PREVENTION OF TUBERCULOSIS IN PERSONS ENROLLING OR ENROLLED IN COLLEGES, UNIVERSITIES OR PRIVATE RESIDENTIAL SCHOOLS IN CONNECTICUT

Recommendations of the Connecticut Advisory Committee for the Elimination of Tuberculosis (CACET)

Updated April 2012

FORWARD

The purpose of the following recommendations is to update the consensus policy of the Connecticut Advisory Committee for the Elimination of Tuberculosis (CACET) originally published in 1998 to prevent tuberculosis (TB) transmission among, and the subsequent development of TB in, persons on college and university campuses in Connecticut. These recommendations are directed to the medical and administrative personnel in all colleges and universities, especially those institutions with large populations of international students, and might also be applicable to those personnel at primary and secondary residential schools.

These recommendations are part of a larger state strategy to eliminate TB transmission in Connecticut and are intended to complement the American College Health Association Guidelines: *Tuberculosis Screening and Targeted Testing of College and University Students* and the Heartland National TB Center Model Tuberculosis Prevention Program for College Campuses (1, 2).

Definitions

Tuberculosis (TB) disease - the state of disease caused by *Mycobacterium tuberculosis*. Persons with TB disease have actively multiplying TB bacilli and symptoms. If the lungs are involved and effective therapy has not been started or is not being taken, they have the potential to infect others. A person with TB disease is reported as having a "case of TB" or having "active TB".

Tuberculosis (TB) infection - the state of being infected with *M. tuberculosis*. Tuberculosis infection is usually manifested by a positive TST or interferon gamma release assay (IGRA). A person with tuberculosis infection can either have TB disease or latent TB infection.

Latent tuberculosis infection (LTBI) - the state of infection with *M. tuberculosis* in which TB bacilli are dormant, the infected person has no symptoms and infection is not contagious. A person with latent infection, however, is at lifetime risk of developing TB disease from their latent infection unless appropriate preventive therapy is taken.

HIV infection - the state of being infected with human immunodeficiency virus. This is usually manifested by a positive HIV antibody test, a positive test for the HIV virus and/or a diagnosis of AIDS.

TB/HIV coinfection - the state of having simultaneous infection with both *M.*

tuberculosis and HIV. A person with coinfection can have either TB disease or LTBI. Those co-infected with HIV and TB have a ≥20% lifetime risk of developing TB disease (3).

International Student - a student who is not a citizen of the United States or its territories and who has entered the United States on a student visa, specifically to enroll in a U.S. college/university/private residential school.

Foreign-born Student - a student whose birthplace is other than the US and its territories, regardless of whether that student is now a citizen or has been a long-term resident of the United States. "Foreign-born students" include international students.

Tuberculin skin test (TST) - Refers to intradermal injection of purified derivate protein (PPD) used to test for TB infection.

Interferon gamma release assay (IGRA) - A blood test that mixes whole blood with TB antigens and subsequently measures interferon gamma release by white blood cells or the number of white blood cells. A positive test indicates that TB infection is likely. The most common test available is the Quantiferon test.

INTRODUCTION

BACKGROUND

* Since 2000 in Connecticut, and 2001 in the United States, the majority of all TB cases have been among persons who were born or who have resided in high TB incidence areas of the world. In 2010, 78% of all TB cases in Connecticut occurred in persons who were foreign-born and 60% of all TB cases in the United States occurred in persons who were foreign-born (4).

* As the percentage of cases among foreign-born persons increases, further decreases in disease incidence can only come from preventing disease in persons coming to Connecticut from high incidence TB countries.

* Prevention will be most effective if screening occurs as soon after arrival in the U.S. as is practical. In a recent study, 28% of foreign born persons reported with TB in the U.S. between 2001–2006 had entered within the last 2 years; however, TB rates among this group remains high beyond this period (5).

* Students coming to study in the United States are not required to undergo TB screening as part of the visa process.

* School and college-based programs have the potential to capture many such persons soon after arrival.

COLLEGE AND UNIVERSITY SPECIFIC ISSUES

The college, university and private residential school setting is one in which there is both a high potential for TB transmission and for efforts to try to prevent it.

* Colleges tend to be highly congregate settings, both in the classroom and in residences, and thus provide special opportunities for large numbers of persons to be exposed to a person with contagious TB. There have been reports of outbreaks in these settings with transmission to other students (6).

* Most international students enter the U.S. on student visas. Unlike immigrants, there are no specific health requirements for them to reside in the U.S. for years. Many students come from countries with high TB rates and are at high risk of having LTBI or TB disease. Many are also likely to stay beyond their tenure as students.

* From 2006–2010, there were 17 TB cases in Connecticut college and university students. Of these students, 13 were foreign-born from a variety of countries (India, Pakistan, Peru, Colombia, China, South Africa, Kenya). Most attended colleges with 4 year or graduate degree programs. The median age of the students was 22 years. The majority of patients had pulmonary disease requiring a contact investigation.

* To prevent TB from occurring in college students, especially international students, there is a need to identify TB-infected students shortly after their arrival and assure that they get preventive therapy.

