INFECTION CONTROL MANUAL

Chapter 19

Policy for the prevention and control of tuberculosis

Recommending Committee: Hospital Control of Infection Committee
Approving Committee: Clinical Performance Council
Signature: 
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## Location of Policy

All wards and departments (for information purposes)
# PREVENTION AND CONTROL OF TUBERCULOSIS

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1. INTRODUCTION

Tuberculosis is an infection caused by one of the Mycobacterium tuberculosis group of organisms (M tuberculosis, M bovis or M africanum). Infection may affect any part of the body but commonly affects the lungs (respiratory tuberculosis).

Transmission

Transmission is usually by inhalation of airborne bacteria, from the cough of an infected person. Patients with suspected respiratory TB must be given a single room.

Duration of communicability

Patients remain infectious to others for as long as viable M tuberculosis organisms are present in the sputum. It usually takes 2 weeks of treatment before the patient is no longer infectious. It may take longer if the patient is infected with multi-drug resistant M tuberculosis.

Course of disease

Once an individual acquires infection, one of three courses may follow:

a. Infection resolves spontaneously
b. Active disease develops over several weeks or months
c. Infection becomes latent but can reactivate when old age or illness weakens the immune system

Those at increased risk of active disease include the elderly, the very young, those from a high prevalence country e.g. Indian subcontinent and Africa, those with HIV infection, chronic alcoholics and the homeless.

Treatment

Several months treatment with antituberculosis drugs e.g. isoniazid, pyrazinamide, rifampicin, ethambutol are required. Treatment must always be guided by a Chest Physician. Unless there is a clear clinical or socioeconomic need, such as homelessness, people with TB at any site of disease should not be admitted to hospital for diagnostic tests or for care.

Multi-drug resistant tuberculosis (MDR TB)

Multi-drug resistance is defined by resistance to 2 or more antituberculosis drugs. Approximately 1.1% of TB isolates in the UK are multi-drug resistant (around 40-50 cases a year). These isolates are not more infectious, but they can be difficult to treat therefore the patient may be infectious for longer.
Control of disease

In order to control spread of the disease the following measures are taken:

- Prompt identification and treatment of cases
- Infection control measures
- Notification of cases so that contact tracing and follow-up can be undertaken
- Immunisation with BCG vaccine

Other Mycobacteria

Atypical mycobacteria eg. M avium intracellulare, M kansasii, etc are not infectious like M tuberculosis. Therefore these do not require notification and contact tracing.

2. NOTIFICATION OF TUBERCULOSIS

2.1 If a patient is known or strongly suspected of having tuberculosis, the clinician in charge of the patient, or the Microbiology medical staff, must notify the CCDC (Consultant in Communicable Disease Control) using the standard notification form. In addition:

2.2 The Infection Control Team should be informed to ensure that correct isolation precautions are carried out and the correct specimens obtained.

2.3 The Consultant Physician (or Consultant Paediatrician) with responsibility for tuberculosis cases will advise on antituberculous therapy, arrange follow-up assessment of the patient, and liaise with Health Visitors to assess the patient’s family. All patients should have a risk assessment for adherence to treatment. DOT (directly observed therapy) should be considered for patients who have adverse factors on their risk assessment

Contacts

Consultant in Communicable Disease Control
Health Protection Agency
0151 290 8360

Service Manager Infection Control
Ext. 4568 or bleep 0020

Clinical Nurse Specialist, Infection Control
Ext. 2452 or bleep 2452

Clinical Nurse Specialist, Infection Control
Ext. 1384 or bleep 1384

Consultant Microbiologist/DIPC
Ext. 1834 or duty microbiologist via switchboard out of hours
Consultant Microbiologist
Ext. 1836 or duty microbiologist via switchboard out of hours

Consultant Physician
Ext 2638 Secretary or bleep 2909

Consultant Physician
Ext 1899/1844

Consultant Paediatrician
Ext 1453

Occupational Health
Ext 1387

TB Health Visitors
For contact details for TB health visitors for St Helens and Knowsley PCTs, please telephone the Health Protection Agency on 0151 290 8355.

