Croydon Health Services NHS
NHS Trust

TUBERCULOSIS: POLICY AND PROCEDURE FOR PREVENTING THE TRANSMISSION OF MYCOBACTERIUM TUBERCULOSIS IN HEALTHCARE SETTINGS

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EXECUTIVE SUMMARY

Tuberculosis (TB) is a slowly progressing chronic disease caused by bacteria belonging to the *Mycobacterium tuberculosis* (MTB) complex. MTB is usually transmitted from person to person only through air and TB is one of the commonest diseases worldwide.

The probability that TB will be passed on from one person to another depends on:

- **Infectiousness of the person with TB disease** - those with pulmonary disease and have a cough and produce sputum which is found to be AFB smear positive are most infectious.
- **Environment in which exposure occurred** – exposure in confined spaces with little or no ventilation poses the highest risk of transmission. When exposure occurs outdoors, the TB bacteria are dispersed quickly in the air and are killed by the sunlight, the risk of transmission being negligible.
- **Length of exposure** – TB transmission usually requires prolonged close contact with an infectious case (greater than 8 hours).
- **Virulence (strength) of the TB bacteria** – some strains have the propensity to spread and cause disease than others.

TB remains a major cause of ill health and is one of the top ten causes of death worldwide. An estimated 10 million (range 9–11.1 million) people fell ill with TB in 2018, a number that has been relatively stable in recent years (WHO 2019).

Globally, there were 1.2 million (range 1.1–1.3 million) TB deaths among HIV-negative people in 2018 (a 27% reduction from 1.7 million in 2000) and an additional 251, 000 deaths (range223, 000–281, 000) among HIV-positive people (a 60% reduction from 620, 000 in 2000). Since 2007, TB has been the leading cause of death from a single infectious agent, ranking above HIV/AIDS.

TB affects people of both sexes in all age groups but the highest burden is in adult men, who accounted for 57% of all TB cases in 2018. By comparison, adult women accounted for 32% and children for 11%. Among all TB cases, 8.6% were people living with HIV.

TB is treatable, curable and its transmission is preventable and indeed the World Health Organisation (WHO) has set an ‘End TB Strategy’ aiming at total elimination of TB as a public health problem by 2050 (WHO 2015)

Transmission of TB can be prevented by

- Early diagnosis of an infected person and initiation of treatment
- Isolation of patients with smear positive TB in their lungs
- Effective personal protective equipment

All cases of suspected or confirmed TB should be isolated in side-room and be referred to the Trust TB team (Ext 3140/3923/5685) who will advise on treatment.

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1. INTRODUCTION

Tuberculosis (TB) is a slowly progressing chronic disease caused by bacteria belonging to the *Mycobacterium tuberculosis* (MTB) complex. The commonest of these bacteria is *Mycobacterium tuberculosis* which causes the majority of TB infections. Other bacteria in this complex include *M.bovis, M.africanum* but are rare causes of TB.

Mycobacteria are intracellular bacilli. In the laboratory, once stained, they resist decolorisation by acids so they are referred to as Acid Fast Bacilli (AFB). The commonest techniques used in the laboratory for staining AFB are the Ziehl-Neelsen (ZN) stain and a fluourescent stain (auramine). Other mycobacteria that do not belong to the MTB complex do not cause TB and are commonly referred to as environmental mycobacteria or non-tuberculous mycobacteria (NTM). NTMs may cause disease in patients who are immunocompromised but they are not transmitted from person to person and are therefore not discussed further in this policy and guidelines.

M. tuberculosis primarily infects the lungs leading to pulmonary TB but it can also infect other organs including bone, kidneys and meninges (extra-pulmonary TB). Pulmonary TB can affect either the lungs alone and/or the pleural cavity, mediastinal lymph nodes or larynx.

TB is transmissible from person to person and is one of the most common diseases worldwide. According to the World Health Organisation (WHO) report, TB leads to 1.5 million human deaths annually worldwide (WHO 2015). In England, TB contributed to the deaths of at least 200 patients in 2017 (PHE 2019). However, TB is treatable, curable and its transmission is preventable and the WHO introduced 'End TB Strategy' in 2015 which aims to achieve a year-on-year decrease (50%) in TB incidence worldwide by 2025 and total elimination of TB as public health problem by 2050 (WHO 2015).

The number of people with TB in England has fallen from a peak of 8,280 in 2011 to 4,655 in 2018 – a reduction of approximately 44%. The incidence of TB in 2018 (8.3 per 100,000 population) was the lowest TB rate ever recorded in England (PHE 2019). However, if we are to reach the WHO's End TB Strategy target of a 90% reduction in new notifications by 2035, considerable efforts and new innovative approaches will be needed to eliminate TB in England.

TB prevention and control would result in savings to the Trust, Commissioners, National Health Service (NHS) and public health through the following means:

- from avoidable costs associated with diagnosis and treatment of drug-sensitive and resistant forms of TB
- from the public health activity that is undertaken to prevent further cases
- from the wider socio-economic impacts of the disease on staff, families and communities.

Public Health England and NHS England have produced a collaborative strategy to control TB and believe that concerted action, can significantly reduce the suffering and harm caused by the disease and also meet the WHO End TB Strategy 2025 milestones (PHE/NHS England 2015).

Acquisition of *M. tuberculosis*

M. tuberculosis is usually transmitted from person to person only through air and not by surface contact. *M. tuberculosis* is carried in airborne particles called droplet nuclei that can be generated when persons who have pulmonary TB disease cough, sneeze, shout, sing or undergo aerosol generating procedures such as intubation and related procedures, respiratory suction, cardiopulmonary resuscitation, collection of lower respiratory tract specimens and autopsy procedures. The particles are approximately 1-5 μm in size and normal air currents

can keep them airborne for prolonged periods and spread them throughout a room or building. TB infection occurs when a susceptible person inhales droplet nuclei containing *M. tuberculosis.* These droplet nuclei carrying *M. tuberculosis* are inhaled and reach the alveoli (Center for Disease Control 2005).

Once inhaled the bacteria grow slowly in the lung over several weeks and may cause local infection and may spread to local lymph glands and to the rest of the body. Within a few weeks of infection, the body's immune system is stimulated to fight the bacteria and prevent further growth of the bacteria. In over 80% of people the immune system kills the bacteria and they are removed from the body.

In a small number of cases, not all the bacteria are killed but are kept in control by the immune system – the patient is infected, but does not have TB symptoms or signs. **This is called latent tuberculosis** (LTB). People with latent tuberculosis are NOT infectious and are not ill with it (CDC 2005). If the immune system fails to build up a defensive barrier, or the barrier fails later, latent tuberculosis can spread within the lung or into the lymph glands within the chest or develop in other parts of the body causing TB disease (patient becomes symptomatic) in the lungs (pulmonary TB) or outside the lungs (extra-pulmonary TB). Typically, approximately 5%-10% of persons who become infected with *M. tuberculosis* and who are not treated for latent TB will develop TB disease during their life time (CDC 2005).

