *Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings, 2005*. MMWR 2005; 54( No.RR-17).

Finn, Peter. *Virulent New Strain of TB Raising Fears of Pandemic*. May 2007. The Washington Post. [http://www.washingtonpost.com/wp-dyn/content/article/2007/05/02/AR2007050202831\\_pf.html](http://www.washingtonpost.com/wp-dyn/content/article/2007/05/02/AR2007050202831_pf.html) Accessed June 2009.

Knox, Richard. *Arizona TB Patient Jailed as a Public Health Menace*. June 2007. National Public Radio Morning Edition <http://www.npr.org/templates/story/story.php?storyId=10874970> Accessed June 2009.

## HNTC Staff

### Medical Consultation

Nurse Consultant/Educator  
Alisha Blair, LVN  
(210) 531-4546  
[alisha.blair@uthct.edu](mailto:alisha.blair@uthct.edu)

Nurse Consultant/Educator  
Sarah Hoffman, MPH, MSN,  
ACRN  
(210) 531-4580  
[sarah.hoffman@uthct.edu](mailto:sarah.hoffman@uthct.edu)

Nurse Consultant/Educator  
Catalina Navarro, RN, BSN  
(210) 531-4569  
[catalina.navarro@uthct.edu](mailto:catalina.navarro@uthct.edu)

Nurse Consultant/Educator  
Debbie Onofre, RN, BSN  
(210) 531-4539  
[debbie.onofre@uthct.edu](mailto:debbie.onofre@uthct.edu)

### Administration

Administrative Specialist  
Delfina Sanchez, MA  
(210) 531-4528  
[delfina.sanchez@uthct.edu](mailto:delfina.sanchez@uthct.edu)

Administrative Specialist  
Sally Santellanes  
(210) 531-4572  
[araceli.santellanes@uthct.edu](mailto:araceli.santellanes@uthct.edu)

Administrative Specialist  
Alysia Thomas  
(210) 531-4549  
[alysia.thomas@uthct.edu](mailto:alysia.thomas@uthct.edu)

The **VISION** of Heartland  
is to provide  
**excellence, expertise,  
innovation** in training,  
medical consultation, and  
product development to  
reduce the impact of  
tuberculosis in our region.

## Related Resources

- [World Health Organization, Tuberculosis](#)
- [Find TB Resources](#)
- [Joint RTMCC Products Page](#)
- [National Tuberculosis Curriculum Consortium](#)
- [Stop TB Partnership](#)
- [Tuberculosis Research Today](#)
- [AIDS Education and Training Centers National Resources Center](#)
- [Partners in Health](#)
- [National Institute of Corrections](#)
- [CDC Infection Control Home](#)
- [TB Infection Control: A Practical Manual for Preventing TB](#)
- [Assoc of Professionals in Infection Control and Epidemiology](#)

## Recent Publications

- [Addressing Social Determinants of Health: Accelerating the Prevention and Control of HIV/AIDS, Viral Hepatitis, STD, and TB; External Consultation Meeting Report; December 9-10, 2008. Atlanta, GA; Department of Health & Human Services and Centers for Disease Control & Prevention](#)
- [Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-infected Adults and Adolescents; MMWR 2009; 58: pages 1-198](#)
- [Plan to Combat Extensively Drug-Resistant Tuberculosis Recommendations of the Federal Tuberculosis Task Force; MMWR 2009; 58 \(RR03\); pages 1-43](#)
- [Overseas Screening for Tuberculosis in U.S.-bound Immigrants and Refugees; Liu Y, Weinberg MS, Ortega LS, Painter JA, Maloney SA. June 4, 2009 in N Engl J Med, 360\(23\): pages 2406-15](#)
- [The Diarylquinoline TMC207 for Multidrug-resistant Tuberculosis.; Diacon AH, et al. June 4, 2009 in N Engl J Med, 360\(23\): pages 2397-405](#)

## State Profile

### Arizona:

In 2008 the state of Arizona reported 227 cases of active tuberculosis resulting in a case rate of 3.5 per 100,000 population. Arizona ranked 15<sup>th</sup> in the U.S. for the highest number of active TB cases. Certain risk factors found to be associated with 2008 reported cases included male gender, Hispanic ethnicity, alcohol use, drug use, correctional residence, homelessness, and foreign-born. In Arizona, 12.8% of cases reported excess alcohol use, 5.3% reported non-injecting drug use, and 2.6% reported injection drug use. In previous years, Arizona has consistently ranked first in the nation for the percentage of cases over 15 years of age diagnosed in correctional facilities. In 2008, correctional facilities accounted for 22% of the state's reported cases. Homelessness is another important risk factor with 6.2% of the 2008 cases reported as being homeless within 12 months prior to diagnosis with TB. In 2008, 65% of Arizona cases were born outside the U.S. and its territories. Persons from Mexico accounted for 51% of the foreign-born cases in 2008.