3. MANAGEMENT OF A WARD PATIENT WITH TUBERCULOSIS

If a patient is suspected of having tuberculosis, the clinician responsible for the care of the patient should inform the:
- Infection Control Team (ICT) and the CCDC
- Dr Stockton (Paediatric cases Dr Amegavie) must also be informed if the diagnosis is confirmed.

Is the patient infectious?
Patients with sputum smear positive tuberculosis are infectious to others and must be isolated in a side room for the first 2 weeks of treatment.

Patients with pulmonary tuberculosis but with 3 consecutive, good quality sputum smear negative specimens, are potentially infectious. They may transmit infection to immunocompromised patients and therefore must not be housed with them.

Patients with tuberculosis at sites other than the lungs e.g. renal are not normally infectious. However they must not be housed with immunocompromised patients who are much more susceptible to infection. Aerosol generating procedures e.g. wound irrigation may necessitate patient isolation.

IMPORTANT

Is the patient at high risk of multi-drug resistant tuberculosis?

A risk assessment for drug resistance should be made for each patient with tuberculosis, based on the risk factors listed below, and on the geographical distribution of drug resistance within the UK:
1. A history of prior TB drug treatment; prior TB treatment failure
2. Contact with a known case of drug-resistant TB
3. Birth in a foreign country, particularly high-incidence countries as defined by the Health Protection Agency website www.hpa.org.uk
4. HIV infection
5. Residence in London
6. Age profile, with highest rates between ages 25 and 44
7. Male gender

If the drug resistance is likely or confirmed the patient must be admitted to a negative pressure isolation room. Therefore the patient must be transferred to the Infectious Disease Unit, Royal Liverpool and Broadgreen University Hospital NHS Trust. If the patient is a Paediatric patient, referral to Dr B Coulter at Alder Hey Hospital is advised.

If the risk of multi-drug resistance is considered significant, the chest physician will request urgent molecular tests for rifampicin resistance.

3.1 Open pulmonary TB (sputum or gastric aspirate smear positive)

The patient must be isolated in single room with the doors closed. Dr Stockton must be informed. (Paediatric cases – inform Dr Amegavie)

Protective clothing
Use standard precautions for contact with blood, body fluids, secretions and excretions. Other than this, do not use masks, gowns or barrier nursing techniques unless:

- you suspect a person has MDR TB, or
- you are performing aerosol-generating/cough-inducing procedures.

When such equipment is used, the reason should be explained to the person with TB.

Inpatients with smear-positive respiratory TB should be asked (with explanation) to wear a surgical mask whenever they leave their room until they have had 2 week’s drug treatment.

Mantoux negative health care workers who have declined BCG vaccination should not work where there is a risk of exposure to TB.

If multi-drug resistant TB is suspected (until transfer to ID unit can be arranged)

Staff and visitors should wear FFP3 masks during contact with a patient with suspected or known MDR TB while the patient is considered infectious. A small stock of suitable masks must be kept on all wards where patients with open pulmonary TB are likely to be cared for e.g. MAU, Emergency Department, ICU/HDU and medical wards.
Cough inducing procedures
Cough inducing procedures e.g. for production of specimen or inhalation of pentamidine must NEVER be performed on the open ward. FFP3 masks must be worn for cough-inducing procedures.

Duration of Isolation
The patient should ideally be isolated for the first 2 weeks of antituberculous chemotherapy. The decision to discontinue isolation must be made by the Chest Physician or the Consultant Microbiologist, taking into account whether there is a possibility of drug resistance which would require isolation nursing for a longer period.

Visitors
Only those who have been in close contact with the patient before diagnosis should be allowed to visit while the patient requires isolation.