The probability that TB will be transmitted depends on:

- **Infectiousness of the person with TB disease** - those with pulmonary disease and have a cough and produce sputum which is found to be AFB smear positive are most infectious.
- **Environment in which exposure occurred** – exposure in confined spaces with little or no ventilation poses the highest risk of transmission. When exposure occurs outdoors, the TB bacteria are dispersed quickly in the air and are killed by the sunlight, the risk of transmission being negligible.
- **Length of exposure** – TB transmission usually requires prolonged close contact with an infectious case (greater than 8 hours).
- **Virulence (strength) of the TB bacteria** – some strains have the propensity to spread and cause disease than others.

Anyone exposed to TB bacteria can be infected but people at particular risk are:

- Those that are close contacts of infectious cases
- People who have lived in, travel to or receive visitors from places where TB is still very common
- Those who are immunocompromised
- The very young and the elderly
- People living in overcrowded, poor housing
- Those who are dependent on drugs or alcohol
- People with chronic poor health

The following persons are at high risk for progressing from LTB to TB disease:

- persons infected with HIV;
- persons infected with *M. tuberculosis* within the previous 2 years
- infants and children aged <4 years
- People with a history of untreated or inadequately treated TB disease, including persons with chest radiograph findings consistent with previous TB disease.

- persons with any of the following clinical conditions or other immunocompromising conditions
    - silicosis
    - diabetes mellitus
    - chronic renal failure
    - certain haematologic disorders (leukaemias and lymphomas)
    - other specific malignancies (e.g., carcinoma of the head, neck or lung)
    - body weight >10% below ideal body weight
    - prolonged corticosteroid use and other immunosuppressive treatments (including tumour necrosis factor-alpha [TNFa] antagonists)
    - organ transplant
    - end-stage renal disease (ESRD)
    - intestinal bypass or gastrectomy

Symptoms and signs of TB:

TB develops slowly in the body and it usually takes several months for symptoms to appear. Any of the following symptoms may suggest TB:

- Persistent cough – initially dry but may become productive
- Haemoptysis (coughing blood) occurs in a small minority of patients
- Night sweats
- Fever, especially later in the afternoon or evening
- Weight loss of over ½ a stone over a 6-week period or less
- Malaise
- Chest pain or chest tightness – uncommon and often non-specific.
- Shortness of breath – usually only occurs in later stages.

2. PURPOSE

The purpose of this policy and guideline is to ensure that staff caring for patients with TB do so in a safe manner. It provides operational guidance on when to isolate patients, when and how to use personal protective equipment and other infection control precautions.

This policy and guideline apply to all individuals employed by Croydon Health Services NHS Trust and it is specifically aimed at staff who are likely to come into contact with patients who have known or suspected tuberculosis.

3. DEFINITIONS

Acid fast bacilli (AFB): refers to Mycobacteria resistant to decolorisation by acids during staining procedures. Using the Ziehl-Neelsen stain, acid fast bacilli are stained bright red and stand out clearly against a blue background.

Household contacts: People sharing a bedroom, kitchen, bathroom or sitting room with the index case.

'Inform and advise' information: Information provided to patients, usually in a standard letter, so that they are able to recognise the symptoms of TB and be aware of the action they should take should these symptoms arise.

Immunocompromised: In this policy and guideline, the definition in the NICE guideline is used. Immunocompromised refers to an individual who has a significantly impaired immune system.

For instance, this may be due to prolonged steroid use, TNF-αn antagonists, anti-rejection therapy, the use of immunosuppression-causing medication or co morbid states that affect the immune system, for example HIV, chronic renal disease, many haematological and solid cancers and diabetes (NICE 2016).

Negative pressure rooms: Rooms with negative pressure in relation to the rest of the ward. Air flows from the rest of the ward into the room. This protects patients in the ward from the negative pressure room's occupier's infection if it is spread through air. Negative pressure rooms are used for infection control purposes and should have air pressure continuously or automatically measured as defined by NHS Estates (2005) and should be clearly identified for staff, for example by a standard sign.

Single room: these are patient rooms that are not negative pressure but are vented to the outside of the building.

Smear positive: bacteria seen on direct microscopic examination of the sputum are termed "smear positive". For example, if AFB are seen on microscopic examination of sputum, this is reported as AFB smear positive.

Open Pulmonary Tuberculosis: (smear positive) **i.e. infectious**
This means that the tubercle bacilli have been seen on direct microscopic examination of a sputum smear. The laboratory report will read:
'MICROSCOPY – AFB – POSITIVE or Acid Fast Bacilli (AFB) present'
Patients with suspected pulmonary TB whose sputum smear results are still awaited should be regarded as 'Open TB' until proven otherwise.

4. ACCOUNTABILITIES AND RESPONSIBILITIES

Trust Board and Chief Executive:

- Ensure that systems are in place to help staff implement this guidance including availability of isolation facilities.

Director of Infection Prevention and Control (DIPC) (currently held by the Chief Nurse):

- Ensure that all staff are compliant with this guidance

Medical Director and Clinical Directors:

- Ensure that training is provided to all doctors around early diagnosis and management of patients with TB.

All clinical staff:

- Ensure they are up-to-date with recent developments in the diagnosis, management, prevention and control of TB
- Ensure all patients suspected of TB are immediately isolated into side rooms as per transmission-risk assessment.
- Liaise with the Trust TB team as soon as a case of TB is suspected or confirmed.
- Liaise with the TB team regarding appropriate antimicrobial prescribing

Microbiology Department senior staff:

- Ensure the laboratory is accredited for the processing of samples for mycobacteria including TB.
- Liaise with TB Reference Laboratory where necessary.

Trust TB team (Consultant Chest Physician /TB Nurse Specialist)

- Ensure they are up-to-date with national and international TB guidance

- Advise colleagues on diagnosis, management and prevention of TB
- Manage the treatment of all cases of confirmed TB
- Notify all cases to the consultant in communicable disease control (CCDC) including non-complying patients
- Visit in-patients providing information
- Liaise with ward staff for support and advice
- Follow up and monitor treatment of the index case
- Conduct contract tracing if required and notify patients and/or their GPs regarding a patient's exposure to TB.

Infection Prevention and Control Team:

- Review the policy and guideline in conjunction with the TB team
- Advise and operate in line with the guidelines
- Liaise closely with the TB team regarding contact tracing in cases involving in-patients.