* All colleges and universities in Connecticut require some form of health assessment as part of their enrollment requirement and most have onsite health services with at least TST capability. Thus, it is feasible for colleges to 1) require a TB risk assessment and subsequent testing if the assessment indicates any risk for TB as part of the enrollment process and 2) assure that at least all enrollees from high risk areas of the world receive TB testing.

* The American College Health Association has recommendations for TB prevention that include risk assessment of all incoming students, with a focus of testing foreign-born students from countries with high TB incidence (1).

State Reporting Requirements

The following statutory requirements apply to reporting TB disease and LTBI in Connecticut:

1. TB disease is both physician and laboratory reportable within 12 and 48 hours of diagnosis respectively to the Connecticut Department of Public Health (DPH) and to the local health department of the town of the patient's residence. Suspect cases are similarly reportable. Suspect cases include anyone on whom anti-TB therapy (two or more drugs) is empirically started pending confirmatory diagnosis, anyone on whom a positive smear for acid fast bacilli (AFB) is obtained and anyone with a chest x-ray consistent with TB disease.

2. LTBI/HIV coinfection is physician reportable within 48 hours of diagnosis.

3. LTBI is currently not reportable except in the following circumstances: TB/HIV coinfection, LTBI in a contact to a TB case, LTBI in a child under 6 years old and for all patients who receive free medication from the DPH.

SCREENING METHODS AND INTERPRETATION

There are currently two methods by which *M. tuberculosis* infection can be determined: a tuberculin skin test (TST) by the Mantoux method or an interferon gamma release assay (IGRA) blood test. While IGRAs have been recommended for use in all situations where a TST would be used, they generally should not be used *in addition* to the TST. Any test for TB infection should only be performed on persons with at least one risk factor for TB disease or infection. A negative test by either method does not necessarily rule out LTBI or TB disease.

1. Tuberculin Skin Testing (TST)

***** The Mantoux intradermal test technique using purified protein derivative (PPD) is the only approved method for TST. Results should be recorded in millimeters of induration.

Interpretation

***** An induration of ≥5 mm should be considered indicative of TB infection (positive skin test) in a person with any of the following risk factors:

- Recent close contact of an individual with infectious TB
- Fibrotic changes on a prior chest x-ray consistent with past TB disease
- Organ transplant recipients
- Immunosuppressed persons: e.g. taking > 15 mg/day of prednisone for > 1 month; immunosuppressive therapy (TNF-α antagonist, cancer chemotherapy)
- Persons with HIV/AIDS

* All persons who have a TST induration of 5–9 mm should be evaluated for each of the above factors.

* An induration of ≥10 mm should be considered indicative of TB infection in a person with any of the following risk factors:

- Born in a high incidence country or who resided in one for a significant amount of time
- History of illicit drug use
- Mycobacteriology laboratory personnel
- History of resident, worker, or volunteer in high-risk congregate settings (e.g. correctional facilities, homeless shelters, hospitals, long-term care facilities).
- Any of the following clinical conditions: silicosis, diabetes mellitus, chronic renal failure, leukemias and lymphomas, head, neck or lung cancer, low body weight (>10% below ideal), gastrectomy or intestinal bypass, chronic malabsorption syndromes

*While a TB test generally should not be done unless a person has at least one risk factor for TB, for new employees with no identified risk factors having a test as a requirement for their employment, a cut-off induration of ≥15 mm should be used.

2. Interferon gamma release assays (IGRA)
IGRAs are a new class of test developed over the last several years to detect TB infection. There are currently three tests approved by the Food and Drug Administration and commercially available in the United States:

Quantiferon® TB-Gold Test (QFT-G)
Quantiferon® TB-Gold In-Tube Test (QFT-GIT)
T-Spot.*TB*® Test (T-Spot)

IGRAs are blood assays that measure a person's immune reaction to the TB bacteria. This is done by mixing the person's blood with antigens from the *M. tuberculosis* bacteria. For most people infected with *M. tuberculosis*, when their white blood cells are exposed to TB antigens, they will release interferon gamma. Depending on the test, either the amount of interferon gamma released can be measured or the number of white blood cells producing interferon gamma can be counted.

As with any test, there are advantages and disadvantages to IGRAs:
Advantages
One visit needed
No boosting of previous tests
Bacille Calmette-Guerin (BCG) vaccination does not cause a false positive result
Mycobacterium avium infection does not cause a false positive result

Disadvantages
Requires a blood draw
Specimen must be in the lab between 12–16 hours after collection
Can be expensive
Limited data on the use of these tests in certain populations (e.g. children <5 years, immunocompromised persons)

Interpretation
IGRA test results are based on the amount of interferon gamma released or the number of cells producing interferon gamma. Results are reported as positive, negative or indeterminate; a positive result indicates TB infection is likely and a negative result indicates TB infection is unlikely. An indeterminate result is not helpful in the determination of TB infection. In these instances, the test should be repeated or a TST performed.

All persons with a positive IGRA result should have a chest radiograph to assess for TB disease.

Bacille Calmette-Guerin (BCG) Vaccination

***** A past history of BCG vaccination is **irrelevant when determining whether or not to test someone for TB infection.** It is **not** a contraindication to TB testing, nor should it be considered in the interpretation of test results. A positive TST as defined above is more likely to represent true infection with *M. tuberculosis* than a false positive reaction to BCG. Since IGRAs do not react to the antigens contained in the BCG vaccine, IGRAs are the *preferred* test for persons who have received BCG although the TST is still an acceptable test in these persons.

