

Guidelines for Tuberculosis Screening of Healthcare Students

Auckland Regional Public Health Service

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Foreword

In the New Zealand Ministry of Health document *Guidelines for Tuberculosis Control in New Zealand 2003*, attention is drawn to the need to monitor healthcare workers for tuberculosis (TB) infection during their working lifetime (see Chapter 9, pages 16-18, *Guidelines for Tuberculosis Control in New Zealand 2003*, available at www.moh.govt.nz).

The aim of this document is to provide a standardised approach to TB risk assessment and screening of healthcare students throughout the Auckland region. This document will be reviewed and updated as necessary, in accordance with any changes to the guidance in future versions of the Ministry of Health tuberculosis guidelines (currently under review).

This document supersedes the 1999 *Protocol for Mantoux Testing and BCG Vaccination of Healthcare Students* and provides recommended guidelines for the TB screening of student healthcare workers prior to clinical placement. The guidelines include options for screening using Mantoux testing and/or interferon gamma release assays (IGRA, a newer type of blood test for TB infection).

Prior to screening, all healthcare students should complete a standard TB risk assessment questionnaire and should be given education on the natural history of TB infection. Following an explanation of the TB disease process and the testing process, students are invited to participate in the programme. It is important to establish the students' baseline TB infection status before they are placed at risk of exposure to infectious patients. TB screening of healthcare students protects both the students and their patients.

This document is complemented by an information package suitable for the education of students prior to TB screening. This material is available electronically on the Auckland Regional Public Health Service website at www.arphs.govt.nz.

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1. Introduction

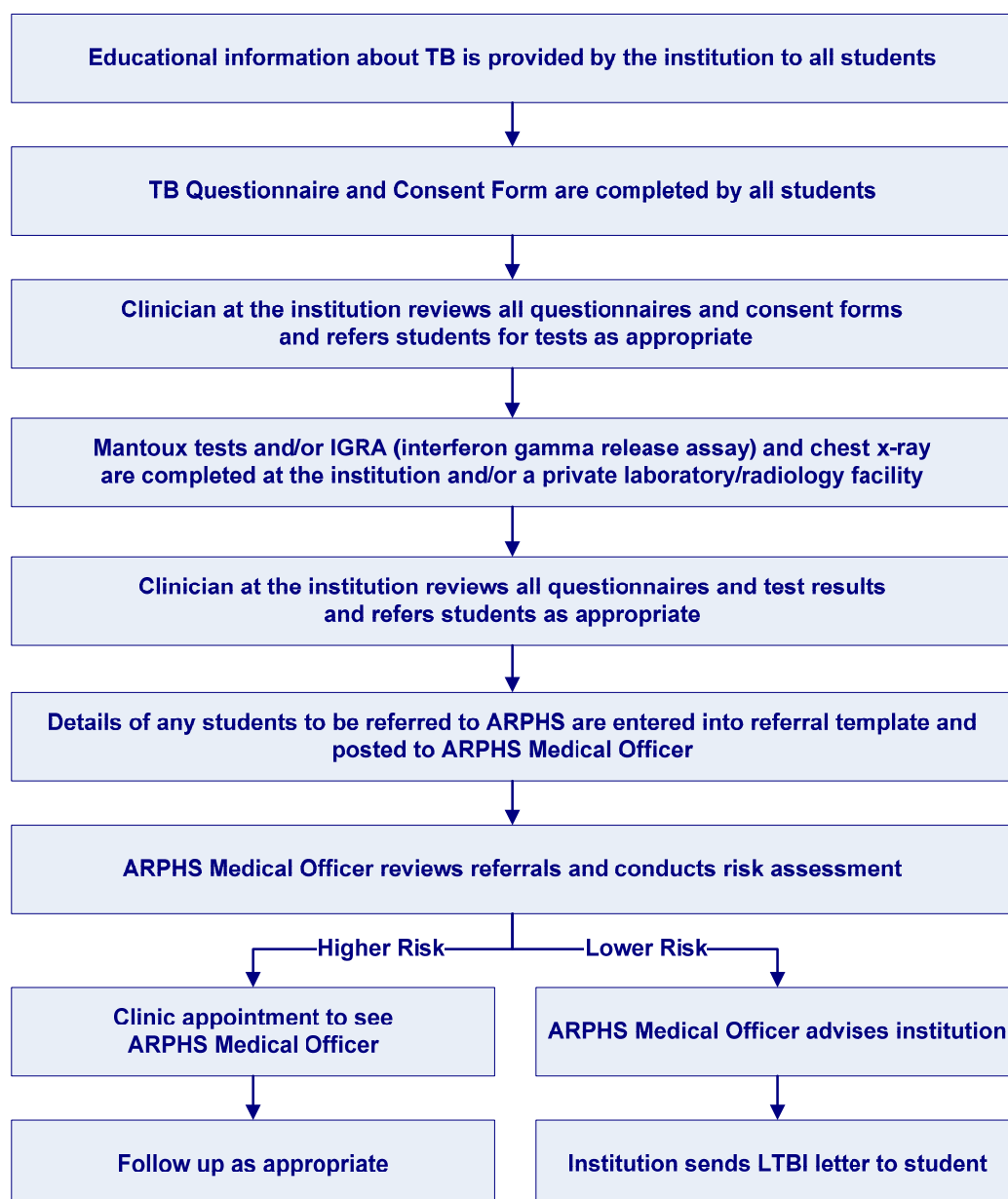
These guidelines are for TB risk assessment and screening of healthcare students and should be used in conjunction with the Ministry of Health's publications *Guidelines for Tuberculosis Control in New Zealand 2003* and *Technical Guidelines for Tuberculin Testing and BCG Vaccination 1996*. (Both documents are currently under review.)

The aim of these guidelines is to provide a standardised approach to TB risk assessment and screening of healthcare students throughout the Auckland region.

2. Management of TB Screening in Healthcare Students

The following procedure is recommended when screening healthcare students for TB.

Figure 1 - Management of TB Screening of Healthcare Students – Flow Diagram



2.1. Educational Information about TB

The programme and its rationale should be explained to all students. This can be achieved by presenting a combination of written and verbal information.

- Verbal presentation. A sample powerpoint presentation is available electronically at www.arphs.govt.nz
- Written information. A sample information sheet is provided in Appendix 1.

2.2. TB Questionnaire & Consent Form

- The TB questionnaire (risk assessment) and consent form should be explained by staff and completed by all students. See Appendix 2.

2.3. Clinician at institution makes preliminary decisions from information on the questionnaire and consent form

A clinician at the institution should review all consent forms and TB questionnaires.

2.3.1. Students reporting symptoms of tuberculosis

If a student reports symptoms of tuberculosis they should be referred without delay for appropriate clinical assessment by a GP or specialist, chest x-ray, and laboratory tests including liver function tests (LFT), full blood count (FBC), ESR and mid-stream urine (MSU). The ARPHS Medical Officer should be notified of the outcome of any students in this category in the ARPHS referral template (Appendix 8).