Ward/Unit Managers and Matrons:

- Ensure that staff are aware of their responsibilities under this policy and guideline especially around isolation of patients and personal protective equipment.
- Daily management of TB cases.
- Provide details of contacts when required by the TB and infection control teams.

Occupational Health Department:

- Advise Trust on screening and vaccination of staff
- Maintain current records of immunity status of all staff with direct patient contact
- Carry out vaccination programme for staff with direct patient contact.
- Risk assess immunocompromised staff with direct patient contact
- Contact tracing of staff
- General advice to staff on risks related to job and infectivity.

All staff

- Ensure they are familiar with the content of this policy and guideline.

5. PROCEDURE/COURSE OF ACTION REQUIRED

5.1 Diagnosis

Early diagnosis is key in preventing TB transmission and preventing complications. TB should be suspected and early investigation implemented in patients with the following symptoms if they last more than 2 weeks:

- Persistent cough – initially dry but may become productive
- Haemoptysis (coughing blood) occurs in a small minority of patients
- Night sweats
- Fever, especially later in the afternoon or evening
- Weight loss of over ½ a stone over a 6-week period or less

TB can be detected in sputum, bronchial washings, tissue biopsies and other body fluid samples. AFB smear results are usually available within 24 hours but if negative, TB culture can take up to 8 weeks to become positive. Most samples that are AFB smear positive will be confirmed as TB, however, a minority (especially in some patient groups) will be TB but non-tuberculous mycobacteria (NTM). The routine confirmation on whether it is TB or not is through culture and/or molecular testing using a rapid TB polymerase chain reaction (PCR) test. For purposes of infection control, public health or drugs to use for treatment, rapid confirmation on whether a patient has TB or NTM infection may be required. This is usually undertaken using the (PCR) test. TB PCR test should only be requested by either the TB team or a consultant microbiologist.

The Mantoux test is a skin test based on the body's cell-mediated immune reaction to antigens in mycobacteria, but is not specific for *M. tuberculosis* and is often positive in those who have received bacille Calmette-Guérin (BCG) vaccination. Mantoux tests are also often falsely negative in patients who are immunosuppressed. Mantoux tests are undertaken by the TB team.

Interferon-gamma release assays (IGRAs) tests are whole-blood tests that can aid in diagnosing *M. tuberculosis* infection but do not differentiate between active and latent TB. IGRAs measure a person's immune reactivity to *M. tuberculosis* and prior BCG vaccination does not cause a false-positive IGRA test result (CDC 2011; NICE 2016). The use of the IGRA tests should be by specialist teams (TB, occupational health and paediatricians with expertise in TB management

Diagnosis of active respiratory TB (including laryngeal) (NICE 2016)

- A posterior–anterior chest X-ray should be taken; chest X-ray appearances suggestive of TB should lead to further diagnostic investigation.
- At least three sputum samples, taken on three consecutive days (including one early morning sample) should be sent for AFB microscopy and culture for suspected respiratory TB before starting treatment if possible or, failing that, within 7 days of starting. **Ensure that the electronic request specifies that the sample is for "AFB culture"**. Patients should not be declared AFB smear negative until at least three sputum samples have been reported as smear negative.
- In adults and young people aged 16-18 years
    - Spontaneously produced sputum should be obtained if possible; otherwise induction of sputum or bronchoscopy and lavage should be used.
    - Request rapid nucleic acid amplification (PCR) test for MTB complex on primary specimens if there is clinical suspicion of TB disease and
        - The person has HIV or
        - Rapid information about mycobacterial species would alter the person's care or
        - The need for a large contact-tracing initiative is being explored.
- In children ≤15 years of age
    - Spontaneously produced sputum should be obtained if possible; if unable to expectorate sputum, induction of sputum or gastric lavage should be considered if it can be done safely.
    - In children aged <15 years with suspected respiratory TB, PCR should be requested/done on each specimen type
    - Interferon-gamma release assay on blood and/or the Mantoux skin test can assist but requires expert input (paediatrician and TB specialist).
- If there are clinical signs and symptoms consistent with a diagnosis of TB, treatment should be started without waiting for culture results.
- Samples should be sent for TB culture from autopsy samples if respiratory TB is a possibility.
- NOTE: early morning urine (EMU) samples to investigate renal or milliary TB should **not be taken unless** specifically requested by the TB Team. Send in a white topped container and order the test as a "TB (urine)"

Diagnosis of extra respiratory active TB in all age groups

- Discuss the advantages and disadvantages of both biopsy and needle aspiration with the patient with the aim of obtaining adequate material for diagnosis.

- When sending a sample for TB culture, place sample in a dry pot. Do no place part or all of any of the samples in formalin (or other fixative) when sending for TB culture.
- A negative PCR on a sample (such as CSF, pleural fluid or ascetic fluid) does not exclude TB.
- Offer all patients presenting with extra respiratory TB a chest X-ray and if possible culture of a spontaneously produced respiratory sample to exclude or confirm co-existing respiratory TB.

Diagnosis of Latent TB

The diagnosis of Latent TB is undertaken by specialists (TB specialists, paediatricians with expertise in TB and Occupational health specialists) using Mantoux and/or interferon-gamma release assay depending on patient's circumstances as described in the national guidelines (NICE 2016).

In 2015, a national screening for latent TB using IGRA was implemented in England and targets specific population groups at high risk of latent TB reactivation (PHE 2019).

5.2 Treatment of TB

TB is a treatable and curable disease.

All cases of suspected or confirmed TB should be referred to the Trust TB team (Ext 3140/3923/5685) who will advise on treatment. Detailed guidance can be found in the national TB guidelines (NICE 2016).

Treatment duration varies from six months onwards, using multiple drugs to reduce the development of resistance. To improve the chances of cure and reduce development of resistance, patients are advised to take all their drugs as prescribed by the clinician for the whole duration.

Drug Resistant Tuberculosis

Drug resistance is an important issue in the management of TB, as it may prolong the period during which patients are infectious as well as compromising the effectiveness of treatment. Resistance can be to a single drug or to multiple drugs. Multi-drug resistant TB (MDR TB) is defined as high level resistance to both isoniazid and rifampicin with or without additional drug resistances (NICE 2011, NICE 2016). It is still not known whether risk factors for MDR TB are the same as those for lesser forms of drug resistance.

Risk factors for TB drug resistance include the following:

- History of previous TB drug treatment particularly if there was known poor adherence to treatment.
- Previous TB treatment failure.
- Contact with a known case of multi-drug-resistant TB.
- Birth or residence in a country in which the World Health Organisation reports that 5% or more of new TB cases are multidrug-resistant (WHO 2015).