The Arizona Department of Health Services (ADHS) TB Control Program has set a goal to reduce the occurrence of tuberculosis disease in Arizona by ensuring the availability of tuberculosis treatment services for individuals with infection or disease and preventing further tuberculosis infection in Arizona. Steps to achieve this goal include diagnosing all TB cases and ensuring that patients complete appropriate therapy, enhancing the effectiveness of contact investigation activities and ensuring the prompt identification and completion of treatment of contacts with latent TB infection (LTBI), and expanding the testing and treatment of LTBI to persons in other high-risk populations.

ADHS maintains several partnerships in order to better meet its goals, including partnerships with *Cure TB* and *TB Net* to ensure continuity of care for deported TB cases. In 2008, ADHS referred 31 cases each to *Cure TB* and *TB Net*. ADHS encourages the local health departments and the correctional facilities to complete these referrals on international TB cases that may be returning to their home country before completion of treatment. ADHS also continues to actively support the Four Corners TB and HIV Conference, which will be held this year in Durango, Colorado on October 26th and 27th. ADHS has also collaborated with Heartland in recent years on several conferences such as *TB 101 & Training Basics*, *Nurse Case Management*, and *Multi Drug-Resistant TB: A Primer to Patient Care*.

In addition to these partnerships, ADHS works in collaboration with county and tribal health departments. Other partners include local, state, federal, and private correctional facilities, the American Lung Association, the Sonora Health Department in Mexico, U.S. Immigration and Customs Enforcement (ICE), U.S. Indian Health Services, and private health care providers.

**Contributor:** Carla Chee, MHS

#### **State Contacts:**

Angelito Bravo, Program Manager

Dr. Cara Christ, TB Control Officer

Dr. Ayesha Bashir, Carla Chee, and Kristina Schaller, Epidemiologists

Mary Gullion, Administrative Assistant



## Training Calendar

### *Heartland National TB Center – 2009 Trainings*

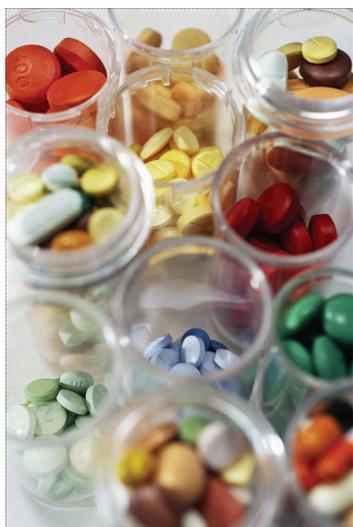
Please go to <http://www.heartlandntbc.org/training.asp> for course information, staff contact information and registration dates for each course. Proposed topics and dates are subject to change; check the website for the latest updates.

<u>Date</u>	<u>Course</u>	<u>Location</u>
September 10	Skills for the Contact Investigator	San Antonio, Texas
September 11	Skills for the Contact Investigator	San Antonio, Texas
September 17-18	The Changing Face of STIs, HIV, & TB	San Antonio, Texas
October 7	Midwest TB Controllers Mtg	Kansas City
November 10-12	TB Intensive	Houston, Texas
November 13	Pediatric TB Intensive	Houston, Texas
November 17	Nurse Case Management	Webinar
November 18	TB Diagnostic Challenges	Oklahoma City, OK
December 1	Refugee Updates	Webinar
December 8-10	TB Nurse Case Management	San Antonio, Texas

**Plus** additional regional webinars and a national webinar; dates and topics to be announced.

## ***TBit***

### **340B Prime Vendor Program**



Heartland National TB Center would like to inform its regional partners about a national program aimed at improving access to affordable medication for covered entities and their patients. The 340B Prime Vendor Program, established through the Veterans Health Care Act of 1992, enables disproportionate share hospitals, community health centers, clinics, and other providers to purchase outpatient pharmaceuticals at discounted pricing. This program is free and voluntary for facilities that are already eligible. For a complete list of eligible facilities please go to the Health Resources and Services Administration Website, <http://www.hrsa.gov/opa/introduction.htm>. To find out more information about this program or to enroll please visit, [www.340bpvp.com](http://www.340bpvp.com).