3.2 Urinary tract, pelvic, genital, meningitis, bone, lymph node TB and those with pleural effusions (effusion smear positive but sputum negative)
Patients with non-pulmonary tuberculosis may be nursed on a general ward. However, aerosol-generating procedures such as abscess or wound irrigation must be carried out in a single room. Therefore on some occasions a side room may be more appropriate. Precautions must be taken when handling infected secretions. This will include the use of plastic aprons and gloves if dealing with infected dressings. The patient should be referred to the appropriate consultant physician or paediatrician to monitor antituberculous therapy. Isolation precautions should be continued for the first 2 weeks of anti-tuberculosis chemotherapy.

3.3 Tuberculosis suspected or radiology report suggestive of active tuberculosis
Isolate the patient in a side room and contact Dr Stockton (Paediatric cases: Dr Amegavie). Ensure that three early morning specimens of sputum or other relevant specimens are sent to the Microbiology Laboratory and request urgent examination. If all three smears are negative the patient does not need to be isolated in a single room but must not be housed with immunocompromised patients. If they are positive proceed as in 3.1 or 3.2.

3.4 Children with TB (open or closed)
Children must be isolated in a single room (as in 3.1) until the source case is identified as this person may be among those visiting the child. Any visitors to a child with TB in hospital should be screened as part of contact tracing, and kept separate from other patients until they have been excluded as the source of infection.
3.5 Precautions for isolated patients

Waste disposal

Clinical waste must be placed in yellow plastic bags not more than ¾ full and tied at the top with ward/department identification tag.

Bed linen

If socially soiled only, place into white linen bag. If linen is contaminated with sputum or other infected body fluids place inside a water soluble liner bag and then into a red soluble liner bag which is placed inside a red canvas bag.

Terminal cleaning with Chlorclean and water. Fumigation is not required.

Crockery and cutlery can be sent to the central dishwasher. Disposable not required.

Sputum specimens must be sent to the laboratory in plastic specimen bags and labelled “Danger of Infection”.

3.6 Post mortem diagnosis

Not infrequently a diagnosis of tuberculosis is made at post mortem. This is due to re-activation of an old primary focus which may re-activate terminally. The patient was not necessarily highly infectious in life. If the patient did not have respiratory problems pre-mortem it is unlikely that (s)he would have been infectious to members of staff or other patients, screening is, therefore, not essential but will be carried out at the discretion of the Consultant Microbiologist and the Consultant in Communicable Disease Control.

4. DIAGNOSIS

Clinical picture
Chest X-ray
Histology

Microbiology (sputum or other specimen)
Ziehl Neelsen stain for acid fast bacilli (microscopy)
Culture for M tuberculosis (can take up to 8 weeks, usually 2 – 4 weeks)
If sputum samples are AFB positive, a nucleic acid amplification test will be routinely performed in order to identify M.tuberculosis and Mycobacterium avium intracellulare (MAI). Results will be telephoned as soon as they are available. This result should be awaited before carrying out large contact tracing exercises.
Reference laboratory tests e.g. PCR (Polymerase Chain Reaction) and molecular methods for detection of resistance. These are expensive investigations which are not appropriate for all patients but should be considered if there is a possibility of multidrug resistant TB.
The specimen will be referred to Newcastle Public Health Laboratory. The clinician must first discuss the case with the Consultant Microbiologist or deputy who will then contact the Newcastle Laboratory to make arrangements for testing.

NB: PCR is less sensitive than culture therefore all specimens still require culture.

Tuberculin skin test. This skin test may also be positive after immunisation or in atypical mycobacterial infection. Conversely, the reaction may be suppressed in HIV patients, despite active infection. Obtain tuberculin PPD from Pharmacy. See Appendix E for further information.

5. **EXAMINATION OF CONTACTS**

5.1 **Contacts in Hospital**

If a patient with open pulmonary TB (sputum or gastric aspirate smear positive) has not been isolated since admission, The Consultant Microbiologist, Chest Physician and CCDC will liaise. In unusual circumstances an Incident Team will be convened e.g.:

- If a health care worker has been in contact with patients and has been found to have infectious TB.
- Paediatric ward involvement

If an incident team is necessary it should comprise:

- Consultant Microbiologist
- CCDC
- Chest physician
- Occupational Health
- Ward Manager & Matron
- Medical Director
- Press Officer
- Complaints Department
- Records manager

5.1.1. **Patients**

Following diagnosis of tuberculosis in a hospital inpatient, a risk assessment should be undertaken. This should take into account:

- degree of infectivity of the index case
- length of time before the infectious patient was isolated
- whether other patients are unusually susceptible to infection
- proximity of contact.