5.3 Notification

All forms of TB are notifiable under the Public Health (Control of Diseases) Act 1984 which was updated in 2010 by the Health Protection (Notification) Regulations (the Notification Regulations). The doctor making or suspecting the diagnosis is legally responsible for notification. The doctor making the diagnosis should inform the Trust TB team who in turn will

inform the local CCDC based at the South London Health Protection Unit. This process triggers contact tracing procedures and provides surveillance data to detect outbreaks and monitor epidemiological trends.

5.4 Infection Prevention and Control

People who are sputum AFB smear positive from spontaneously expectorated sputum are those cases with the highest infectivity, and pose a risk to household and other close contacts.

Wherever possible, people with TB at any site of disease should not be admitted to hospital. Treatment can proceed in the patient's home. Infectiousness declines rapidly once treatment begins.

All patients with TB should have a **risk assessment for drug resistance** (see section 5.5) and for HIV. If risk factors for MDR TB are present, see section 5.6 for recommendations on infection control.

5.4.1 Early diagnosis and implementation of effective control measures

Staff should suspect TB in patients with fever, weight loss, night sweats (and cough if pulmonary TB).
Patients with suspected TB should be investigated as per NICE (2016) guidelines (summarised in the Introduction section)
Patient suspected of having respiratory TB should be isolated in single room.
All patients with suspected TB should be referred to the Trust TB team.

5.4.2 Isolation requirements

People with suspected respiratory TB who will remain in a hospital setting (including emergency, outpatients and inpatient care) should be given a single room, if this is not possible, keep the person's waiting times to a minimum. This may involve prioritising their care above other patients.

In patients admitted to hospital, risk assess patients with suspected infectious or confirmed respiratory TB for multi-drug resistant TB.

Patients deemed to be low risk of having MDR-TB should be cared for in a single room as a minimum. The patient should remain in isolation until the patient has had at least 2 weeks of effective standard anti-TB treatment regimen or they are discharged from the hospital. The decision to take the patient out of the side room should be taken by the TB team not by ward staff.

Patients with suspected or confirmed respiratory TB should not be admitted to a ward containing people who are immunocompromised (e.g. transplant recipients, people with HIV and those on anti-tumour necrosis factor or other biologics) unless they can be cared for in a negative pressure room on the same ward. See section 1.2.2 and Appendix C for algorithm for making isolation decisions.

Patients suspected or confirmed to be at high risk of MDR-TB should be cared for in a negative pressure room and have specimens sent for TB PCR. Due to the current design of local negative pressure siderooms at Croydon University Hospital, these patients will in most cases be transferred out to a unit with specialists in management of MDR-TB and into negative siderooms with anteroom.

Doors to single room or negative pressure room should always remain closed.

5.4.3 Removing a patient from isolation

Taking into account the risks and benefits, the patients at low risk of MDR-TB can be removed from isolation if

- The patient has had at least two weeks of appropriate multiple drug therapy
- There is agreement to adhere to treatment
- There is resolution of cough
- There is definitive clinical improvement
- There are no immunocompromised people such as transplant recipients, people with HIV and those on anti-tumour necrosis factor or other biologics in the same accommodation
- The person's initial smear results showed scanty AFB
- There is no extensive pulmonary involvement
- There is no laryngeal TB

5.4.4 Isolation Precautions if nearby patients are immunocompromised

TB patients admitted to a setting where care is provided for people who are immunocompromised, including those who are HIV-positive, should be considered infectious and, if sputum smear-positive at admission, should stay in a negative pressure room until:

i) The patient has had at least two weeks of appropriate multiple drug therapy

AND

ii) the patient is showing tolerance to the prescribed treatment and an ability and agreement to adhere to treatment

AND

iii) **either** any cough has resolved completely, **or** there is definite clinical improvement on treatment, for example remaining afebrile for a week.

AND

iv) If moving to accommodation (inpatient or home) with people who are immunocompromised (including those who are HIV-positive), the patient has had at least three negative AFB smears **on separate occasions over a 14-day period,**

AND

v) For patients who were sputum smear negative at admission (that is, three negative samples were taken on separate days; samples were spontaneously produced sputum if possible, or obtained by bronchoscopy or lavage): all of above should apply.

See Appendix C for algorithm showing isolation decisions for patients with suspected respiratory TB.

5.4.5 Infection control precautions during aerosol-generating procedures

Aerosol-generating procedures such as sputum induction, suction, chest physiotherapy procedures, bronchoscopy, decannulation and downsizing of tracheostomy tube, sputum induction or nebuliser treatment **should be carried out in a negative pressure room for**:

- All patients in whom TB is considered a possible diagnosis, in any setting
- All patients on a ward with HIV patients, regardless of whether a diagnosis of TB has been considered

At Croydon Health Services, areas that are suitable for these procedures are:

i) Negative pressure rooms on Heathfield 2 and Purley 2.
ii) Endoscopy Procedure Rooms
iii) Operating Theatres
iv) The GUM Clinic has a negative pressure room (Upstairs)

Personal protective equipment during aerosol generating procedures:

Healthcare workers performing aerosol generating procedures on patients suspected of having TB **should wear a properly fitted Fine Filter Particulate respirator (FFP3 mask)** in addition to other appropriate universal infection control precautions.

5.4.6 Personal protective clothing including masks

- Masks

At Croydon Health Services NHS Trust, to ensure compliance with personal protective equipment at all times, we advise that all staff caring for patients with suspected or confirmed TB wear FFP3 masks when giving direct care to patients. Wearing FFP3 masks is particularly important when:

- MDR-TB is suspected

aerosol-generating procedures are being performed e.g. suction, bronchoscopy, sputum induction, use of nebuliser equipment. **See list in 5.4.5**

All staff who need to use an FFP3 mask must have been fit tested with the specific make and size of mask, in accordance with Health & Safety Executive standards.

Suitable makes of FFP3 respirator are:

3M 1863 Healthcare Respirator (disposable) [**preferred option if fit can be achieved]**

3M 7500 Full maintenance Respirator Facepiece (re-usable)

See section 5.6 for further details of MDR TB infection control.

5.4.7 Patients and mask wearing

Patients should not be asked to wear masks when they are in their room and this practice is not recommended in UK national guidance.

The only instance where inpatients with smear-positive respiratory TB should be asked (with explanation) to wear a mask is whenever they are outside their room during the first two weeks of drug treatment, for example going to X-ray. **This mask should be a surgical mask** (not an FFP3 mask).

5.4.8 Precautions for visitors

Visitors should be kept to a minimum and children aged ≤12 years should not visit unless it is a parent being treated.

Visitors should not wear masks, gowns or gloves **unless MDR TB is suspected**.

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. Parents of the child should be screened as soon as possible by chest x-ray.