2.3.2. Students who should not have Mantoux testing

Students with either of the criteria below should not have Mantoux testing:

- A history of previous tuberculosis disease or latent TB infection (LTBI)
- Documented evidence of a Mantoux reaction greater than or equal to 15mm at any time in the past, or a severe reaction to a previous Mantoux test (necrosis, blistering, ulceration, anaphylaxis), or documented evidence of a positive interferon gamma release assay (IGRA) at any time in the past.

These students should be offered a chest x-ray by the clinician at the institution. Any students who meet the ARPHS referral criteria (see section 5) should be referred using the ARPHS referral template (Appendix 8).

NOTE: Pregnancy is not a contraindication to Mantoux testing.

The only contraindication to Mantoux testing is a previous positive Mantoux test greater than or equal to 15mm, or a severe reaction to a previous Mantoux test (necrosis, blistering, ulceration, anaphylaxis).

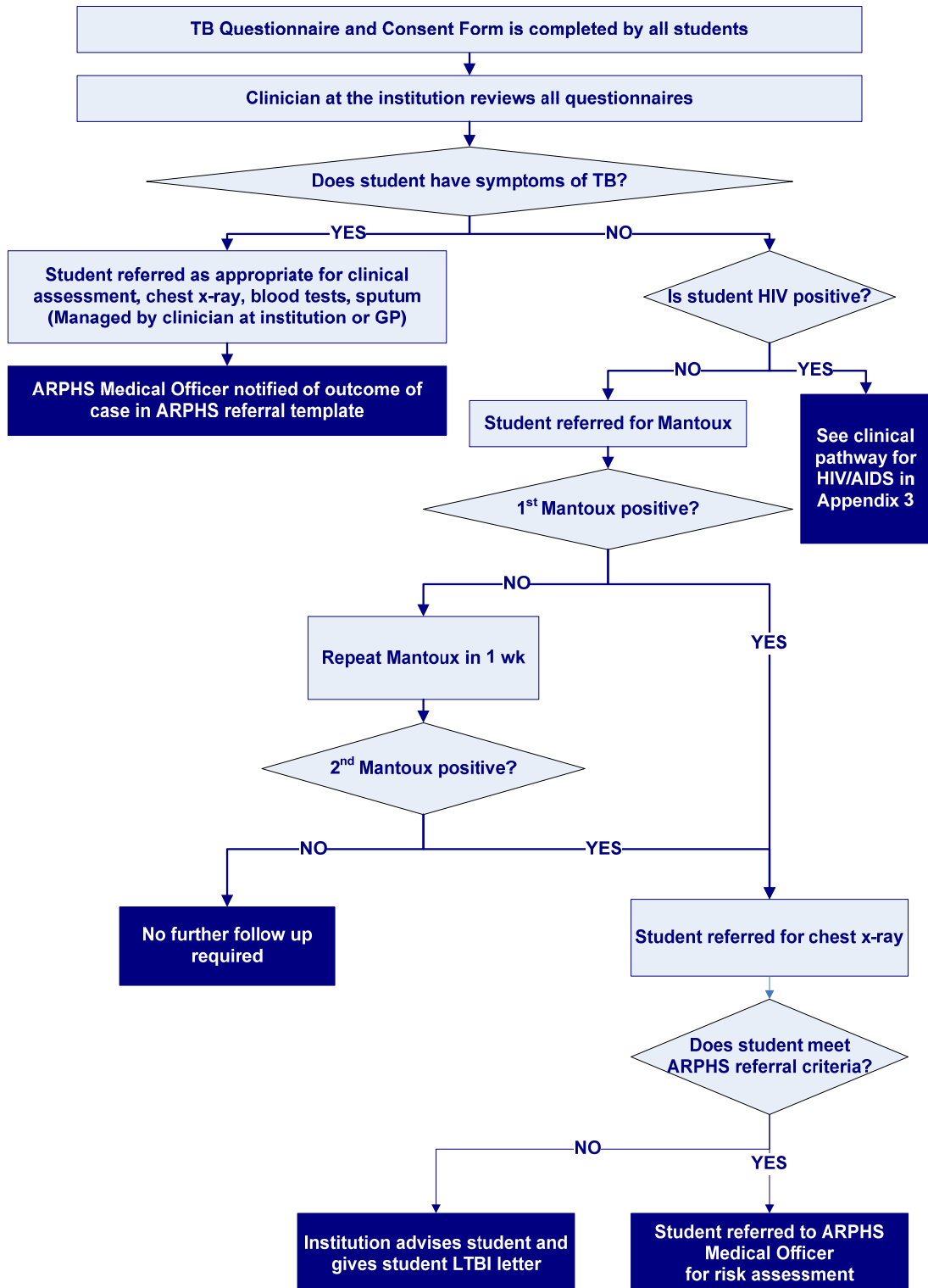
2.3.3. All other students

Students who do not report symptoms of TB, do not have a history of previous TB disease or infection, and have not had a previous Mantoux reaction greater than or equal to 15mm should receive a screening test for TB infection.

This may be done via Mantoux testing, interferon gamma release assay (IGRA) or a combination of the two. The method of screening utilised should be determined by each institution.

3. Mantoux testing

3.1. Clinical Pathway – Mantoux testing



3.2. Mantoux Testing – General Information

3.2.1. Requirements for administering Mantoux tests

Staff carrying out Mantoux testing must be trained and must hold a 'Certificate of Competence for Mantoux testing'. The requirements are set out in Appendix 2 of the *Technical Guidelines for Tuberculin Testing and BCG Vaccination 1996 (currently under review)* which covers the test material, storage, administration and reading of the Mantoux test.

3.2.2. General procedure for Mantoux tests

All students who are eligible for and consent to Mantoux testing require two-step testing (two Mantoux tests placed one week apart). The second step is only needed if the first test reading is negative. See Appendix 4 for the definitions of positive Mantoux reactions (cutting points) in New Zealand. A 5 tuberculin unit (5TU) dose of tuberculin (Mantoux solution) should be used for each test. The Mantoux tests should be administered by trained staff at the institution or at a private laboratory.

3.2.3. Two-step testing

The two-step Mantoux test is performed when there is a need to establish a true baseline Mantoux reaction. Two-step testing is recommended in the pre-employment screening of healthcare workers, including healthcare students. Two-step testing is done to distinguish boosting from conversion in people who are having serial Mantoux tests (such as healthcare workers).

Recommended best practice for two-step testing is as follows:

- Place the first test; read the first test 72 hours after placement (when any reaction is likely to be maximal).

If the first test reading is negative (i.e. less than the cutting point – see Appendix 4 for cutting points):

- Place the second test one week after the first test (i.e. same day of the week but one week later); read the second test 48 hours after placement (when boosting is likely to be maximal).

In a two-step Mantoux test, the second test reading is the correct, 'boosted' result.

NOTE: The second step is only needed if the first test reading is negative.

The first and second Mantoux tests should be given in different forearms.

Recommended: first test RIGHT forearm; second test LEFT forearm.

3.2.4. Booster effect

In people who have previously received BCG vaccination or had tuberculosis, the resultant delayed hypersensitivity detected by the Mantoux test may wane over the years. In this situation an initial Mantoux test may give a negative result, but the stimulus of this test may activate (or boost) the previous immune responsiveness. A further tuberculin test administered one week to one year later may show an increased size of reaction - an apparent (but false) Mantoux conversion.