All persons with a positive TST or IGRA should receive a chest radiograph to assess for TB disease regardless of their history of BCG vaccination.

Cost is often a factor in determining if an IGRA can be performed for a particular patient. The DPH Public Health Laboratory offers QFT-GIT testing free of charge to patients who fit certain criteria. Guidelines on requesting QFT-GIT testing through the DPH Lab can be found at http://www.ct.gov/dph/lib/dph/StatelabQFTtestingupdate3-5-12.pdf.

RECOMMENDATIONS

Based on these considerations, CACET recommends that colleges, universities and private residential schools in Connecticut adopt policies and procedures to assure the following to minimize the potential for TB transmission on school campuses and to diminish the long-term potential for TB to occur. Any questions about these recommendations and guidelines should be directed to the DPH TB Control Program at (860) 509-7722.

1. Colleges, universities and private residential schools should adopt and implement a TB policy that includes risk assessment and testing policies as well as a plan in the event that a student is diagnosed with TB disease.

2. All students should have an initial student health record that includes a TB risk assessment using a standard screening questionnaire (Appendix A). Any student with at least one risk factor for TB infection should be tested using a TST or IGRA. This means that while most US-born students will not have risk factors for TB, many international students will be arriving from high-incidence countries for TB and should be tested for TB (Appendix B). **This is best done prior to matriculation. The longer this testing is delayed, the more students that will not be tested.** Ideally, testing should be done at a U.S. healthcare facility; TB tests and CXRs performed in other countries within the last 6 months can also be accepted. Because of their particularly high risk of having underlying TB infection, special priority should be given to assuring that international and other foreign-born students from high incidence areas of the world get TB testing **as soon as possible** during their first semester of enrollment.

Students with a history of a positive TST or IGRA do not need another test for TB administered and do not require another chest radiograph as long as there is documentation of a negative chest radiograph at the time of the positive test. These

students should have an assessment for TB signs and symptoms and if any are affirmative, a chest radiograph should be done.

3. All those screened for TB infection who are found to have a positive TST or IGRA should be medically evaluated (including a chest radiograph) to rule out active TB disease and evaluated for preventive therapy.

4. Aggressive efforts should be made to encourage all students with LTBI to initiate and complete a standard course of preventive therapy for TB as soon after enrollment as possible, including the use of directly observed therapy (DOT) by the school health service staff, if feasible.

5. School health services **should make every effort** to offer TB testing and referral as indicated to family members accompanying full time international students.

6. School health services are encouraged to perform a TB risk assessment (e.g. symptom review and exposure history) on each student with a previously negative test for TB who has recently returned from visiting or living in a high TB incidence country. A TB test (TST or IGRA) should be considered for those students who have spent at least 2 months in this setting and should be performed 8–10 weeks after return. This recommendation includes international students from high TB incidence countries who return to their home country for extended breaks. Symptomatic students, students with known contact to persons with TB, and students at high risk for becoming infected with TB (e.g. immunocompromised) should be tested immediately on return and again 8−10 weeks later if negative on initial testing. Persons with a previously positive TST or IGRA and known exposure to TB (regardless if they have completed LTBI treatment in the past) should have a symptom assessment and education about TB signs and symptoms on their return.[1]

7. All full and part-time health service employees should have a pre-employment TST or IGRA. If a TST is done, a two-step test should be done. Those health service employees whose most recent result is negative should be retested based on the risk assessment of the health facility or if close contact with a student with TB disease occurs. Instructions for performing a TB risk assessment for your health facility can be found in the "Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health-care settings" published by CDC in 2005 (7).

MANAGEMENT OF PERSONS WITH TUBERCULOSIS INFECTION

***** All persons with a positive TST or IGRA who have not already completed treatment for TB disease or LTBI should be evaluated by a specially trained student health service provider or referral healthcare provider. This includes all those with positive results

[1] There is not a consensus on the amount of time traveling in a high TB incidence country that should warrant repeat testing. The decision to test students who have traveled or returned to high incidence TB countries should take into account the types of settings and locations visited as well as time spent in the country.

reported from testing occurring before their actual enrollment/employment as well as results from testing done onsite at the student health service. Before being offered treatment, each person should be evaluated for TB disease and for medical contraindications to treatment. Evaluation should minimally include a clinical review of systems for symptoms of active TB disease and acute or active liver disease, and a chest radiograph. Because most TST positive students are likely to be international students, many will have had BCG vaccination. Language and cultural barriers (including inaccurate perceptions about BCG) may be present that could interfere with their understanding of the meaning of a positive TST and the importance of being treated for LTBI. Thus, it is important that each school identify a provider who already is or can be trained to perform such evaluations and to oversee TB management.

* The usual treatment for LTBI is isoniazid (INH). The recommended duration of INH preventive treatment is 9 months of continuous therapy. The recommendation is the same for persons with HIV infection and other forms of immunosuppression. Rifampin for four months is also an acceptable alternative. For persons with fibrotic lesions or evidence of old TB on chest radiograph, an alternative treatment regimen is a 4 month course of INH and rifampin (8).