5.4.9 Patients going to theatre

Precautions in theatre for potentially infectious tuberculosis
The following precautions should be taken in patients whose sputum does not contain acid fast bacilli but in whom one or more cultures are positive, or in cases of non-pulmonary tuberculosis e.g. kidney:

- The clinical team caring for the patient should ensure that the operating theatre is informed in advance of the patient's tuberculosis status.
- Disposable ventilation and respiratory equipment must be used.
- Gloves and aprons must be worn for close patient contact.
- Patient contact surfaces should be cleaned with detergent and water

5.4.10 Patients with suspected TB undergoing bronchoscopy

The patient should be placed at the end of a bronchoscopy list, unless clinical need dictates otherwise.

The procedure should be performed in an Endoscopy Procedure Room or a negative pressure room.

Recover the patient in the Endoscopy Procedure Room or in a negative pressure isolation room. Do not recover them in the general Recovery area with other patients as the procedure can induce coughing after the procedure and smear negative patients may convert to smear positive sputum after the procedure.

5.4.11 Precautions in theatre if patients are sputum positive for acid fast bacilli

Elective non-urgent surgery should be postponed until the patient has completed at least two weeks duration of anti-TB treatment and has been reviewed by the Chest/TB Physician.

5.4.12 Preparing the Patient for Theatre (Emergency Surgery)

- The doctor should discuss the case with the Consultant Chest/TB Physician or Consultant Microbiologist as soon as possible.
- The nurse in charge of the ward should inform Theatres that the patient has open pulmonary TB.
- The patient should be placed at the end of a theatre list, unless clinical need dictates otherwise.
- Patients must be brought to theatre immediately prior to surgery and must not wait in communal areas.
- A surgical mask should be worn by the patient during transfer.
- Disposable ventilation and respiratory equipment must be used.
- Anaesthetic and recovery staff must wear a FFP3 mask
- Disposable gloves must be worn if contact with the patient's sputum is anticipated.
- **The patient should be recovered in the operating theatre or anaesthetic room and not in the Recovery room.**
- Patient contact surfaces should be cleaned with detergent and water.
- Conventionally ventilated operated theatres should not be used for at least15 minutes, after a known infectious tuberculosis case.
- Ultraclean ventilated theatres should not be used for at least five minutes after a known infectious tuberculosis case.

See also Section 5.4.5 Precautions Infection control precautions during aerosol-generating procedures

5.5 Drug-Resistant TB

Drug resistance is an important issue in the management of TB, as it may prolong the period during which patients are infectious as well as compromising the effectiveness of treatment. Resistance can be to a single drug or to multiple drugs. Multi-drug resistant TB (MDR TB) is defined as high level resistance to both isoniazid and rifampicin with or without additional drug resistances (NICE 2011). It is still not known whether risk factors for MDR TB are the same as those for lesser forms of drug resistance.

5.5.1 Risk assessment and infection control in drug-resistant TB

A risk assessment for drug resistance should be made for each patient with TB, based on the risk factors listed below:

Risk factors

- History of prior TB drug treatment; prior TB treatment failure.
- Contact with a known case of drug-resistant TB.
- Birth in a foreign country, particularly high-incidence countries as defined by the HPA on its website.
- HIV infection.
- Residence in London.

The absence of risk factors is not enough in itself to remove clinical suspicion of drug-resistant TB.

At Croydon Health Services, the risk assessment must be made by either a respiratory/TB consultant or the Respiratory Nurse Specialists.

5.5.2 Infection control precautions in drug resistant TB (MDR TB)

Patients with sputum smear-positive MDR-TB (multiply drug resistant tuberculosis) are no more infectious than similar patients with fully susceptible TB, i.e. they should not infect a higher proportion of contacts, because the organism is no more virulent. The consequences of acquiring MDR-TB infection, however, are much more serious than for fully susceptible TB, because MDR-TB needs prolonged treatment (often with more toxic second-line drugs) and the outcome in terms of death and proportions cured are worse.

Because of the loss of the most effective killing drug (isoniazid), and the most effective sterilising drug (rifampicin), such patients take much longer to become non-infectious than if organisms are fully susceptible. In these cases, there is not the rapid fall in numbers of viable organisms in the sputum seen in drug-susceptible cases, so they have a much prolonged infective potential after starting treatment.

Because of these differences it is advised that:

- **Patients with suspected or known infectious MDR TB who are admitted to hospital should be admitted to a negative-pressure room**. If none is available locally, the patient should be transferred to a hospital that has these facilities. Care should be carried out in the negative-pressure room until the patient is found to be non-infectious or non-resistant, and ideally until cultures are negative.

- **Staff and visitors should wear FFP3 masks** during contact with a patient with suspected or known MDR TB while the patient is considered infectious.

- **Preparation for Discharge**: before the decision is made to discharge a patient with suspected or known MDR TB from hospital, secure arrangements for the supervision and administration of all anti-TB therapy should have been agreed with the patient and carers.

- **The decision to discharge a patient with suspected or known MDR TB** should be discussed with the Trust's TB team, the infection control team, the local microbiologist and the consultant in communicable disease control (CCDC).

5.6 Non-respiratory TB

TB smear negative pulmonary infection and TB infection at other sites, e.g. renal tract, joints, are much less infective and **do not require isolation.** However, aerosol-generating procedures such as abscess or wound irrigation, may require isolation in a single room.

Use Standard Infection Control Precautions as required, when there is risk of contact with bodily fluids e.g. aprons, gloves, face visor.
See also **Section 5.4.9.** For procedures in a theatre setting.

5.7 Contact tracing

Any contact tracing required within the hospital and community, including household contacts, schools, nursing homes, or offices is undertaken and managed by the local TB Team (in liaison with infection control team for inpatients) or South London Health Protection team, in line with the NICE Guidance 2016.

Any contact tracing required within the community, including household contacts, schools, nursing homes, or offices is undertaken and managed by the local TB Team or South London Health Protection team, in line with the NICE Guidance 2011.

5.7.1. Contact tracing following exposure of hospital patients to TB

There are incidents where patients with tuberculosis are not appropriately isolated, leading to potential exposure of other patients, some of whom may have reduced immunity. Another type of incident is where a healthcare worker is found to have active tuberculosis, with patients being exposed to possible infection risks.

Following diagnosis of TB in a hospital inpatient setting, the diagnosing physician should inform the Respiratory/TB consultant and/or Respiratory Nurse Specialist (TB team) and Infection Control Team. A risk assessment should be undertaken by the TB and Infection control team so that the need for contact tracing can be assessed. The risk assessment should take into account the following:

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

5.7.2. The TB Team will lead and advise on contact tracing procedures.

Contact tracing and testing should only be carried out for patients for whom the risk is regarded as significant. Contact tracing should not be delayed until notification.