A booster effect may occur at any age, but is said to be highest among people over 55 years of age and/or those who have had previous BCG vaccination. People who show a boosted

reaction should be classified as reactors (having a positive test) and not as converters. The second (boosted) result should be recorded as their Mantoux result.

3.2.5. Determining the cutting point for a positive Mantoux reaction for each student

The clinician at the institution should determine the cutting point i.e. what would be a positive Mantoux reaction for each student. Refer to Appendix 4 for current New Zealand cutting points to decide what would be a positive Mantoux reaction for individual students. The cutting point should be recorded on each student's consent form in the appropriate space (see Appendix 2).

3.3. Clinician at institution reviews 1st Mantoux results

Following the first Mantoux test:

- Students with negative results (i.e. Mantoux reading less than the individual student's cutting point) should be retested (i.e. a second Mantoux test should be placed 1 week after the first), as described in section 3.2.3 above.
- Students with positive results should be given written information about positive Mantoux tests (see Appendix 5), and referred for chest x-ray by tertiary institution staff.
- When all test results for all students in a class/intake are complete, student screening data should be reviewed by the clinician at the institution (see section 5).

3.4. Clinician at institution reviews 2nd Mantoux results

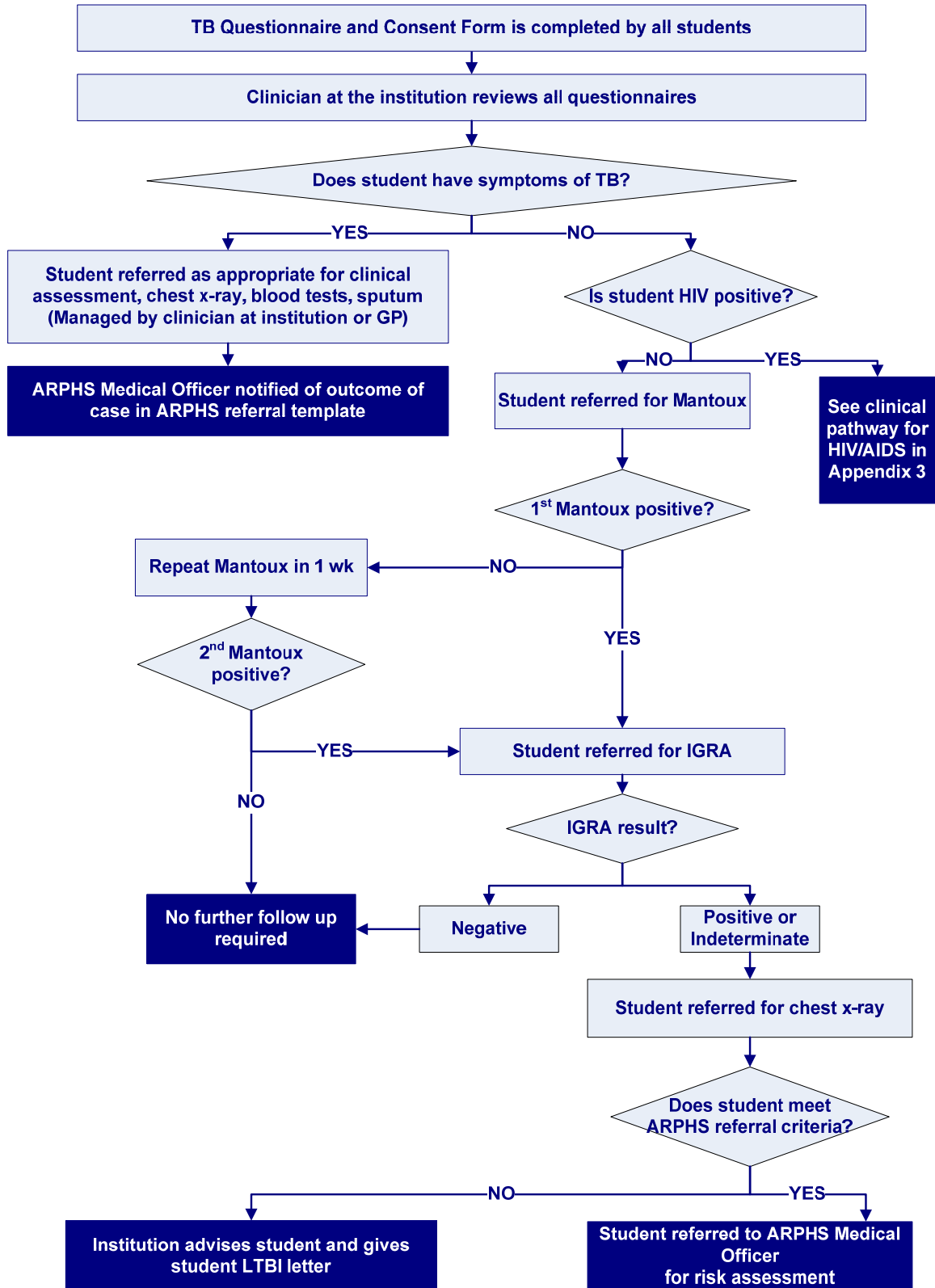
Following the second Mantoux test:

- Students with negative results (i.e. Mantoux reading less than the individual student's cutting point) should be reviewed by the clinician at the institution. The TB questionnaire should be reviewed to ensure that the student does not have HIV/AIDS. If the student does not have HIV/AIDS, no further action is required.
- Students with HIV/AIDS should be referred to the ARPHS Medical Officer for risk assessment regardless of their Mantoux results (i.e. even if their Mantoux is negative), as they are at highest risk of having a false negative Mantoux test.
- Students with positive results should be given written information about positive Mantoux tests (see Appendix 5), and referred for chest x-ray by tertiary institution staff.
- When all test results for all students in a class/intake are complete, student screening data should be reviewed by the clinician at the institution (see section 5).