Contact tracing and testing should only be carried out in patients where the risk is regarded as significant. Patients should be regarded as at risk of infection if they were in the same bay, for more than 8 hours, as an inpatient with sputum smear-positive tuberculosis who had a cough.

If patients were exposed to a patient with smear positive TB for long enough to be equivalent to household contacts (as determined by the risk assessment above), or the exposed patient is known to be particularly susceptible to infection, they should be managed as equivalent to household contacts. (See Appendix A for algorithm).

The nurse in charge of the ward will provide the Infection Control Nurse with a list of those patients in close proximity to the infected patient for more than
8 hours (including DOB, unit number, address, consultant and GP) and will note if any other patient was at increased risk i.e. immunosuppressed through disease or therapy. The Infection Control Nurse will check for any risk factors that would make the patient more susceptible to tuberculosis. The exposure to TB should be documented in the contacts’ clinical notes by the Infection Control Nurse.

The Consultant in charge of these contact patients and the general practitioner will be notified by the Consultant Microbiologist (Appendix B). Patients without undue susceptibility will be informed and advised (Appendix C letter 1). Patients who are more susceptible (Appendix C, sample letter 1) will be invited to attend for further investigation e.g. Mantoux test (<35y), chest X ray (>35y) or interferon gamma testing, as decided by the Chest Physician. The Consultant Microbiologist will send a list of these patients to the appropriate Consultant Chest Physician.

These patients will be managed in screening clinics organised by the hospital. If all tests are negative a standard letter can be used by the chest clinic to inform & advise each patient (Appendix C sample letter 3) with copies to their GP and Consultant.

In cases of doubt when planning contact tracing following a diagnosis of smear positive TB in an inpatient, further advice should be sought. A summary of the numbers of patients who have been informed and advised and referred for screening will be sent by the Consultant Microbiologist to the CCDC. Any patients diagnosed as having acquired tuberculosis as a result of this exposure will be notified as such to the CCDC.

5.1.2 Staff
Staff have a duty of care to their patients and must report any symptoms suspicious of tuberculosis promptly to Occupational Health.

All staff are screened at pre-employment and a record of their immunisation status is kept in their confidential Occupational Health file.

When a patient with open tuberculosis is notified, the ward manager will supply Occupational Health with a list of staff, including full names, addresses and dates of birth. The Occupational Health Department will take the opportunity to assess the records of the members of staff on the ward to ensure that they have adequate protection to TB. Staff are generally considered to be at low risk of contracting infection.

A record of the individual employee’s exposure will be kept in his/her confidential health medical records. The necessity to carry out further screening will be determined by occupational health with advice from the chest physician if required. Members of staff who have had prolonged contact with an infected patient will be treated as a family contact. This includes staff who have undertaken mouth-to-mouth resuscitation, repeated chest physiotherapy or prolonged care of a high dependency patient.
5.2 Contacts in the Home and Family

The CCDC will ensure that asymptomatic household and other close contacts of cases of active TB are screened according to NICE guidance.

6. PROTECTION AGAINST TUBERCULOSIS – STAFF

6.1 New staff (see Appendix D for algorithm)

Employees new to the NHS who will be working with patients or clinical specimens should not start work until they have completed a TB screen or health check, or documentary evidence is provided of such screening within the preceding 12 months.

New NHS employees who will not have patient contact should not start work if they have signs or symptoms of TB.

Health checks for employees new to the NHS should include:
- assessment of personal or family history of TB
- symptom and signs enquiry, possibly by questionnaire
- documentary evidence of TB testing and/or BCG scar check by occupational health professional
- Mantoux result within the last 5 years, if available.