- Patients should be regarded as at risk of infection if they spent more than eight hours in the same bay as an inpatient with sputum smear-positive TB who had a cough. The risk should be documented in the contact's clinical notes. The contact should be given 'inform and advise' information on the instructions of the TB Team and the patient's GP should be informed (NICE 2011).

- If an inpatient with sputum smear-positive TB is found to have MDR TB, or if exposed patients are HIV positive, contact tracing should be in line with the *Interdepartmental Working Group on Tuberculosis guidelines* (1998)

In cases of doubt when planning contact tracing, further advice should be sought from the local Health Protection Unit.

Contact Tracing Forms can be found in Appendix D and E. The ward staff should complete these on the instruction of the Respiratory Nurse Specialist or Infection Control Team.

The TB team is responsible for notifying patients or their GPs regarding a patient's exposure to TB.

5.7.3 Staff Contacts

The TB team, in liaison with the infection control team will advise ward staff on the need for obtaining details of staff contacts. The Occupational Health department will be involved to follow up staff. Appendix E contains a form that can be used.

Contact tracing for staff will only be necessary if:

- Staff members were involved in aerosol-generating procedures and may not have been wearing an FFP3 mask.
- Staff were caring for a patient in a bay (as exposure is likely to be greater than when a patient is in a side room).

5.8 Multidisciplinary team (MDT) meeting following significant exposure

A multidisciplinary meeting will be called by the Director of Infection Prevention and Control (DiPC) or his/her representative if there is a significant TB exposure in the Trust. As a minimum, members of this MDT will include the infection control doctor, an infection control nurse, the clinical area manager, the index patient's doctor, occupational health staff, TB/respiratory doctor TB specialist Nurse from Croydon Health Services and a member of the South London Health Protection Team.

5.9 Occupational Health

Employees (including clinical students, agency and locum staff and contract ancillary workers) 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 having taken place within the preceding 12 months.

Health checks for such 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 skin testing (or equivalent testing) and/or BCG scar check by an occupational health professional, not relying on the applicant's personal assessment
- Mantoux or an interferon-gamma test (IGRA) result within the last 5 years, if available.

Employees who are Mantoux positive or IGRA test positive will then be referred to the Chest Clinic.

Employees who are Mantoux or IGRA negative and have not been previously had BCG immunisation, should be offered BCG immunisation after individual assessment for HIV infection.

If a prospective or current healthcare worker who is Mantoux negative (less than 6 mm) or IGRA negative declines BCG vaccination, the risks should be explained and the oral explanation supplemented by written advice. If the person still declines BCG vaccination, he or she should not work where there is a risk of exposure to TB.

Employees of any age who are new to the NHS and are from countries of high TB incidence, or who have had contact with patients in settings with a high TB prevalence should have a Mantoux or IGRA test and be referred to Chest Clinic if positive.

Reminders of signs and symptoms of TB and the need for prompt reporting of such symptoms, will be sent out annually by the Occupational Health Department 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.

6 TRAINING

All clinical staff will receive training in hand hygiene and wearing of protective equipment as part of the trust induction and mandatory infection control update sessions.

Staff caring for patients with suspected/confirmed TB must arrange for FFP3 respirator fit testing.

This document will be uploaded on the hospital intranet where all staff can access it for information.

Occupational health department to check with staff if they have been fit-tested.

6.1 Equality Impact Assessment

The Equality Impact Assessment for this policy and guideline is attached in Appendix A.

7 MONITORING COMPLIANCE

Monitoring of compliance against this policy and guideline will be done by review of incidents reported to the Infection Control Team and the Respiratory Nurse Specialists. Incidents will be reported through the directorate governance meetings and actions monitored via this route.

8 REFERENCES

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Perry C (2006) *Infection Prevention and Control*. Oxford, Blackwell Publishing

Interdepartmental Working Group on Tuberculosis (1998) *The Prevention and Control of Tuberculosis in the United Kingdom:UK Guidance on the Prevention and Control of Transmission of 1. HIV-related Tuberculosis 2. Drug-resistant , Including Multiple Drug-resistant, Tuberculosis.* London, Department of Health. Available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4006196

9 ASSOCIATED DOCUMENTATION

Standard Infection Control Precautions
Isolation Policy
Notifiable diseases: Guidelines for notification of diseases

10 VERSION HISTORY TABLE

Version	Date	Author	Ratified by	Comment/Reason for change
1		Unknown	Unknown	
2		Unknown	Unknown	
3	Nov 2003	Dr M Sahathevan, J East,	Infection Control Committee	Due for updating
4	Jan 2006	Dr M Sahathevan,	Infection Control Committee	Due for updating
5	July 2008	Dr M Sahathevan,	Infection Control Committee	Due for updating. Need to incorporate NICE guidance.
6	Jan 2012	N. Mukombe, S. Watts, Dr M Twagira	Policy Committee	Due for updating
7	October 2016	Dr M Twagira	Policy Group	Due for updating. Incorporated 2016 NICE TB guidelines
8	November 2019	Juliana Kotey, Lead Nurse, Infection Prevention & Control	Risk and Policy Group	Due for updating Updated information on TB trend in London and elsewhere Updated the Equality Analysis document

APPENDIX A EQUALITY IMPACT ASSESSMENT

Appendix A- Equality Analysis (EA) Template – Services, Strategies or Policies

An Equality Analysis is a way of assessing the effects of a key policy, strategy, staff -restructure or a service function. The Equality Act 2010 - Public Sector Duty requires Public Bodies to assess the impact that those functions may have on people in respect of; age, disability, gender-reassignment, pregnancy or maternity, marriage or civil partnership, race, religion or belief, sex and sexual orientation.

This includes looking for opportunities to promote equality that could have been missed, as well as negative or adverse impacts that can be removed or mitigated, where possible.

Title:	Tuberculosis Guidelines
Short description of policy, procedure, strategy or change in practice: (e.g. aims and objectives)	TB is transmissible from person to person and is one of the most common diseases worldwide, however it is treatable, curable and its transmission is preventable. TB prevention and Control would result in savings to the Trust, Commissioners, National Health Service (NHS) and public health through the following means: • from avoidable costs associated with diagnosis and treatment of drug-sensitive and resistant forms of TB • from the public health activity that is undertaken to prevent further cases • from the wider socio-economic impacts of the disease on staff, families and communities.
Directorate Lead:	Elaine Clancy, Chief Nurse
Is this a new or policy, procedure, strategy, change in practice?	No

Please enter the name/s of the individuals completing this Equality Analysis.