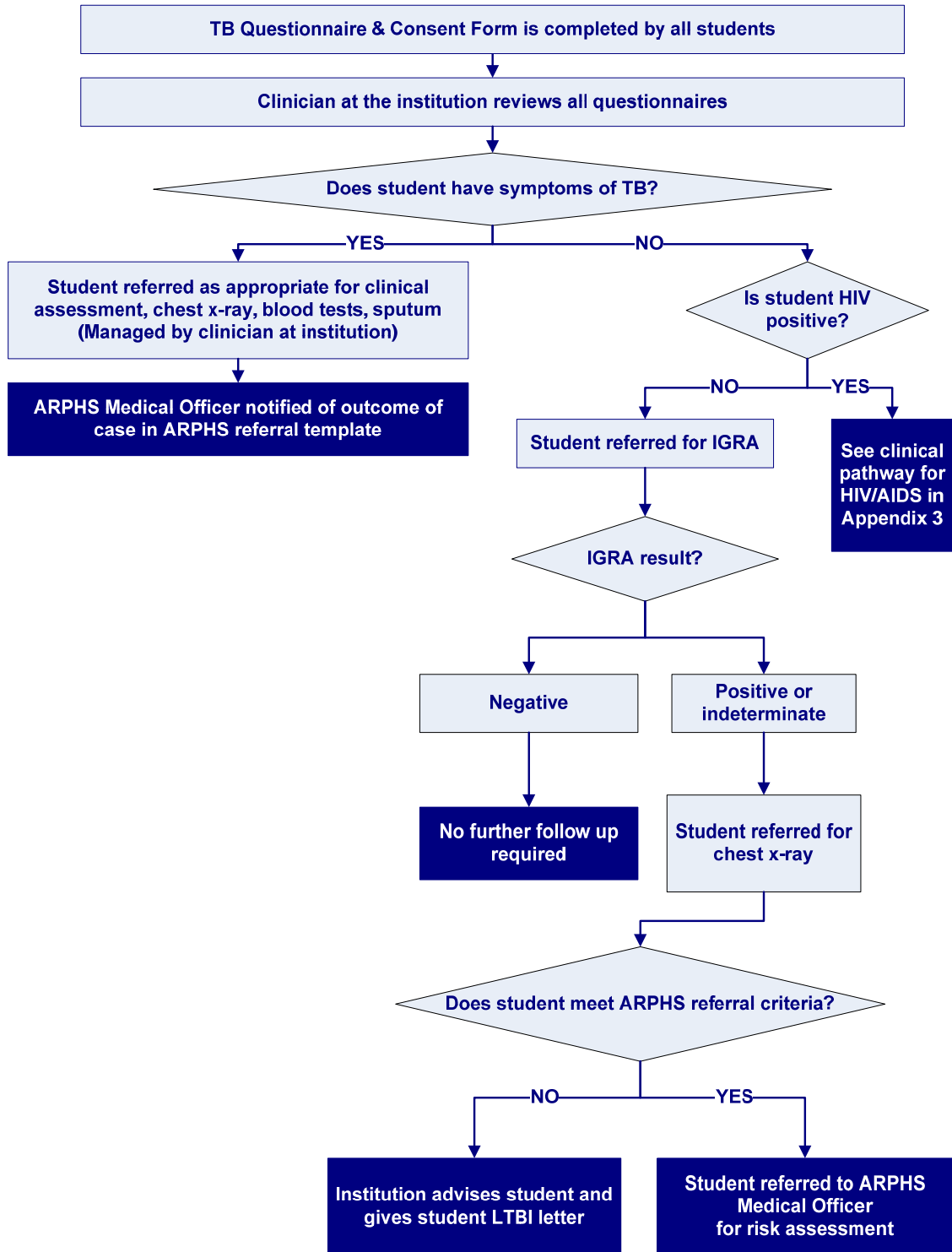
NOTE: Pregnant students: If pregnant students have a positive Mantoux, they should be assessed carefully for symptoms of active TB disease. If they have any symptoms, they should be referred promptly for investigation, including chest x-ray. If they are asymptomatic, their chest x-ray should be deferred. The chest x-ray can safely be done after the first twelve weeks of pregnancy, but at the latest should be done immediately after delivery of the baby.

4. Interferon Gamma Release Assay (IGRA)

4.1. Clinical Pathway – Mantoux & IGRA



4.2. Clinical Pathway – IGRA only



4.3. General Information about IGRA

Interferon gamma release assays (IGRA) are blood tests that were developed as an alternative to Mantoux testing for use as part of the diagnostic work-up for active TB disease, and for screening for latent TB infection. These assays are based on the principle that the T-cells of an individual sensitised to mycobacterial antigens (TB bacteria antigens) produce interferon gamma (IFN γ) when the antigens are re-encountered. The production of IFN γ by lymphocytes correlates with TB infection.

The main advantages of IGRA compared with Mantoux are that IGRA results are less affected by BCG vaccination, and are also more specific for exposure to *M. tuberculosis* infection (infection caused by the TB bacteria). In other words, there are less 'false positive' reactions. Some positive Mantoux tests can be caused by previous BCG vaccination or by infection with non-tuberculous mycobacteria (bacteria that are in the same family as TB, but are not TB).

There are two different IGRA tests:

- The QuantiFERON TB-Gold test (QFT-G), produced by Cellestis (Australia), and approved for use in the USA, UK and Japan. This test was approved by the U.S. Food and Drug Administration (FDA) in 2005.
- The TSpot-TB test (TSpot), produced by Oxford Immunotec (UK), and approved for use in Europe.

The QuantiFERON TB-Gold test (QFT-G) is the only IGRA currently available in New Zealand. In New Zealand, the QFT-G test is currently analysed at only one laboratory in Auckland (LabPlus at Auckland District Health Board).

An institution may decide to use IGRA for screening healthcare students, either alone (as in section 4.1. above) or in conjunction with Mantoux (as in section 4.2 above). In either case, arrangements for access to and payment for the QFT-G test need to be made directly with LabPlus by each tertiary institution, on behalf of their students.

Results of an IGRA can be negative, positive or indeterminate. Test results for students with positive or indeterminate IGRA should be sent to the ARPHS Medical Officer for risk assessment (following the clinical pathway in either section 4.1 or 4.2). Students with HIV/AIDS should be referred to the ARPHS Medical Officer for risk assessment regardless of their IGRA results (i.e. even if their IGRA is negative or indeterminate).

Written information for students regarding the QFT-G test and the possible test results can be found in Appendix 6.

4.4. Interpreting discordant results

Discordant results occur when the Mantoux test is positive and IGRA is negative or vice-versa. Available evidence suggests that the IGRA is more specific than Mantoux testing and is at least as sensitive.

In students without medical risk factors for progression of LTBI to active TB, the IGRA results can be considered more reliable. However, in students with medical risk factors for progression of LTBI to active TB (for example, HIV positive or otherwise immunocompromised) the student should be considered to have LTBI if either the Mantoux or the IGRA is positive.

5. Process for referral to ARPHS Medical Officer

ARPHS Medical Officers will see those students assessed to be at highest risk for progression of LTBI to active TB disease. Risk factors for developing TB disease following infection are discussed in the *Guidelines for Tuberculosis Control in New Zealand 2003*, Chapter 3: Latent Tuberculosis Infection, Section 3.2.2, Pages 13-14.

HIV is the strongest medical risk factor for progression of LTBI to active TB disease. Other medical and treatment risk factors include diabetes, alcoholism and drug addiction, immunosuppressive diseases (leukaemia, lymphoma, end-stage renal disease), immunosuppressive treatments (steroid therapy, some cancer chemotherapy, transplant anti-rejection drugs), silicosis, gastrectomy, intestinal bypass and chronic malabsorption syndromes.

Time since infection is also important. A person with LTBI who has a history of recent contact (within the past 1-2 years) with a smear positive TB case is at significant risk of progression to active TB disease. The risk is lower in those who have been infected in the remote past. There are also age-related peaks in the risk of progression of LTBI to TB disease – the preschool years and early adulthood (and many healthcare students are young adults).