All workers and students who have contact with patients or clinical materials must be screened for TB to the same standard. This includes:
- clinical students, agency/locum staff and contract ancillary workers
- healthcare workers in non-NHS settings caring for NHS patients.

Tests and BCG vaccination for employees new to the NHS

Mantoux (see Appendix E) or interferon-gamma test if:
- there is no (or inconclusive) evidence of prior BCG vaccination
- they are from a country of high TB incidence, or have had patient contact in a setting with high TB prevalence.

BCG vaccination

Always undertake risk assessment for HIV infection before BCG vaccination if Mantoux negative (BCG contraindicated if HIV infected)

If staff, whatever their age, will have contact with patients or clinical specimens and are Mantoux negative and not previously vaccinated, they should receive BCG vaccination.

Clinical assessment

If staff are from a country of high TB incidence, or have had patient contact in a setting with high TB prevalence, and are Mantoux positive, they should be clinically assessed for diagnosis and possible treatment of latent infection or active disease.
Anyone else with a positive Mantoux result should be clinically assessed and be given a chest X-ray. Refer the health care worker to a chest physician for consideration of TB treatment if the X-ray is abnormal, or for consideration of treatment of latent TB infection if X-ray is normal.

6.2 **Existing staff**

Occupational health should:

Include annual reminders of TB symptoms and the need for prompt reporting for staff who:
- are in regular contact with TB patients or clinical materials, or
- have worked in a high-risk clinical setting for 4 weeks or longer.

Send one-off reminders after a TB incident on a ward.

If there is no documentary evidence of prior screening, screen staff in contact with patients or clinical material who are changing jobs as if they were new employees.

6.3 **BCG refusal**

A Mantoux-negative healthcare worker who declines BCG vaccination after explanation of the risks should not work where there is a risk of exposure to TB. The refusal and action taken should be recorded.

6.4 **HIV positive health care workers**

BCG must not be given to an individual known or suspected to be HIV positive.

Assess TB risks at the time of recruitment
- be aware of settings with increased risk of exposure to TB e.g. respiratory care wards, Microbiology Laboratory.

If HIV is diagnosed during employment, assess TB risk and modify the person’s work if needed.
Testing and treating asymptomatic household and other close contacts of all cases of active TB

APPENDIX A: Testing and treatment of close contacts

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For children older than 4 weeks and younger than 2 years who are contacts of people with sputum smear-positive TB, see algorithm on page 15.

Previous BCG vaccination cannot be accepted as evidence of immunity in HIV-infected patients.

A negative test in immunocompromised people does not exclude TB infection.

People advised to have treatment for latent TB infection, but who decline, should have 'inform and advise' information reinforced and chest X-ray follow-up at 3 and 12 months.
APPENDIX B: Draft letter for general practitioners and consultants

Dear Dr…,

The above named patient registered at your surgery was on a ward at Whiston Hospital where an individual was recently diagnosed with tuberculosis. Tuberculosis is not easily transmitted. To be at risk one must spend many hours in close contact with someone who is openly infectious. We do not think it likely that any patients are at significant risk of infection. Patients who are unusually susceptible to infection due to their underlying condition or treatment have been identified from hospital records.

Conditions that increase a patient’s susceptibility to tuberculosis are listed below:

1. Immunosuppression due to disease or treatment (e.g. HIV infection, haematological malignancy, anti-TNF-alfa treatment, systemic steroid therapy)
2. Chronic renal failure / haemodialysis
3. Solid organ transplantation, jejuno-ileal bypass or gastrectomy
4. Diabetes
5. Injecting drug use
6. Silicosis

We have written to all patients considered at risk to inform and advise them of their exposure. Of those, we have invited the more susceptible patients to be screened for tuberculosis by chest X-ray/Mantoux.