Recently, CDC recommended a new regimen for the treatment of LTBI. This regimen of INH and rifapentine is dosed weekly for 12 weeks (9). Due to the weekly dosing schedule, this regimen can only be prescribed with accompanying directly observed therapy to ensure compliance and tolerance. All providers interested in prescribing this regimen to their patients should contact the DPH TB Control Program. Guidelines for the use of this regimen in Connecticut can be found at http://www.ct.gov/dph/lib/dph/INH-RPTinCTfinal.pdf.

* Active efforts to assure continuity of treatment are essential to the completion of therapy. Each school should have a tracking system in place for all students with LTBI. Schools with onsite student health services should consider administering daily or twice-weekly directly observed therapy to all medically evaluated, latently TB infected students for whom there are no contraindications to treatment. Any student or employee started on self-administered treatment for LTBI should be closely monitored by the student or employee health service in addition to being monitored by any outside health care provider who may be involved in initiating their preventive therapy. It is recommended that those taking LTBI therapy be seen by a provider at least monthly. *No one who is started on self-administered preventive therapy should be prescribed more than a one month supply of medication at a time. In addition to being educated about medication side effects, all patients with LTBI should be advised of the signs and symptoms of TB disease. Educational pamphlets should be provided in the appropriate language (see* ***Appendix E: Tuberculosis Information and Education Resources****).*

***** Persons with TB-HIV coinfection (TB disease or LTBI) have an extraordinary risk of developing TB disease. They should be reported immediately to the state TB Program and local health department as required by state law. Treatment for LTBI in HIV patients is highly recommended and is the same as for those not HIV-infected.

RESOURCES FOR MEDICAL CONSULTATION, MEDICATION AND CARE

*Both the local health department and the DPH TB Control Program are available to serve as resources for questions and treatment referral related to TB. Some health departments also have TB clinics. It is highly encouraged that student health service staff get to know their local health department and the public health staff and services that might be available for students with LTBI. It is recommended that schools work with their local health departments to develop an action plan to be used in the event that a student with TB disease is identified at a school. The local health department has the primary responsibility and authority for managing patients with TB disease and performing a contact investigation. Having a plan in advance will allow for better care of the patient and mitigate fear and confusion among staff and students.

* *No one should be denied treatment for LTBI because of cost considerations.* Free INH and other anti-TB drugs can be obtained from the state TB Program. For persons who have no third party coverage for TB preventive care, the state TB Program will reimburse at Medicaid rates for medical evaluation and follow-up services including chest x-rays, blood work and physician or home visits. To obtain medication from the state or to inquire about billing procedures, contact the TB Control Program at 860-509-7722.

TRAINING AND EVALUATION

* The administrator of the student health service at each college, university or residential school should be responsible for assuring that staff who will be administering TSTs or IGRAs are properly trained. The state TB Program and the American Lung Association have copies of the CDC video, "Tuberculin Skin Testing", which can supplement efforts to refresh staff in TST administration, reading and interpretation. A DVD copy of this training along with TST rulers are available free of charge from CDC and can be ordered at the following link: http://wwwn.cdc.gov/pubs/tb.aspx. In addition, the CDC-developed "Core Curriculum on Tuberculosis" with accompanying slides is available on-line for training staff who will be medically evaluating students with positive skin tests and who need TB-specific information; this can be accessed at http://www.cdc.gov/tb/education/corecurr/. Staff with the DPH TB Control Program is also available for training of both school-based and contract physicians who may be involved in the medical evaluation and follow-up of TST or IGRA positive students.

* Once an effort is made to adopt these recommendations, each school should evaluate the extent to which TST/IGRA results are being obtained on all new full time students, the prevalence of positive tests, the extent to which students found to be positive are receiving appropriate evaluation, are being started on treatment for LTBI and are successfully completing therapy. The DPH TB Control Program is available to assist in the planning and interpretation of this type of program evaluation.

References

1. ACHA Tuberculosis Guidelines Task Force. American College Health Association: ACHA guidelines: tuberculosis screening and targeted testing of college and university students. *ACHA* 2011; 1–8.
2. Heartland National Tuberculosis Center, Model Tuberculosis Prevention Program for College Campuses, June 2007.

3. Horsburgh CR. Priorities for the treatment of latent tuberculosis infection in the United States. NEJM 2004; 350:2060–67.
4. CDC. Trends in tuberculosis—United States, 2010. MMWR 2011; 60:333–7.
5. Cain KP, Benoit SR, CA Winston, WR MacKenzie. Tuberculosis among foreign-born persons in the United States. *JAMA* 2008;300:405–412.
6. Braden CR and an Investigative Team. Infectiousness of a university student with laryngeal and cavitary tuberculosis. *Clin Inf Dis* 1995; 21:565–70.
7. CDC. Guidelines for preventing the transmission of Mycobacterium tuberculosis in health-care settings, 2005. MMWR 2005;54:RR1–140.
8. CDC. Targeted tuberculin testing and treatment of latent tuberculosis infection. MMWR 2000; 49:1–51.
9. CDC. Recommendations for use of an isoniazid-rifapentine regimen with direct observation to treat latent Mycobacterium tuberculosis infection. MMWR 2011; 48:1650–53.