ARPHS Referral Criteria

- **Students with positive or indeterminate IGRA** (note: please do not refer students who have a positive Mantoux but a negative IGRA, unless they are HIV positive, as per 3rd bullet point below)
- **Students who have not had IGRA and who have Mantoux \geq 15mm**
- **Students who are HIV positive, regardless of Mantoux size or IGRA results**

At the conclusion of the screening for the class/intake of students, the clinician at the institution should review records and results for each student and determine if they meet the criteria to be referred to the ARPHS Medical Officer. All students should fall into one of the following categories:

- Have symptoms or signs of active TB disease:* The clinician at the institution should ensure that these students are referred to a clinician (GP or specialist, not ARPHS Medical Officer) promptly for investigation.
- Do not have LTBI and therefore do not need referral:* No further action needed.
- Do have LTBI but do not meet the ARPHS referral criteria:* The clinician at the institution should give these students written information about their screening results, about LTBI, about the lifelong need to be aware of the symptoms and signs of TB disease, and the need to present promptly for medical attention should these occur. A sample letter is provided in Appendix 7.
- Do have LTBI and meet the ARPHS referral criteria:* These students should be referred to the ARPHS Medical Officer for risk assessment, using the ARPHS Referral Template in Appendix 8.

A. Students who were referred to a clinician as a result of reported TB symptoms or signs

Students who were referred to a clinician as a result of TB symptoms (identified following completion of the TB Risk Assessment Questionnaire) should be identified. Details regarding these students should be entered into the ARPHS Referral Template found in Appendix 8.

B. Students who do not have LTBI and therefore do not need referral

Those students who do not need a referral to the ARPHS Medical Officer should be identified. Their results and screening information should be filed by the institution. Please enter the total number of students who did not require referral in the ARPHS Referral Template (Appendix 8). Please note that further details such as test results for these students should NOT be sent to ARPHS, as the ARPHS Medical Officer has no need to see any of these students' details.

C. Students who do have LTBI but do not meet the ARPHS referral criteria

Students who have LTBI but who do not meet the ARPHS referral criteria should be given written information about their screening results, about LTBI, about the lifelong need to be aware of the symptoms and signs of TB disease, and the need to present promptly for medical attention should these occur. A sample letter to give to these students is provided in Appendix 7. Please enter the total number of students who have LTBI but did not meet the ARPHS referral criteria in the ARPHS Referral Template (Appendix 8). Please note that further details such as test results for these students should NOT be sent to ARPHS, as the ARPHS Medical Officer has no need to see any of these students' details.

D. Students who do have LTBI and meet the ARPHS referral criteria

Students who have LTBI and meet the criteria for referral to an ARPHS Medical Officer should be identified, according to the ARPHS referral criteria above. Details of all students requiring referral should be entered into the ARPHS Referral Template found in Appendix 8. Copies of the completed TB Questionnaire, Consent Form, Mantoux and/or IGRA results and chest x-ray report should be made and collated for each student.

The collated material along with the completed ARPHS Referral Template should be sent via post to:

Auckland Regional Public Health Service
Attention: Medical Officer, Healthcare Student TB Screening
Private Bag 92 605
Symonds St
Auckland

Please include the name/address/contact details for the sender/institution on the back of the envelope (to enable the material to be directed to the appropriate Medical Officer for that geographic area, and to enable subsequent correspondence from the ARPHS Medical Officer to be directed to the referring clinician/institution).

Please note that referrals should NOT be made individually, but only by class/intake.

If clinicians have any questions regarding the need for referral of a student (for example, if they are unsure whether or not the student is immune compromised and meets the ARPHS referral criteria), they should feel free to contact an ARPHS Medical Officer on 09 623 4600. When calling, please state the name of the institution to enable the call to be directed to the appropriate Medical Officer for that geographic area.

6. ARPHS Medical Officer Risk Assessment

6.1. Purpose of referral to ARPHS

The purpose of referring students who meet the referral criteria to ARPHS is to:

- Assess individual students' risk factors for progression of LTBI to TB disease
- Offer chemoprophylaxis to those students at highest risk for progression of LTBI to TB disease.

6.2. Risk Assessment Process

When the ARPHS Medical Officer receives the completed ARPHS Referral Template and copies of information for each student, he/she will review the information and make an assessment.

- Students identified as at highest risk for progression of LTBI to TB disease will be contacted in order to book a clinic appointment, and will receive further tests and follow up as appropriate.
- The institution will be notified if there are any students who were referred to ARPHS but have been assessed by the ARPHS Medical Officer as not needing to be seen at a clinic. The clinician at the institution should then provide these students with written information about their screening results, about LTBI, about the lifelong need to be aware of the symptoms and signs of TB disease, and the need to present promptly for medical attention should these occur (see Appendix 7).

7. Notification

Because TB is a notifiable disease (Health Act 1956), all students taking medication for treatment of TB disease or LTBI (whether prescribed in New Zealand or overseas) need to be notified to Public Health.

Students taking medication for treatment of TB or LTBI need to be closely supervised and monitored for side effects. The drugs used to treat TB and LTBI can only be prescribed by a specialist in New Zealand. If medical practitioners at tertiary institutions wish to consider treating students with LTBI, they should obtain advice by discussing this on a case by case basis with the ARPHS Medical Officer for their geographic area.

Public Health has an important role in investigating and controlling infectious disease in the community. ARPHS has a team of Public Health Nurses whose role it is to investigate and monitor cases of TB, and to supervise treatment of TB and LTBI.

To notify ARPHS of a case of TB or LTBI in a healthcare student (of which ARPHS is not already aware), please contact Auckland Regional Public Health Service on 09 623 4600, and ask for the TB Support Officer.

8. Data Storage by Institutions

All tertiary institutions should keep easily accessible records of all students' TB risk assessments, screening information and test results for at least 10 years. These may be requested in the future by the Occupational Health Service at an employing hospital, or by a doctor, if the student is later exposed to a case of tuberculosis.

Tertiary institutions should give students a copy of their screening information and students should be encouraged to keep it in a safe place for future reference.

Appendix 1: Written information for students

Information about TB screening for healthcare students

The purpose of tuberculosis (TB) screening for healthcare students (future healthcare workers) is:

- to protect students, who are at risk of becoming infected with TB bacteria from their patients, by establishing a baseline before students are exposed to patients
- to identify those students who have already been infected and who have latent TB infection (LTBI), so that they can be informed about LTBI, and know what to look out for in future
- to protect patients and fellow healthcare workers, who are at risk of becoming infected with TB bacteria from student healthcare workers with undiagnosed and untreated TB disease.

The purpose of the Health Practitioners Competence Assurance Act 2003 is to protect the health and safety of members of the public by ensuring that health practitioners are competent and fit to practise their professions. Fitness to practise your profession includes not risking infecting patients with whom you come into contact. In this respect, healthcare students are expected to meet the same standards as qualified health practitioners.

The TB screening involves filling in a TB questionnaire and getting some tests done. It is essential that you answer each question honestly when you fill in the questionnaire. Get the tests done as soon as possible. **You will not be able to go on clinical placement until you have filled in the questionnaire, have had the tests done and have been cleared to go on clinical placement.**

Tests

The usual test for infection with TB bacteria is the **Mantoux test**. This is an intradermal skin test and involves injecting 0.1ml of a test solution (tuberculin) into the dermal skin layer of the forearm. The injection site must be examined 3 days later to “read” the Mantoux result. Any thickening of the skin with associated reddening will be measured to decide if the test is positive or negative. If the first Mantoux test is negative, you will need a second test one week after the first. Previous infection with TB bacteria usually gives a positive test result but a previous BCG vaccination may also give a positive reaction. This is a very safe test and pregnancy is not a contraindication. Large Mantoux reactions may be tender and itchy for a few days.