**High risk patient:**
The above named patient has been identified as requiring screening

**Low risk patient:**
We do not consider the above named to be in this category.

In the very unlikely event of your patient consulting you in the future with persistent symptoms consistent with the diagnosis of tuberculosis, then you will wish to keep this possible exposure in mind. Typical symptoms are:

- Fever and night sweats
- Persistent cough
- Unexplained weight loss
- Haemoptysis

Yours sincerely
APPENDIX C: Example letters to patients

1. Example letter to close contact of person on ward with sputum smear-positive TB (Inform & advise only i.e. not in the more susceptible group)

Dear…

A person on the same ward as you during your recent stay in Whiston Hospital has since been diagnosed as having tuberculosis. It is routine procedure for us to inform individuals like yourself who may potentially have come into contact with the person with tuberculosis.

We believe the risk to you is very low. Tuberculosis is not easily transmitted. To be at risk one must spend many hours in close contact with someone who is infectious. Some people are less resistant to infection than others due to their medical condition or treatment.

I want to stress again that the likelihood of tuberculosis being passed on to you is extremely low. In the unlikely event of this happening, it is easily treatable with appropriate antibiotics.

I have also written to inform your Consultant and GP. No further action need be taken. If you have any particular concerns, or believe yourself to be at particular risk of infectious disease, you can discuss these with your GP.

Yours sincerely

2. Example letter to close & susceptible contact of person on ward with sputum smear-positive TB (Recall for screening i.e. within more susceptible group)

Dear

A person on the same ward as you during your recent stay in March 2008 at Whiston Hospital has since been diagnosed with tuberculosis. It is routine procedure for us to inform individuals like yourself who may potentially have come into contact with the person with tuberculosis.

We believe the risk to you is very low. Tuberculosis is not easily transmitted. To be at risk one must spend many hours in close contact with someone who is infectious. Some people are less resistant to infection than others due to their medical condition or treatment.

As a precaution, we would like to invite you to be screened to make sure there is no infection. This involves a chest x-ray. Please contact the X-Ray department on 0151 430 1866 for an appointment. Appointments can be made at the venue of your choice: Whiston Hospital, St Helens Hospital, Newton Hospital or the Millennium Centre.
I want to stress again that the likelihood of tuberculosis being passed on to you is extremely low. In the unlikely event of this happening it is easily treatable with appropriate antibiotics.

I have also written to inform your GP. If you have any concerns, you can discuss these with your GP.

Yours sincerely

2. Example letter for a contact of a person with sputum smear-positive TB, with negative Mantoux/interferon-gamma test

Dear...
You have been screened as a close contact of someone who has tuberculosis (TB).

Not all forms of TB are infectious. The test you had shows no evidence of TB infection. It is very unlikely that you will have any problem from TB in the future and no further check-ups are needed.

However, if in the future you develop weight loss, cough up blood, have a persistent cough or fever or swollen glands in the neck, which lasts for over four weeks, you should contact your GP.

Yours sincerely,
APPENDIX D: screening of new staff

Algorithm for screening new NHS employees

Pre-employment Questionnaire

Yes

New Entrant to UK?

No

Suspicious symptoms

Yes

Medical assessment CXR

No

Normal

Yes

Working with patients or clinical materials?

No

Prior BCG (scar or documented)?

Yes

TST/interferon-γ test, unless performed in previous 5 years

No

TST or interferon-γ test positive?

Medical assessment

Yes

Suspicous symptoms or circumstances?

No

CXR normal?

Yes

Risk assessment

No

TB Clinic

No action

Inform & Advise. Consider chemoprophylaxis

TB Clinic

Record refusals.

Offer BCG

Suspicious symptoms

Aged 35 or over?

See new entrants algorithm, NICE guidelines

Issue date: 1 November 2008
APPENDIX E: Mantoux test

Administration

Strength of tuberculin PPD (Manufacturer: Statens Serum Institute- SSI)
Routine use: 2TU per 0.1ml dose
If the first test (2TU per 0.1ml) is negative (less than 6mm diameter) and a retest is considered appropriate for clinical purposes the higher concentration (10 TU per 0.1 ml may be used.