CACET would like to recognize the following individuals and groups for their thoughtful review of this document:
Christopher Diamond, MD, Central Connecticut State University; Melissa Lopez, RN, MPH, University of Bridgeport; Mary Manton, MD and student health services staff, University of Connecticut-Storrs; Davis Smith, MD, Wesleyan University; Beth Vernali, RN, Salisbury School

******* *The Advisory Committee membership who participated in the development and review of this document are as follows:*
Milford Hospital/Yale-New Haven Hospital: Lloyd Friedman, MD, Chairman
Lawrence and Memorial Hospital: Joseph Gadbaw, MD
CDC, Division of TB Elimination: Mark Lobato, MD
Bridgeport Health Department: Michele Meade, RN; Robert Sheiman, MD
American Academy of Pediatrics, CT Chapter: Stephen Updegrove, MD, MPH
St. Francis Hospital: Richard Zuwallack, MD
University of Connecticut Health Center: Trini Mathew, MD
James Hadler, MD, MPH
Department of Public Health, TB Control Program Staff: Patricia Christensen; Heidi Jenkins; Danielle Orcutt; Lynn Sosa, MD; Margaret Tate; Maureen Williams, RN; Gary Budnick.

Appendix A: Tuberculosis (TB) Risk Assessment

Persons with any of the following are candidates for either Mantoux tuberculin skin test (TST) or Interferon Gamma Release Assay (IGRA), unless a previous positive test has been documented:

Risk Factor		
Recent close contact with someone with infectious TB disease	❑ Yes	❑ No
Foreign-born from (or travel* to/in) a high-incidence area (e.g., Africa, Asia, Eastern Europe, or Central or South America)	❑ Yes	❑ No
Fibrotic changes on a prior chest x-ray suggesting inactive or past TB disease	❑ Yes	❑ No
HIV/AIDS	❑ Yes	❑ No
Organ transplant recipient	❑ Yes	❑ No
Immunosuppressed persons: e.g. taking > 15 mg/d of prednisone for > 1 month; immunosuppressive therapy (TNF-α antagonist, cancer chemotherapy)	❑ Yes	❑ No
History of illicit drug use	❑ Yes	❑ No
Resident, employee, or volunteer in a high-risk congregate setting (e.g., correctional facilities, nursing homes, homeless shelters, hospitals, and other health care facilities)	❑ Yes	❑ No

** The significance of the travel exposure should be discussed with a health care provider and evaluated.*

1. Does the student have signs or symptoms of active tuberculosis disease? Yes _____ No _____
If No, proceed to 2 or 3. If Yes, proceed with additional evaluation to exclude active tuberculosis disease including tuberculin skin testing, chest x-ray, and sputum evaluation as indicated.

2. Tuberculin Skin Test (TST)
(TST result should be recorded as actual millimeters (mm) of induration, transverse diameter; if no induration, write "0". The TST interpretation should be based on mm of induration as well as risk factors.)**

Date Given: ____/____/____ (M D Y) Date Read: ____/____/____ (M D Y)

Result: _____ mm of induration **Interpretation: positive____ negative____

Date Given: ____/____/____ (M D Y) Date Read: ____/____/____ (M D Y)

Result: _____ mm of induration **Interpretation: positive____ negative____

3. Interferon Gamma Release Assay (IGRA)

Date Obtained: ____/___/___ (M D Y) (specify method) QFT-G QFT-GIT T-Spot other_____

Result: negative___ positive___ indeterminate___ borderline___ (T-Spot only)

Date Obtained: ____/___/___ (M D Y) (specify method) QFT-G QFT-GIT T-Spot other_____

Result: negative___ positive___ indeterminate___ borderline___ (T-Spot only)

4. Chest x-ray: (Required if TST or IGRA is positive)

Date of chest x-ray: ____/____/____ Result: normal____ abnormal_____
M D Y

5. Report to state/local health department if abnormal chest x-ray.

****Interpretation guidelines**

>5 mm is positive:

- Recent close contacts of an individual with infectious TB
- Persons with fibrotic changes on a prior chest x-ray consistent with past TB disease
- Organ transplant recipients
- Immunosuppressed persons: e.g. taking > 15 mg/d of prednisone for > 1 month; immunosuppressive therapy (TNF-α antagonist, cancer chemotherapy)
- Persons with HIV/AIDS

>10 mm is positive:

- Persons born in a high incidence country or who resided in one for a significant* amount of time
- History of illicit drug use
- Mycobacteriology laboratory personnel
- History of resident, worker, or volunteer in high-risk congregate settings
- Persons with the following clinical conditions: silicosis, diabetes mellitus, chronic renal failure, leukemias and lymphomas, head, neck or lung cancer, low body weight (>10% below ideal), gastrectomy or intestinal bypass, chronic malabsorption syndromes

>15 mm is positive:

- Persons with no known risk factors for TB disease

**The significance of the exposure should be discussed with a health care provider and evaluated.*

Form adapted with permission from the American College Health Association (ACHA)