Another test for infection with TB bacteria is the **QuantiFERON-TB Gold test (QFT-G)**. You may be offered this test instead of a Mantoux test or because your Mantoux test was positive.

If your test for infection with TB bacteria is positive (and in some circumstances even if it is negative), you will need to have a **chest x-ray**. The chest x-ray is to ensure that you do not have active TB disease in your lungs, which may be infectious to other people. If you are found to have active TB disease, you will be referred for appropriate treatment.

What is latent TB infection (LTBI)?

In most people who breathe in TB bacteria and become infected, the body is able to fight the bacteria to stop them from growing. The bacteria become inactive, but they remain alive in the body and can become active later. This is called latent TB infection (LTBI). People with LTBI:

- Have no symptoms
- Don't feel sick
- Can't spread TB to others
- Usually have a positive Mantoux or QuantiFERON-TB Gold test (QFT-G)
- May develop active TB disease if they do not receive treatment for LTBI

Most people (9 out of 10) who have latent TB infection never develop active TB disease. In these people, the TB bacteria remain inactive for a lifetime without causing disease. But in other people, especially people who have weak immune systems, the bacteria become active and cause TB disease.

Appendix 2: TB questionnaire for risk assessment of health care students & consent for Mantoux testing

General Information

Surname: _____ First Names: _____

Address: _____

D.O.B: ____ / ____ / _____ Sex: Male Female

Name of GP: _____

Address of GP: _____

Baseline Personal Tuberculosis Information

1. What country were you born in? _____

2. Ethnicity (please choose all that apply)

NZ European NZ Maori Pacific Island Other European

Other (please state) _____

3. Please list the countries you have lived in for more than 3 months for within the past 5 years.

4. What date did you arrive in New Zealand? _____ N/A

5. Do you have or have you had a chronic illness such as HIV, kidney disease, diabetes, cancer, any immunosuppressive illness Yes No

or immunosuppressive treatment? *

If yes, please list _____

* Please talk to the nurse if you are unsure about how to answer this question. Key risk factors for HIV include: anal intercourse with an HIV-infected person without using a condom; vaginal intercourse with an HIV-infected person without using a condom; using shared needles or syringes or injecting equipment during IV drug use; transmitted by an HIV positive mother to her baby during pregnancy, birth or breastfeeding. Immunosuppressive diseases include leukaemia and lymphoma. Immunosuppressive treatments include long-term oral steroid therapy (not asthma inhalers), some cancer chemotherapy and transplant anti-rejection drugs. Other relevant conditions include silicosis, gastrectomy, intestinal bypass, chronic malabsorption syndromes, alcoholism and drug addiction.

6. Do you take any oral steroids, immunosuppressive therapy (not including inhaled steroids) or other medication? Yes No
If yes, please list _____
7. Have you ever been treated for tuberculosis? Yes No
If yes, when _____
8. Have you ever been exposed to anyone with TB? Yes No Don't know
If yes, when _____
9. Have you had any previous exposure to TB in the course of your work? Yes No Don't know
If yes, when _____
10. Have you ever been vaccinated with BCG? Yes No Don't know
If yes, when _____
If yes, has it left a scar? (nurse to verify) Yes No
11. Are you pregnant? N/A Yes No Don't know
12. Have you ever had a Mantoux test, heaf test or blood test for TB infection? Yes No Don't know
If yes, what was the result? _____
(in mm for Mantoux; positive, negative or indeterminate for IGRA)
13. Have you ever been told that you should not have any more Mantoux tests because you have had a positive Mantoux reading? Yes No Don't know
14. Have you had a chest x-ray in the last 2 years? Yes No Don't know
If yes, what was the result? Normal Abnormal
Please provide details if available _____

(place and date x-ray taken, x-ray report and/or x-ray)
15. Do you have as much energy as you think you should have for your age? (circle)
- | | | | | | |
|-----------|---|---|---|---|----------------|
| 0 | 1 | 2 | 3 | 4 | 5 |
| No energy | | | | | Lots of energy |

16. Does your cough produce a lot of sputum (phlegm)? Yes No
17. Do you have a persistent cough, or cough most days? Yes No
18. Have you ever coughed up blood or bloody sputum? Yes No
19. Do you wake at night sweating so much you have to change your bed clothes? Yes No
20. Have you had urinary tract infections without your doctor being able to find a cause? Yes No
21. Have you lost any weight over the last 6 months without meaning to? Yes No
If yes, how much? _____(kg)
22. Have you had any lumps in your neck, armpit or groin which won't go away? Yes No

Declaration

I _____ (full name) declare that to the best of my knowledge the answers in this questionnaire are correct. I understand that if I have given any false or deliberately misleading information, or I have deliberately omitted any relevant facts, this may lead to serious consequences. I may be subject to disciplinary action which may affect my ability to continue my course of study at this institution.

Signed _____ Date _____

Consent

- I have received fact sheets about Tuberculosis (TB) and the Mantoux test and/or IGRA test.
- I have been given the opportunity to ask questions about the Mantoux test and/or IGRA test. Any questions asked have been answered to my satisfaction.
- I have answered the questions in the TB Questionnaire for Risk Assessment of Healthcare Students.
- I understand the details of the Mantoux test and/or IGRA test and I consent to the test(s).

I consent to the administration of the Mantoux test(s) and/or IGRA test.

Full Name (please print) _____

Signed _____ Date _____

FOR STAFF USE ONLY – Students please do not write on this page

Clinician Assessment

Assessed by _____ Date assessed _____

Mantoux

Mantoux Cutting Point _____

	Mantoux 1	Mantoux 2
Date and time placed		
Site		
Batch number		
Expiry date		
Placed by (sign)		
Name (print)		
Date and time read		
Result (mm)		
Read by (sign)		
Name (print)		

IGRA

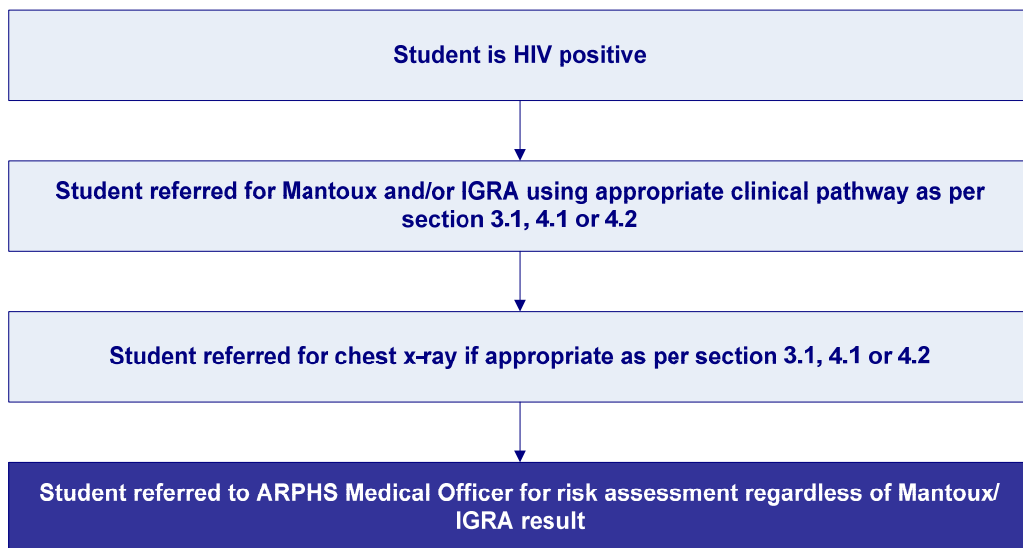
	IGRA
Date blood taken	
Result	
Date result reviewed	
Reviewed by (sign)	
Name (print)	

Referred to ARPHS Medical Officer? Yes No

Appendix 3: Clinical Pathway for Students with HIV/AIDS

NOTE: All students with HIV/AIDS should be referred to the ARPHS Medical Officer for risk assessment regardless of their Mantoux and/or IGRA results (i.e. even if Mantoux and/or IGRA are negative).