# Case Presentation

## Utilizing Precautionary Infection Control Measures

### Case History:

An 18-year-old U.S.-born male high school student presented to his cardiologists' office for follow up consultation and scheduled cardiopulmonary stress testing. Previous medical history included severe congenital heart disease and multiple surgical procedures since 1991 with additional surgeries scheduled in the months ahead. During patient evaluation, he revealed the onset of a cough so severe it often caused vomiting. He attributed this cough to his history of marijuana use. Further investigation revealed that the patient also had episodes of hemoptysis associated with the cough. The patient denied any fevers or chills. CT of the chest revealed multiple cavitary lesions and a tree-in-bud appearance within the lingula and right upper lobe. Small non-pathological lymph nodes were present in the mediastinum. The patient denied contact to a TB case or significant travel; a skin test was not placed. He was not able to produce a spontaneous sputum sample so a BAL was performed which was AFB positive. The patient was classified as a TB suspect; antituberculous therapy was started and the treating physician and pulmonologist were advised by the health department to place him on respiratory isolation until sputum smear samples were negative x 3. The patient's graduation was to be held the following day and the treating pulmonologist advocated strongly that the patient be allowed to attend his graduation ceremony with mask usage because he felt the exposure risk was minimal. The sputum sample was later sent for nucleic acid amplification testing (NAA) which was negative for *M. tuberculosis*. Anti-tuberculosis medications had been initiated, but were discontinued once the NAA results were received. The patient was removed from respiratory isolation and the contact investigation was suspended. The patient was allowed to travel via airplane as he had previously planned. Final culture results were pending.

### Background:

Infectiousness is directly related to the number of tubercle bacilli the TB patient expels in the air. Patients who expel more bacilli are considered more infectious than those who expel fewer bacilli. The number of bacilli an individual expels is dependent among the following factors:

- Presence of a cough
  - *M. tuberculosis* is carried in airborne particles, or droplet nuclei, generated when a person with pulmonary or laryngeal TB coughs or sneezes. Infection occurs when a susceptible person inhales droplet nuclei containing *M. tuberculosis* bacilli which reach the alveoli of the lungs.<sup>1</sup>
- Cavitation on chest radiograph
- Positive acid-fast bacilli (AFB) sputum smear results
- Respiratory tract disease with involvement of the larynx (substantially infectious)
- Respiratory tract disease with involvement of the lung or pleura (exclusive pleural involvement even without visible lung involvement-although less infectious-is associated with a positive culture in 40% of patients)
- Failure to cover the mouth and nose when coughing
- Incorrect, lack of, or short duration of antituberculosis treatment
- Undergoing cough-inducing or aerosol-generating procedures (e.g., bronchoscopy, sputum induction, and administration of aerosolized medications)<sup>2</sup>
- Virulence of the infecting strain of tuberculosis<sup>2</sup>

Other factors that increase the likelihood of TB bacilli transmission include environmental factors and host characteristics as listed below.

### Environmental Factors<sup>3</sup>

- Environmental factors that enhance transmission include:
  - Exposure in relatively small, enclosed spaces
  - Lack of adequate ventilation to "clean" the environment through dilution or removal of infectious droplet nuclei
- Re-circulation of air containing infectious droplet nuclei

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**Case Presentation** continued from Page 6

### Duration of Exposure

- For any specific setting, index patient, and contacts, the optimal cut-off duration is undetermined
- Increasing the intensity and duration of exposure usually increases the likelihood of recent *M. tuberculosis* infection in contacts. Because knowledge is insufficient for providing exact recommendations, cut-off points for duration of exposure are not included; state and local program officials should determine cut-off points after considering published results, local experience, and these guidelines.<sup>2</sup>

### Host Characteristics

The characteristics of the persons exposed to *M. tuberculosis* that may affect the risks of becoming infected are not as well defined:

- Persons who have been infected previously with *M. tuberculosis* are less susceptible to subsequent infection
- In high-prevalence countries, when the risk of new infection is very low, the majority of new adult TB cases results from reactivation of remotely acquired infection
- The effect of human immunodeficiency virus (HIV) infection on the risk of TB infection has not been clearly proven, although HIV is the strongest known risk factor for progression from TB infection to TB disease
- The risk of infection may be increased because of changes in the immune response in the mucosa of bronchi and lung tissue that is affected by silicosis, inhalation of smoke (e.g. tobacco, exposure to cooking fires, industrial exposure)<sup>3</sup>