Name	Job Title and Directorate	Contact Details	Date
Juliana Kotey	Lead Nurse Infection Prevention & Control	Ext. 3389	4th Nov, 2019

Part 1- Identify the aims of the project/ service

What is the purpose of the proposed or existing policy, procedure, strategy or change in practice?
The purpose of this guideline is to ensure that staff caring for patients with TB do so in a safe manner. It provides operational guidance on when to isolate patients, when and how to use personal protective equipment and other infection control precautions.
Who is intended to benefit and how?
This guideline applies to all individuals employed by Croydon Health Services NHS Trust and it is specifically aimed at staff who are likely to come into contact with patients who have known or suspected tuberculosis.
Is the responsibility shared with another directorate or organisation?
Yes, all staff caring for patients with TB are required to communicate patient status to relevant healthcare workers on transfer to another directorate or organisation.
What other groups or organisations have an interest?
TB nurses and respiratory/chest clinicians
What are the intended outcomes?
To prevent and control the transmission of TB to both patients and staff.

Part 2- Data Analysis

Data Analysis should be used to identify who are the actual and potential users or those affected by the policy, procedure or change in practice, and any significant findings across the protected characteristics. Quantitative and qualitative information is often already available in-house, from local authorities, stakeholders, complaints and from service user surveys.

If your policy, procedure or changes in practice are for a particular equality group you will need the demographic data of that group. This is available from various sources including census data, user surveys, local consultations, evaluation forms, comments and complaints or PALS data.

If there is limited data, perhaps around sexual orientation, you can use local knowledge for the analysis as well as national data. You can also contact the relevant E & D subgroup.

Protected Characteristic	**Data Analysis should be used to identify who are the actual and potential users or recipients of the policy, procedure or change in practice are.** (If it is for a particular equality group you will need the demographic data of that group)
Age • Have you considered different age	Yes, this policy applies to all irrespective of age to avoid infections.

groups and the impact on each group? • What are the different ways young people access services to the way older people access services? • Is the service user friendly?	Yes, It is user friendly
Disability • This could be physical disabilities or learning difficulties. • Remember not all disabilities are visible. • What are the accessibility considerations - venue, location, and signage? •	Does not affect disabilities of any kind. Staff must explain the isolation and infection control precautionary measures to all patients with TB to gain cooperation.
Gender Reassignment • Are Tran's gender people being offered a non-judgemental and user friendly environment? • If your policy, procedure or change in practice is targeted at this population have you considered staff training, confidentiality, and communication skills?	No
Marriage and Civil Partnership • Does Being Married or in a Civil Partnership affect the level of service that the individuals receive? • Has staff been trained in confidentiality? • What is the impact on same sex groups/ activities?	No
Pregnancy and Maternity • Is the service/change of practice fully accessible to all? for example flexible hours of the service/ change of practice? • Is there access to private area for breastfeeding mothers?	Yes This policy does not affect breast feeding
Race • Have you considered and understood the demographic data that affects the policy, procedure or change in practice? • What is the size of the BME communities your service/ project affects? • How will you make your service/ project accessible for the diverse local population?	Yes This policy does not affect race
Religion or Belief • Is the policy, procedure or change in practice accessible to all individuals/ communities with a religion or belief? • Do you know what these are in the communities that you are targeting? • Have you thought about prayer times, meal times, religious holidays e.g. Ramadan? • Will there be training for staff?	Yes This policy does not affect belief or religion
Sex	This policy does not affect sex

• What is the impact on males and females? • Location-in general men do not access health services as much as women, could location of service/ project improve access e.g. workplace?	
Sexual Orientation • Is the language used respectful of LGBT people and does it acknowledge same-sex relationships?	This policy does not affect sexual orientation or use of language in that regard.

Part 3

1) Assess the Likely Impact.

Parts 1 & 2 will have provided sufficient information for you to judge what impact the project/ service will have or is having across the protected characteristic questions.

Please give a brief explanation below of EA outcomes. Record if the policy, procedure strategy or change in practice will have a **negative**, **neutral** or **positive** impact for each protected characteristic, using the table below.

Protected Characteristics	**Impact on discrimination across the protected characteristics?**	**Impact on promotion of equal opportunity?**	**Impact on relations between different groups**
Age	None	None	None
Disability	None	None	None
Gender Reassignment	None	None	None
Marriage & Civil Partnership	None	None	None
Pregnancy and Maternity	None	None	None
Race	None	None	None
Religion and Belief	None	None	None
Sex	None	None	None
Sexual Orientation	None	None	None

2) Consultation

Who have you consulted with? (Ensure there is diverse representation)	Infection Control Team, Microbiologist, TB nurses and doctors, members of ICC and Taskforce.

What key issues have been raised through the consultation process?	None yet
What changes have been made to your proposal as a result of the consultation?	None yet

3) Consider ways of minimising adverse impact.

Explain the amendments you have made so that negative consequences are eliminated or minimised, for the relevant protected characteristics.	Updated the information on TB trends Updated the Equality Analysis form
What alternative ways have you considered to achieve the aims of the policy/ procedure/ strategy / change of practice?	Effective Communication with key members of staff when a case of TB is suspected
Do you need to consider abandoning the policy/ procedure/ strategy/ change of practice?	**No,** this policy is critical in a healthcare setting to safeguard service users against and staff against TB infections.

4) Monitoring and reviewing arrangements

State what arrangements will be put in place to monitor the policy/ procedure/ strategy/ change of practice?	Ensuring that suspected TB patients are admitted into side-rooms. Early referral to TB nurses for follow up
Identify the frequency of the monitoring reports to be produced, and published.	Possibly six - monthly

5) Action Plan

You also need to prepare an action plan. You should base your action plan on:

- The evidence you find and immediate actions that need to be taken to support your decisions
- The challenges you identify that may need future arrangements in place.
- The opportunities you identify

Action		Rationale	Lead	Target Date	How will it be monitored?
1.	Appropriate use of side room priority poster	To ensure TB patients are isolated promptly	Clinical staff/Chest physicians and TB nurses	Ongoing practice	Side-room reviews/isolation audits
2.					

Sign Off

Please complete the section below and send an electronic copy of the completed EA to the Equality & Inclusion Manager in the HR Department. Please ensure that the EA is published on our website (this is a legal requirement).