If clinicians have any questions regarding the screening and/or referral of students with HIV/AIDS, they should feel free to contact an ARPHS Medical Officer on 09 623 4600 to discuss. When calling, please state the name of the institution to enable the call to be directed to the appropriate Medical Officer for that geographic area.



Appendix 4: Definition of positive Mantoux reactions in New Zealand, adults ≥ 15 years

Source: *Guidelines for Tuberculosis Control in New Zealand 2003*
Chapter 2, Section 2.2, Page 11, Table 2.1

Mantoux Cutting Points for Adults (≥ 15 years)		
NZ born	No BCG	≥ 10mm
	Previous BCG	≥ 15mm
Following residence in a high-incidence country *	No BCG or previous BCG	≥ 10mm
With immunosuppressive illness or taking immunosuppressive drugs	No BCG or previous BCG	5 -10mm **
HIV / AIDS	No BCG or previous BCG	≥ 5mm
Close contacts of smear-positive cases (any origin)	No BCG or previous BCG	≥ 10mm

* **High incidence countries: All countries except the following low incidence countries:** Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Holland, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, New Zealand, Norway, Slovakia, Sweden, Switzerland, the United Kingdom, and the United States of America.

** Comments on the cutting points for immunosuppressive illness/immunosuppressive drugs:

Source: *Guidelines for Tuberculosis Control in New Zealand 2003*, Chapter 2, Section 2.2.1, Pages 11– 12 : Comments on the cutting points in Table 2.1

In those who are immune-suppressed, the degree and duration of impairment should be documented, and the appropriate cutting point selected, as shown below.

The 5 mm cutting point is appropriate with:

- immunosuppressive treatment for organ transplantation
- aggressive immunosuppressive cancer treatment
- cytotoxic immune-suppressive agents such as cyclophosphamide or methotrexate
- systemic corticosteroid treatment that is prolonged (eg, for more than six weeks) *and* in a dose of prednisone ≥ 15 mg/day (or equivalent with another steroid); the higher the dose, the greater the risk of reactivation of TB
- combinations of immunosuppressive conditions (e.g. prednisone < 15 mg/day plus diabetes mellitus (on treatment), moderate/severely advanced malignancy or malnutrition (this advice is empirical, not evidence-based)
- end-stage renal failure.

The 10 mm cutting point should be used with:

- doses of prednisone < 15 mg/day long term
- diabetes mellitus (including insulin-dependent)
- alcoholism, malnutrition or disseminated malignancy.

Appendix 5: Positive Mantoux test – student information

A Positive Mantoux Test

What does a positive Mantoux test result mean?

A raised, reddened skin area around the injection site, depending on its size, can indicate a positive Mantoux. A positive Mantoux test DOES NOT mean that you have TB. It means that you have reacted to tuberculin given in the Mantoux test, indicating that you have an immune response to tuberculin.

What happens if my Mantoux test is positive?

If your Mantoux test for infection with TB bacteria is positive (and in some circumstances even if it is negative), you will need to have a **chest x-ray**. The nurses at the Health and Counselling Centre will refer you for the chest x-ray. It is important that you have the chest x-ray done as soon as possible. The results of the chest x-ray will be reviewed by a doctor at the Health and Counselling Centre. If the doctor believes it is appropriate, information regarding your screening will be referred to a Medical Officer at Auckland Regional Public Health Service (ARPHS).

What does the ARPHS Medical Officer do?

The Medical Officer will perform a risk assessment based upon the information you have provided to the Health and Counselling Centre, your Mantoux test results and chest x-ray results. If he/she does not believe that further consultation is needed, you will receive a letter from the Health and Counselling Centre with information. If the Medical Officer believes that further consultation is needed, they will contact you to arrange an appointment.

At the appointment with the Medical Officer, you will receive an examination, and further tests may be arranged (including blood tests and urine tests). The Medical Officer may advise that you do not require any further intervention, or alternatively you may be offered a course of antibiotics for latent TB infection (LTBI). You will have the opportunity to ask questions and receive an explanation from the Medical Officer.

What is latent TB infection (LTBI)?

In most people who breathe in TB bacteria and become infected, the body is able to fight the bacteria to stop them from growing. The bacteria become inactive, but they remain alive in the body and can become active later. This is called latent TB infection (LTBI). People with LTBI:

- Have no symptoms
- Don't feel sick
- Can't spread TB to others
- Usually have a positive Mantoux or QuantiFERON-TB Gold test (QFT-G)
- May develop active TB disease if they do not receive treatment for LTBI

Most people (9 out of 10) who have latent TB infection never develop active TB disease. In these people, the TB bacteria remain inactive for a lifetime without causing disease. But in other people, especially the people who have weak immune systems, the bacteria become active and cause TB disease.

What is active TB disease?

Some people with LTBI develop TB disease later in life. TB is the disease caused by the bacteria called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs. But TB bacteria can attack any part of the body such as the lymph nodes, kidney, spine and brain. If not treated properly, TB disease can be fatal. TB is spread through the air from one person to another. The bacteria get into the air when a person with active TB disease of the lungs or throat coughs or sneezes. People nearby may breathe in these TB bacteria and become infected.

The general symptoms of active TB disease include:

- Coughing lasting for 3 weeks or longer
- Coughing up blood or bloody sputum (phlegm)
- Fever
- Unexplained weight loss
- Loss of appetite
- Night sweats
- Fatigue

Appendix 6: QuantiFERON TB-Gold test – student information

QuantiFERON-TB Gold test

What is the QuantiFERON®-TB Gold test?

The QuantiFERON-TB Gold test (QFT-G) is a whole-blood test for use as an aid in diagnosing *Mycobacterium tuberculosis* (*M. tuberculosis*) infection. *M. tuberculosis* is the germ that causes tuberculosis (TB) disease and latent tuberculosis infection (LTBI). This test was approved by the U.S. Food and Drug Administration (FDA) in 2005. In New Zealand, the QFT-G test is currently analysed at only one laboratory in Auckland.

How does it work?