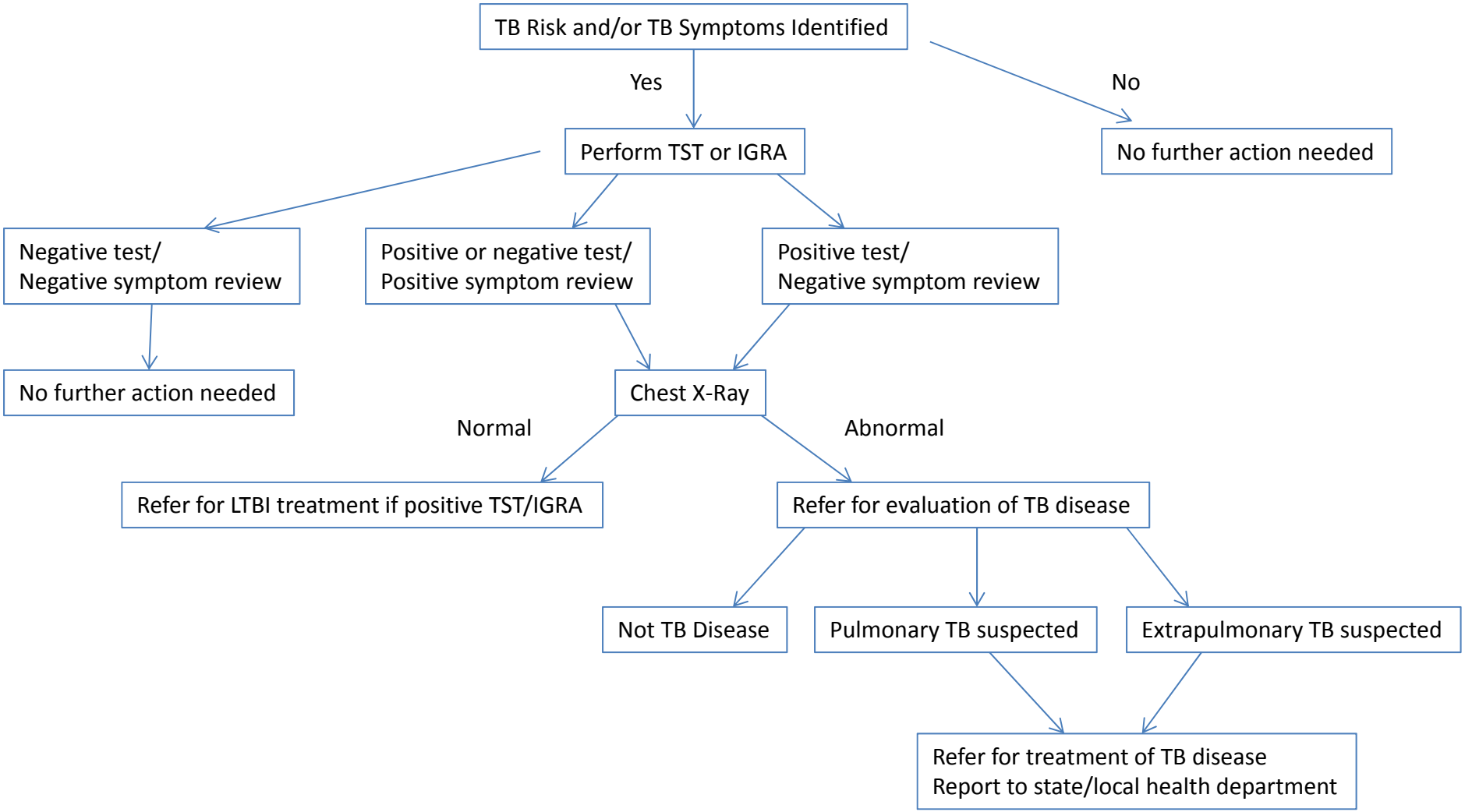
Appendix B: List of High Risk[1] Tuberculosis Countries

Afghanistan
Algeria
Angola
Anguilla
Argentina
Armenia
Azerbaijan
Bahrain
Bangladesh
Belarus
Belize
Benin
Bhutan
Bolivia (Plurinational State of)
Bosnia and Herzegovina
Botswana
Brazil
Brunei Darussalam
Bulgaria
Burkina Faso
Burundi
Cambodia
Cameroon
Cape Verde
Central African Republic
Chad
China
China, Hong Kong Special Administrative Region
China, Macao Special Administrative Region
Colombia
Comoros
Congo
Cook Islands
Côte d'Ivoire
Croatia
Democratic People's Republic of Korea
Democratic Republic of the Congo
Djibouti
Dominican Republic
Ecuador
El Salvador
Equatorial Guinea
Eritrea
Estonia
Ethiopia
French Polynesia
Gabon
Gambia
Georgia
Ghana
Guam
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
India
Indonesia
Iraq
Japan
Kazakhstan
Kenya
Kiribati
Kuwait
Kyrgyzstan
Lao People's Democratic Republic
Latvia
Lesotho
Liberia
Libyan Arab Jamahiriya
Lithuania
Madagascar
Malawi
Malaysia
Maldives
Mali
Marshall Islands
Mauritania
Mauritius
Micronesia (Federated States of)
Mongolia
Montenegro
Morocco
Mozambique
Myanmar
Namibia
Nepal
New Caledonia
Nicaragua
Niger
Nigeria
Northern Mariana Islands
Pakistan
Palau
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Republic of Korea
Republic of Moldova
Romania
Russian Federation
Rwanda
Saint Vincent and the Grenadines
Sao Tome and Principe
Senegal
Serbia
Seychelles
Sierra Leone
Singapore
Solomon Islands
Somalia
South Africa
Sri Lanka
Sudan
Suriname
Swaziland
Syrian Arab Republic
Tajikistan
Thailand
The former Yugoslav Republic of Macedonia
Timor-Leste
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Tuvalu
Uganda
Ukraine
United Republic of Tanzania
Uruguay
Uzbekistan
Vanuatu
Venezuela (Bolivarian Republic of)
Viet Nam
Yemen
Zambia
Zimbabwe