The patient featured in this case study was able to be taken out of isolation despite the positive AFB smear once his sputum tested NAA negative. Although, in most individuals with cavitory disease and positive sputum smears, the diagnosis of *M. tuberculosis* would be strongly considered, our patient's past history of multiple surgical and medical interventions for a congenital heart defect coupled with his history of marijuana use made the possibility of a non-tuberculous mycobacterial infection more likely. NAA tests are occasionally falsely negative due to the presence of inhibitors but this is only likely about 3% of the time when smears are AFB positive. If his NAA had been positive, he would have been required to remain in isolation in accordance with the recommendations below.<sup>4</sup> A surgical mask is inadequate to prevent the transmission of infection and would not have been a reasonable approach in order to allow the patient to attend graduation. Surgical masks decrease the transmission of TB by trapping exhaled respiratory secretions. Masks usually become wet and no longer effective in less than 20 minutes.

The determination of any patient's infectiousness is directly related to each of the factors listed above and each of these factors should be taken into consideration when implementing infection containment procedures including respiratory isolation. TB suspects and cases should be maintained on respiratory isolation until they are cleared and further determined to be non-infectious or an alternative diagnosis is made and TB excluded. TB patients are deemed non-infectious when all of the factors below are present:

- Have received at least two weeks of a standard multi-drug TB regimen<sup>2</sup> (and HNTC *Guidelines for Home and Hospital Isolation of TB Patients*, in this newsletter, pages 9-10)
- When there has been clinical improvement
- Have at least three negative sputum smears collected at least 8 hours apart with a minimum of one early morning specimen.
- Have no risk factors for drug resistance (HNTC *Guidelines for Home and Hospital Isolation of TB Patients*, in this newsletter, pages 9-10)

### Hierarchy of Infection Control

Generally any patient suspected or confirmed as having TB disease should be considered infectious until otherwise noted. The patient should be placed on AII (Airborne Infection Isolation) with surgical mask usage and advised against visiting public places until cleared. The risk of exposure to the public, no matter how minimal, should be taken into consideration when a patient's infectiousness is unknown or questionable.

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**Case Presentation** continued from Page 7

When referencing to the term "infection control", one must be familiar with the current hierarchy of control measures; see below for definitions.

### **Administrative Controls:**

The first and most important level of the hierarchy, administrative measures, affects the largest number of persons and is intended primarily to reduce the risk of uninfected persons exposed to persons who have TB disease.

### **Environmental Controls:**

The second level of the hierarchy is the use of environmental controls to prevent the spread and reduce the concentration of infectious droplet nuclei in ambient air.

### **Respiratory Protective Equipment:**

The third level of the hierarchy is the use of respiratory protective equipment in situations that pose a high risk of exposure to *M. tuberculosis*. Use of respiratory protection equipment can further reduce risk for exposure of health care workers (HCWs) to infectious droplet nuclei that have been expelled into the air from a patient with infectious TB disease.<sup>5</sup>

Also note that within diverse environments, e.g. hospitals, home, clinics, and emergency departments, there are numerous infection control procedures that vary within each setting. Remember, no single infection control plan as it relates to tuberculosis control is considered the gold standard. Clinical assessment and judgment should always be applied with each individual patient. (HNTC *Guidelines for Home and Hospital Isolation of TB Patients*, in this newsletter, pages 9-10)

### **Teaching Points**

- As long as there are viable bacilli that the patient is expelling, there is a possibility for transmission (Dr. Barbara Seaworth, HNTC)
- Cultures remain the "Gold Standard" for laboratory confirmation of TB and are required for isolating bacteria for drug susceptibility testing and genotyping<sup>4</sup>
- The relative contagiousness of patients with smear-negative pulmonary results is unknown, but indirect evidence suggests that smear negative disease and even culture negative disease is responsible for transmission<sup>6</sup>
- Smoking increases the risk and complications of TB
- Infection control measures reduce but do not eliminate the risk of transmission
- A contact investigation is recommended if sputum smear has AFB on microscopy, unless the result from an approved NAA test for *M. tuberculosis* is negative<sup>7</sup>
- MDR and XDR confirmed TB cases are subject to different standards for discontinuance of respiratory isolation including (HNTC *Guidelines for Home and Hospital Isolation of TB Patients*, in this newsletter, pages 9-10):
  - Receiving and tolerating appropriate multi-drug anti-TB regimen for at least 2 weeks
  - Demonstrated adherence to DOT (Directly Observed Therapy)
  - Demonstrated clinical improvement
  - Have 3 consecutive negative AFB cultures\*
    - \* *Expert opinion varies; some experts are satisfied with negative smears*

Continued with HNTC **Guidelines for Home and Hospital Isolation of Infectious Tuberculosis Patients** on Pages 9 & 10.