Blood samples are mixed with antigens (proteins produced by the bacteria) and controls. For QFT-G, the antigens include mixtures of synthetic peptides representing the *M. tuberculosis* proteins, ESAT-6, CFP-10 and TB7.7. When the individual's white cells, in particular the lymphocytes, in the blood are mixed with the antigens, the white cells in an individual who is infected with *M. tuberculosis* recognise the bacterial proteins and release interferon-gamma (IFN-gamma). After incubation of the blood with antigens for 16 to 24 hours, the amount of IFN-gamma is measured.

If a person is infected with *M. tuberculosis*, their white blood cells will release IFN-gamma in response to contact with the TB antigens. The QFT-G results are based on the amount of IFN-gamma that is released in response to the antigens.

Why have I been offered this test?

You have been offered this test either instead of a Mantoux test (a skin test for TB infection) or because your Mantoux test was positive. QFT-G is less affected by BCG vaccination than the commonly used tuberculin skin test (Mantoux test). QFT-G is also more specific for exposure to *M. tuberculosis* infection, compared with the Mantoux test, which can be positive due to infection with non-tuberculous mycobacteria (related types of bacteria which do not cause TB, and do not need treatment).

How are the test results interpreted?

A positive result suggests that *M. tuberculosis* infection is likely; a negative result suggests that infection is unlikely; and an indeterminate result suggests QFT-G results cannot be interpreted as a result of low mitogen response or high background response. An indeterminate test result can occur if a person is immunocompromised.

What happens if I have a positive or an indeterminate test?

If the QFT-G test is positive or indeterminate, (and in some circumstances even if it is negative), you will need to have a **chest x-ray**. The nurses at the Health and Counselling Centre will refer you for the chest x-ray. It is important that you have the chest x-ray done as soon as possible.

The results of the chest x-ray will be reviewed by a doctor at the Health and Counselling Centre. If the doctor believes it is appropriate, information regarding your screening will be referred to a Medical Officer at Auckland Regional Public Health Service (ARPHS).

What does the ARPHS Medical Officer do?

The Medical Officer will perform a risk assessment based upon the information you have provided to the Health and Counselling Centre, your Mantoux and/or IGRA test results and chest x-ray results. If he/she does not believe that further consultation is needed, you will receive a letter from the Health and Counselling Centre with information. If the Medical Officer believes that further consultation is needed, they will contact you to arrange an appointment.

At the appointment with the Medical Officer, you will receive an examination, and further tests may be arranged (including blood tests and urine tests). The Medical Officer may advise that you do not require any further intervention, or alternatively you may be offered a course of antibiotics for latent TB infection (LTBI). You will have the opportunity to ask questions and receive an explanation from the Medical Officer.

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In most people who breathe in TB bacteria and become infected, the body is able to fight the bacteria to stop them from growing. The bacteria become inactive, but they remain alive in the body and can become active later. This is called latent TB infection (LTBI). People with LTBI:

- Have no symptoms
- Don't feel sick
- Can't spread TB to others
- Usually have a positive Mantoux or QuantiFERON-TB Gold test (QFT-G)
- May develop active TB disease if they do not receive treatment for LTBI

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The general symptoms of active TB disease include:

- Coughing lasting for 3 weeks or longer
- Coughing up blood or bloody sputum (phlegm)
- Fever
- Unexplained weight loss
- Loss of appetite
- Night sweats
- Fatigue

Appendix 7: Letter for students with LTBI

Dear **STUDENT NAME**

Prior to your clinical placement as a healthcare student, you recently completed screening for tuberculosis (TB). As a result of the screening you have been found to have latent TB infection (LTBI).

This is a letter for you to keep so that you have a permanent record of your screening results. I strongly recommend that you give a copy of this letter to your family doctor.

Relevant test results:

Your Mantoux test result on **DATE** was **RESULT** in mm. This is a positive result.

Your QuantiFERON-TB Gold test result on **DATE** was **RESULT** positive/negative/indeterminate.

Your chest x-ray result on **DATE** was **RESULT** normal/abnormal.

NOTE ANY ABNORMALITIES AND ADVISE IF GP FOLLOW UP REQUIRED

Your test results indicate that you have LTBI.

You **do not** have active TB disease, and you are not infectious – you cannot pass the infection on to anyone else. You can continue with all your work and social activities as normal.

LTBI means that you have been infected with TB bacteria (germs) at some stage in the past. The TB bacteria are in your body, but are dormant (asleep) and inactive. Your body is mounting a response to the bacteria. The bacteria can stay in your body for many years without causing problems. It is most likely that you will never develop active TB disease.

However you have a small risk (around 10% during your lifetime) of developing active TB disease at some time in the future. This is more likely to happen if you develop a weakened immune system (immunocompromise), or as you get older (because the immune system weakens as people age).

To reduce the chance of developing active TB disease in the future you should follow a healthy lifestyle: don't smoke, exercise regularly, eat a good diet, drink alcohol in moderation (if at all), and get enough rest.

Conditions or treatments that make it more likely that active TB disease will develop include:

HIV, kidney disease (renal failure), diabetes, gastrectomy, cancer, chemotherapy medicines for cancer, large doses of oral steroid medication, old age, alcoholism and any other condition that weakens your immune system.

You must be always be aware of and watch out for symptoms of TB disease:

- Coughing lasting for 3 weeks or longer
- Coughing up blood or bloody sputum (phlegm)
- Fever
- Unexplained weight loss
- Loss of appetite
- Night sweats
- Fatigue

If you develop any of these symptoms you must be checked without delay by your family doctor. Make sure you tell your doctor that you have LTBI, or even better, show the doctor this letter.

Remember that if you do develop active TB disease and are infectious (if the TB is in the lungs or throat), you will first infect those you spend the most time with (usually family and friends, especially young children). However your patients (who are already sick) and colleagues may also be infected. So it is very important to be checked by a doctor without delay if you develop symptoms of TB disease.

If you start work in the healthcare sector, you should tell the Occupational Health Service at your workplace about your LTBI. They will advise whether any ongoing surveillance is required.

If your Mantoux test was 15mm or greater, you should not have any more Mantoux tests, as they will not provide useful information, and may scar your arm.

Appendix 8: ARPHS Referral Template

Medical Officer, Healthcare Student TB Screening
 Tuberculosis Control Programme
 Auckland Regional Public Health Service
 Private Bag 92605
 Symonds St
 Auckland

Dear Medical Officer

Re: Student screening from DATE to DATE at INSTITUTION NAME

INSTITUTION NAME conducted healthcare student screening for TB from **DATE** to **DATE**.

- A. _____ students had symptoms/signs of TB disease and were referred to a clinician (details below).
- B. _____ students did not have LTBI, no further action needed.
- C. _____ students had LTBI but did not meet ARPHS referral criteria, given written information.
- D. _____ students had LTBI and are being referred to ARPHS (details below). Copies of the TB risk assessment questionnaire & consent form, Mantoux test results and/or IGRA results and chest x-ray reports, are attached for each student.
- E. _____ students were screened in total (A + B + C + D).

A: Details of students referred to a clinician due to symptoms/signs of TB disease

Surname	First Name	NHI	DOB	Clinician name	Clinician address	Clinician phone

D: Details of students referred to ARPHS

Surname	First Name	NHI	DOB	Address	Suburb	Phone

Sincerely,

CLINICIAN NAME
INSTITUTION NAME