In all cases, the Mantoux test should be administered intradermally (intracutaneous administration) normally on the flexor surface of the left forearm at the junction of the upper third with the lower two-thirds. If the skin is visibly dirty it should be washed with soap and water.
The Mantoux test is performed using the 0.1ml tuberculin syringe or, alternatively, a 1ml graduated syringe fitted with a short bevel 26G (0.45 × 10mm) needle. A separate syringe and needle must be used for each subject to prevent crossinfection.
0.1ml of PPD should be drawn into the tuberculin syringe and the 25G or 26G short-bevelled needle attached to give the injection. The needle must be attached firmly and the intradermal injection administered with the bevel uppermost.
The operator stretches the skin between the thumb and forefinger of one hand and with the other slowly inserts the needle, with the bevel upwards, for about 3mm into the superficial layers of the dermis almost parallel with the surface.
The needle can usually be seen through the epidermis. A correctly given intradermal injection results in a tense, blanched, raised bleb and considerable resistance is felt when the fluid is being injected. A bleb is typically of 7mm diameter following 0.1ml intradermal injection. If little resistance is felt when injecting and a diffuse swelling occurs as opposed to a tense, blanched bleb, the needle is too deep. The needle should be withdrawn and reinserted intradermally. Do not massage or dress the wound.
Mantoux tests can be undertaken at the same time as inactivated vaccines are administered. Live viral vaccines can suppress the tuberculin response, and therefore testing should not be carried out within four weeks of having received a live viral vaccine such as MMR. Where MMR is not required urgently it should be delayed until the Mantoux has been read (see below).

Reading of the test

The results should be read 48 to 72 hours after the test is taken, but a valid reading can usually be obtained up to 96 hours later. The transverse diameter of the area of induration at the injection site is measured with a ruler and the result recorded in millimetres. As several factors affect interpretation of the test, the size of the induration should be recorded and NOT just as a negative or positive result. The area of erythema is irrelevant. There is some variability in the time at which the test develops its maximum response. The majority of tuberculin-sensitive subjects will be positive at the recommended time of reading. A few, however, may have their maximum response just before or after the standard time.

Mantoux negative:
Induration less than 6 mm
Previously unvaccinated individuals may be given BCG provided no contraindications
Mantoux positive:
Induration 6 mm or greater
Should not be given BCG. May be due to previous TB infection or BCG or exposure to non-tuberculous mycobacteria.
When Mantoux tests are being performed as part of an immunisation programme, no further action is required for people with a reaction in this range. In other contexts (e.g. new immigrant screening, contact-tracing programmes), where the subject has not previously been vaccinated with BCG, and taking account of the precise size of the reaction and the circumstances of the case, referral to a chest clinic may be indicated for further investigation.

Mantoux strongly positive:
Induration 15 mm or greater.
Suggests tuberculosis infection or disease. Should be referred for further investigation & supervision (which may include preventive chemotherapy).

Factors affecting the result of the tuberculin test
The reaction to tuberculin protein may be suppressed by the following:
- glandular fever
- viral infections in general, including those of the upper respiratory tract
- live viral vaccines (tuberculin testing should not be carried out within four weeks of having received a live viral vaccine)
- sarcoidosis
- corticosteroid therapy
- immunosuppression due to disease or treatment, including HIV infection.

Subjects who have a negative test but who may have had an upper respiratory tract or other viral infection at the time of testing or at the time of reading should be re-tested two to three weeks after clinical recovery before being given BCG. If a second tuberculin test is necessary it should be carried out on the other arm: repeat testing at one site may alter the reactivity either by hypo- or more often hyper-sensitising the skin and a changed response may reflect local changes in skin sensitivity only.

For further information:
Includes pictorial guide:
The Green Book chapter on tuberculosis
www.immunisation.nhs.uk
For further information and training materials on the administration, reading and interpretation of the Mantoux test.
Reference

1. **Tuberculosis**: Clinical diagnosis and management of tuberculosis, and measures for its prevention and control. Royal College of Physicians 2006.  