Researched and written by: Alisha Blair, LVN; Catalina Navarro, RN; Debbie Onofre, RN.

**Footnotes** continued on Page 11.

**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\***

<p>Sputum Acid Fast Bacilli (AFB) smear positive</p>	<p>Hospitalized under inpatient airborne isolation or home isolation and being released to:</p> <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>	<p>Discharge from airborne isolation patient <i>must</i> meet all the following criteria:</p> <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>
<p>Sputum AFB smear negative and TB is not suspected or confirmed by NAA testing, another diagnosis is likely</p>	<p>Hospitalized under inpatient airborne isolation and being released to:</p> <ul style="list-style-type: none"> <li>• General hospitalization</li> <li>• Return to school, or</li> <li>• Return to work, or</li> <li>• Travel on public transportation</li> </ul>	<p>Discharge from airborne isolation patient <i>must</i> meet all the following criteria:</p> <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>
<p>Sputum AFB smear negative and TB is suspected or confirmed initially through NAA testing</p>	<p>Hospitalized under inpatient airborne isolation or home isolation and being released to return to normal activities including:</p> <ul style="list-style-type: none"> <li>• General hospitalization</li> <li>• Return to school, or</li> <li>• Return to work, or</li> <li>• Travel on public transportation</li> </ul>	<p>Discharge from home isolation patient <i>must</i> meet all the following criteria:</p> <ol style="list-style-type: none"> <li>1. Have received standard multidrug anti-TB therapy for ≥ 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>
<p>TB MDR/ or XDR confirmed infection</p>	<p>Hospitalized under inpatient airborne isolation or home isolation and being released to return to normal activities including:</p> <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>	<p>Discharge from home isolation patient <i>must</i> meet all the following criteria:</p> <ol style="list-style-type: none"> <li>1. Receiving and tolerating appropriate multidrug anti-TB regimen for 2 weeks</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> <p><i>*Expert opinion varies; some experts satisfied with negative smears</i></p>

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.

<p><b>Frequently Asked Questions</b></p> <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? 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? 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? 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? 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><b>Factors that Predict Likely Transmission of TB</b></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>Anatomical site Pulmonary, laryngeal or pleural TB disease - infectious; laryngeal tends to be the most infectious</p> <p><u>Sputum bacteriology</u> Positive culture and AFB smear indicates more efficient transmission than if positive culture and negative smear</p> <p>Radiographic findings 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                      Singing Poor cough etiquette                Behavior such as shouting High sociability of the index patient</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><b>References</b></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> <p><small>THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT TYLER</small></p> <p><b>HEARTLAND</b> NATIONAL TUBERCULOSIS CENTER <small>A PARTNERSHIP OF UT HEALTH SCIENCE CENTER AND TCID</small></p>
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\*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.

*Case Presentation* continued from Page 8

**Footnotes:**

1. University of North Carolina at Chapel Hill Environment Health and Safety. *Tuberculosis and Infection Control*. 2003. [http://ehs.unc.edu/training/self\\_study/tb.shtml](http://ehs.unc.edu/training/self_study/tb.shtml)
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Heartland National TB Center provides a **Medical Consultation Line** that is staffed Monday to Friday, 8:00 AM to 5:00 PM (CST). After business hours, voice mail is available and will be returned in one business day:

**Toll Free Telephone Number: 1-800-TEX-LUNG (1-800-839-5864)**



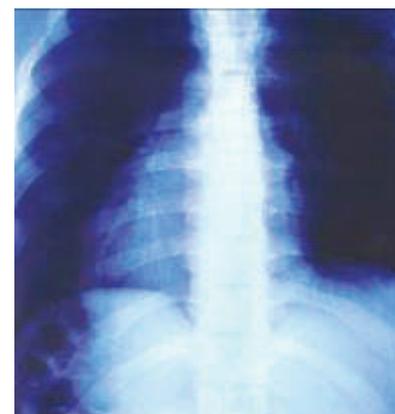
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**The MISSION of the Heartland National TB Center is to build capacity with our partners. We will share expertise in the treatment and prevention of tuberculosis by: developing and implementing cutting-edge trainings, delivering expert medical consultation, providing technical assistance, and designing innovative educational and consultative products.**