Equality Analysis Lead Officer (please print)	**Equality Analysis Lead Officer Signature**	**Date**
Juliana Kotey, Lead Nurse – Infection Prevention and Control		4th November, 2019
Directors Name (please print)	**Directors Signature**	**Date**
Elaine Clancy, Chief Nurse		

Policy: Tuberculosis: guideline for preventing transmission of Mycobacterium Tuberculosis in healthcare settings. Version 7	**Date:** 9th December, 2019
Officer conducting this Analysis: Juliana Kotey, Lead Nurse, Infection Prevention & Control	

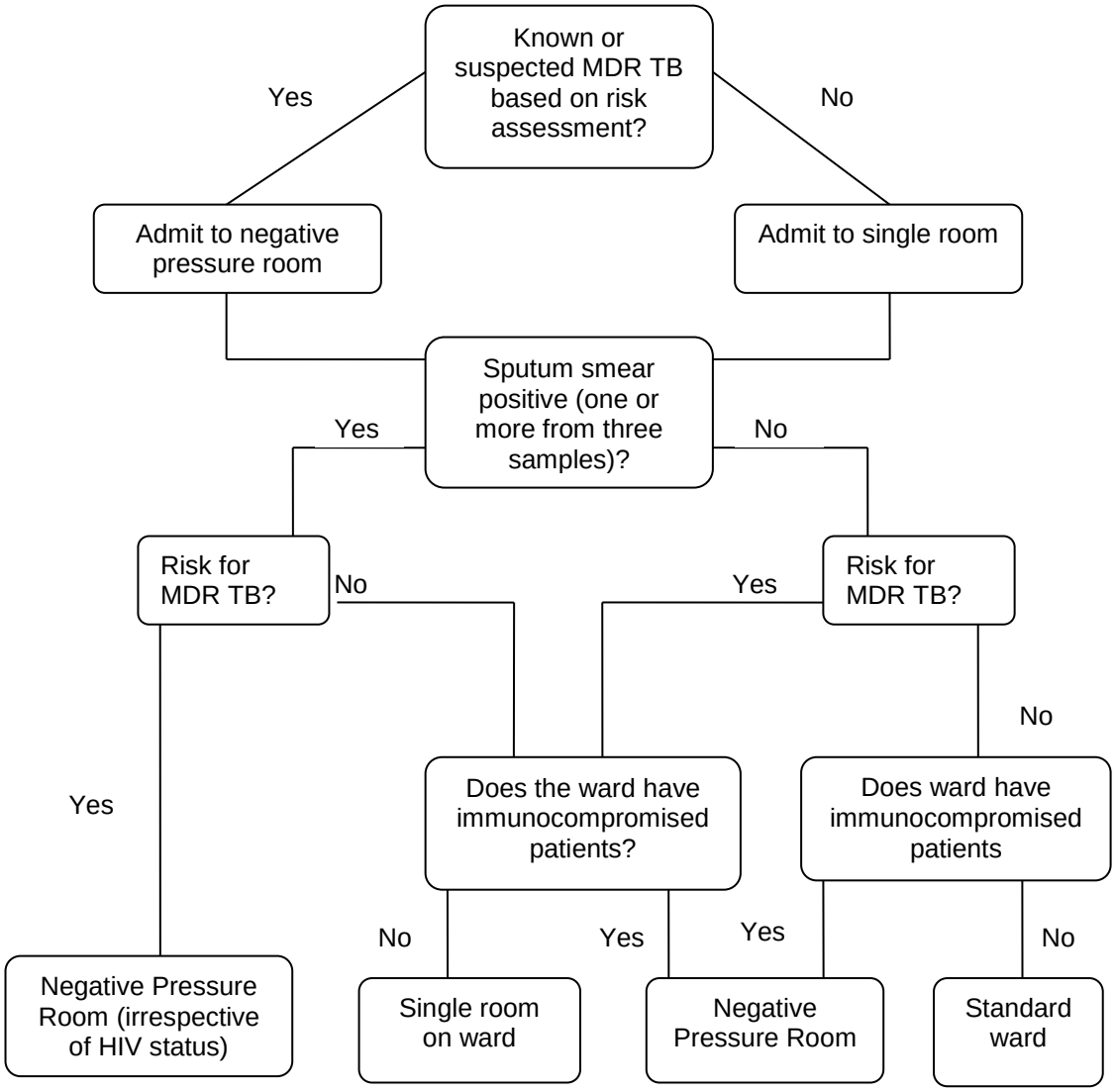
Protected Characteristic	**Positive Impact**	**Negative Impact**	**None**	**Reasons for decision**
Age			√	This policy does not affect race, belief , age, sex or sexual orientation
Disability			√	
Faith			√	
Gender			√	
Race			√	
Sexual Orientation			√	

APPENDIX B CONSULTATION TEMPLATE

1.	Procedural Document's Name:	Tuberculosis: guideline for preventing transmission of Mycobacterium Tuberculosis in healthcare settings. Version 8.0	
2.	Procedural Document Author:	Dr Mary Twagira, Consultant microbiologist and infection control doctor	
3.	**Group/Committee Consulted**		**Date**
	Infection control committee		15-22/01/16 & 03/08/16 & 10-25/10/16
	TB Nurses specialist team		15-22/01/16 & 03/08/16 & & 10-25/10/16
	Respiratory consultants		15-22/01/16 & 03/08/16 & 10-25/10/16
4	**Name and Title of Key Individuals Consulted**		**Date**
	Infection Prevention & Control Team		9th December, 2019
	Dr Mala Sahathevan, Infection Control Doctor and Consultant Microbiologist		9th December, 2019
	Dr Mary Twagira, Consultant Microbiologist		9th December, 2019
	Dr Qureshi, Consultant Microbiologist		9th December, 2019
	Dr Emma Wiley, Consultant Microbiologist		9th December, 2019
	TB team and chest physicians		9th December, 2019
	Infection Control Taskforce members		13th December, 2019
	Comments received: MT: minor comment in relation to numbering – incorporated.		

APPENDIX C ALGORITHM SHOWING ISOLATION DECISIONS FOR PATIENTS WITH SUSPECTED RESPIRATORY TB

Source: NICE Clinical Guideline 2011



APPENDIX D TB PATIENT CONTACT TRACING FORM

This form is to be completed by the nurse in charge and to be used in cases of confirmed or suspected smear positive pulmonary TB. Completed forms should be sent to the respiratory nurse specialist.

Date…… **Ward……** **Name of person completing……**

Index Case…… **Date of Admission……** **Date of Positive Culture……**

Add all patients that have shared the same area for 8 hours or more with the index case in the table below. Any queries contact TB nurses on Bleep 791/164 or ext 3140

Name and Address	M00	DOB	Date of Admission	GP: Name & Address	Comments

APPENDIX E STAFF CONTACT TRACING FORM

This form is to be completed by the nurse in charge and to be used in cases of confirmed or suspected smear positive pulmonary TB. Completed forms should be sent to the occupational health department

Ward…… Date……

Name of person completing…… Index Case……

Date of Admission…… Date of Positive Culture ……...

Add names of staff who have been present during aerosol generating procedures e.g. suction bronchoscopy, sputum induction or use of nebuliser equipment. They may be managed as "close contacts" for contact purposes.

Name	DOB	Area worked	Date

Any queries contact Occupational Health 3463