[1] Greater than 20/100,000 population

Estimates can be found at http://apps.who.int/ghodata/?vid=500

Appendix C: Algorithm for TB Screening and Testing



Appendix D: Frequently Asked Questions

Prevention of Tuberculosis in Persons Enrolled in Colleges and Universities in Connecticut

Abbreviations: TST = tuberculin skin test, IGRA = interferon-gamma release assay, CXR = chest radiograph, LTBI = latent tuberculosis infection

1. **A student is from a country (e.g., Mexico) that is not on the list of counties having a high incidence of TB? Do they need to be tested?**

   Perhaps. Persons who are from countries that are not on the list of high-incidence countries should have an individual TB risk assessment that may reveal reasons for being tested (e.g., history of exposure to a person with contagious TB). Questions about whether to test a particular student can be referred to the DPH TB Control Program at 860-509-7722.

2. **How should we record and interpret the results of a TST when the longitudinal reading of the induration of the TST result is 12 mm and the lateral reading is 8 mm?**

   The correct TST reading should be recorded as 8 mm (not 12 mm or 8 x 12 mm). Only record the millimeters of induration, which should be measured transversely (i.e., perpendicular) to the long axis of the forearm. Recording is never "positive" or "negative" without the measure of induration. Erythema (redness) around the TST site should not be read as part of the TST result.

3. **If a student has a positive TST by history and no written documentation, do we accept the verbal result?**

   Unless the student has written documentation of a positive TST result or previously treated LTBI or TB disease, they should usually receive a TST (or IGRA).

4. **If a person does not return for a TST reading within 48-72 hours, when can a TST be placed again?**

   A TST can be administered again as soon as possible.

5. **Some students receive vaccinations at the same time they might have a TST placed or IGRA done. Will this affect the results of these tests?**

   Most vaccines will not interfere with the interpretation of the TST or IGRA result. Measles-mumps-rubella (MMR) and varicella vaccines can affect the TST or IGRA results if given before the tests are done. MMR and varicella vaccines given at the same time or after the TST or IGRA will not interfere with interpretation of the test. If these

vaccines were given before the TST or IGRA, 4 weeks should separate the vaccination and the TB test.

6. **If the student has written documentation of a prior positive TST or IGRA (QuantiFeron and T.Spot.TB) result and no documentation of a chest radiograph CXR, is that a sufficient evaluation?**

   The purpose of screening tests is to detect TB disease. The TST and IGRA are tests diagnostic for LTBI, not TB disease. A student with a positive TST or IGRA result must have a CXR to rule out possible pulmonary disease.

7. **Are periodic CXRs recommended for students who have positive TST or IGRA results and no treatment for LTBI?**

   No, persons with positive TST or IGRA results should receive one baseline CXR to exclude a diagnosis of TB disease. Further CXRs are not needed unless the patient has symptoms or signs of TB disease or unless ordered by a physician for a specific diagnostic examination. Instead of participating in serial testing, persons with positive TST or IGRA results and no treatment should have a symptom review done at least annually.

8. **If a student has documentation of a prior positive TST or IGRA result and documentation of a negative CXR result following that, would they need an additional CXR?**

   If the student has symptoms of TB, a CXR would be recommended. If the student is immunocompromised, a CXR should be considered. If not, another CXR is not needed unless recommended by a physician.

9. **Should a student with a previously positive TST (no history of treatment) and a history of BCG vaccination have an IGRA done?**

   Maybe. An IGRA could be performed in this situation if a positive IGRA result would convince the student to start LTBI treatment. If the student is not willing to accept treatment regardless of the results of the IGRA, there is no reason to perform the additional test. At a minimum, this student would need a CXR done to rule out TB disease if there is no documentation of a CXR from the time of their positive TST.

   The DPH State Laboratory does offer Quantiferon Gold In-Tube testing for patients who have a history of BCG vaccination and who are uninsured or unable to afford this testing from a commercial laboratory. Additional questions on QFT-GIT testing at the DPH Laboratory can be referred to the TB Control Program at 860-509-7722.

10. **Upon returning from travel to a high TB incidence area of the world, do I need to test the person and when?**

Persons returning from at least two months of travel to areas of the world with a high incidence of TB and who lived among the indigenous population during their travel require a symptom review and a TST or IGRA. For most persons, testing after the symptom review can take place 8–10 weeks after return to the United States.

Persons who would require an evaluation and testing as soon as possible to rule out TB disease are those with known or suspected exposure to contagious pulmonary TB (is a TB contact) and persons having symptoms or signs suggestive of TB disease . An initial negative TST or IGRA result in a contact should be followed up with a second evaluation including having the TST or IGRA repeated in 8–10 weeks following the first test. Persons being evaluated for TB disease may also need a CXR and possible collection of specimens (e.g. sputa) for culture. Persons having TB disease should also be tested for HIV infection. A negative TST or IGRA in a person with signs and symptoms of TB disease should not be used to rule out TB.

Questions about whether to test a particular student can be referred to the DPH TB Control Program at 860-509-7722.

11. **Many of our foreign-born students have received BCG vaccination as a child. How reliable is the TST in these persons?**

    US standards are to discount BCG vaccination when interpreting the TST result. BCG can cross react with the TST although false positive tests are uncommon five or more years after vaccination as an infant unless the person has received multiple BCG vaccinations. IGRAs do not share antigens with BCG and hence false positive results from BCG do not occur. An IGRA is preferable when testing persons who have had BCG vaccination, although the TST is acceptable.

12. **We did a CXR in a student who had a positive TST result. The radiology report states that the CXR is abnormal. Besides completing a TB report form for the state and local health departments, is there anything else I need to do?**

    A person with a positive TST or IGRA result and an abnormal CXR should have a medical evaluation to rule out possible TB disease. Suspected TB disease requires a report to the state/local health department the same day that the condition is suspected. Please call the TB Control Program if there is a concern for a student with TB disease.

13. **I heard that a positive TST should be confirmed with an IGRA. Is that true?**

    Recommendations from the Centers for Disease Control and Prevention (http://www.cdc.gov/mmwr/PDF/rr/rr5905.pdf) are that either the TST or an IGRA are acceptable tests to diagnose LTBI. The IGRA is not designed as a confirmatory test for the TST, but is the preferred type of test in persons who previously received BCG vaccination although the TST is also acceptable. Some persons mistakenly believe that if you had BCG vaccination, the TST result will necessarily be positive. Although some persons with a positive TST result may be more willing to take treatment for LTBI if the

IGRA test result is also positive, we do not recommend using both types of tests routinely. In addition to adding costs, discordant test results (TST+/IGRA- or TST-/IGRA+) are frequent enough to make interpretation difficult. Staff in the TB Control Program are available to discuss TST and IGRA results and assist in making treatment recommendations regarding discordant results.

14. **A student started on INH for LTBI but only completed 7 months before leaving for the two months in the summer. Should I start INH again when (s)he returns for fall semester?**

    Nine months of daily INH is the preferred treatment regimen for patients who have LTBI. Generally, it is preferable that the 9 months of INH are completed within 12 months of starting. Depending on the length of time in the break of treatment, therapy should be extended (to complete 9 months total) or it may be necessary to restart treatment. Although not optimal, 6 months of INH is acceptable if the person cannot complete 12 months except in persons who are at higher risk for progression to TB disease. Persons with an immunocompromised or immunosuppressed condition should complete 9 months of INH. Questions about treatment issues can be referred to the TB Control Program.

15. **A student refused to take therapy for LTBI. Should (s)he be restricted from classes?**

    Treatment for a LTBI is a prevention strategy to protect the individual's health and to prevent possible transmission to others if the person were to develop pulmonary TB disease. Thus, treatment for LTBI cannot be required. If attempts to educate and motivate the person fail, restriction of activities, including attendance in classes, is not warranted.

16. **A new student had a TST and CXR in their home country. Can I accept the reports of these tests or should they be repeated?**

    Documentation of TSTs, IGRAs or CXRs performed in other countries is acceptable if the tests or CXR were performed within the previous 6 months. Testing and CXRs can be repeated if validity of tests is concerning or unknown.

17. **A student has a history of a positive TST and a normal CXR but was never treated. Should I start treatment for LTBI now?**

    Yes, but the CXR should be repeated if it is older than 6 months or if the student has TB symptoms to rule out active TB disease.

18. **Where can millimeter rulers be obtained to measure TST results?**

    A TST training kit, which includes a TST training DVD and a TST millimeter ruler is available free of charge from the Centers for Disease Control and Prevention and can be ordered online at http://wwwn.cdc.gov/pubs/tb.aspx. In addition, your local health department or PPD manufacturers may have rulers available.

19. **I have more questions. Who can I talk with?**

The Connecticut TB Control Program can be reached at 860-509-7722.

Appendix E: Tuberculosis Information and Education Resources

Department of Public Health TB Control Program-
http://www.ct.gov/dph/cwp/view.asp?a=3136&q=388584&dphNav_GID=1601&dphPNavCtr=|#47055
State specific information including information about services provided and access to report forms

Centers for Disease Control and Prevention- www.cdc.gov/tb
Access to national guidelines and statistics as well as fact sheets

Northeastern Regional Training and Medical Consultation Center-
http://www.umdnj.edu/ntbcweb/rtmcc.htm
One of four regional centers for tuberculosis in the country funded by CDC; tasked with developing educational sessions and products related to TB

American College Health Association TB Screening Guidelines
http://www.acha.org/Publications/docs/ACHA_Tuberculosis_Screening_Apr2011.pdf

Heartland TB Center Model TB Prevention Program for College Campuses
http://www.heartlandntbc.org/products/model_tb_prevention_program_college_campuses.pdf

Find TB Resources
www.findtbresources.org
Website dedicated to sharing TB education resources; includes access to developed materials that are available for adaptation