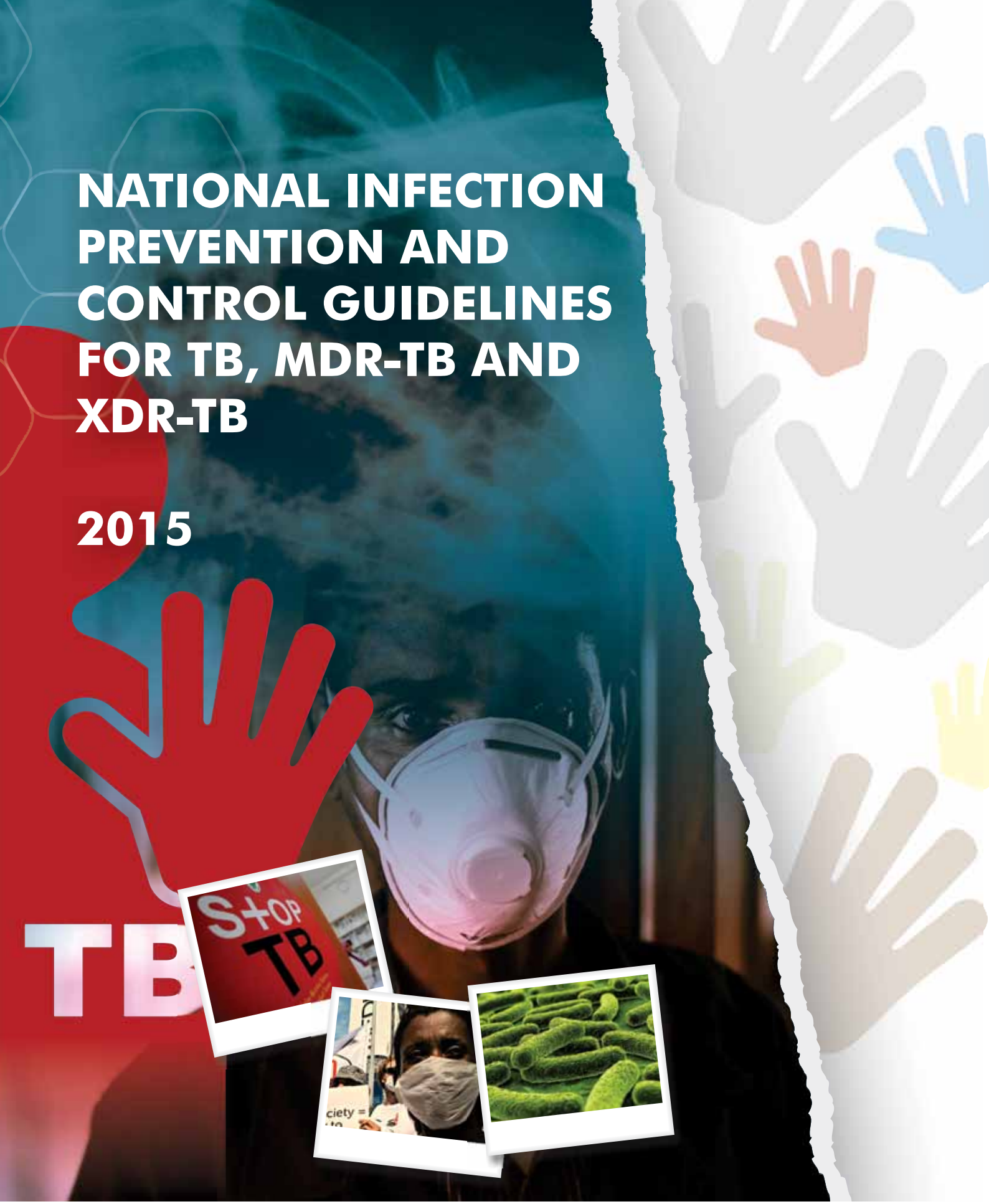
NATIONAL INFECTION PREVENTION AND CONTROL GUIDELINES FOR TB, MDR-TB AND XDR-TB

2015



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DEFINITIONS

Droplet nuclei: Microscopic particles that are estimated at 1-5 microns in diameter and are produced when a person coughs, sneezes, shouts or sighs. Such particles may remain suspended in the air for hours.

Health care associated infection (nosocomial or hospital-associated infection): An infection acquired in a health care facility by a health care user, health care worker, or a visitor to a health care facility, who was in the facility for a reason other than that infection. Such an infection should have neither been present nor incubating at the time of admission or at the time when the initial contact with the health care facility was made. This includes infections acquired in the hospital, but appearing after discharge, including any infection in a surgical site up to six weeks post operatively. Also included are occupational infections among staff of the facility.

Health care workers: A group of people that includes nurses, physicians, nursing and medical students, laboratory workers, counsellors, and others who work in health care facilities and may be exposed to patients with communicable diseases.

TB Infection: The sub-clinical, latent infection with the organisms that cause TB, manifested by a positive tuberculin skin test, but without clinical evidence of disease.

Infection Prevention and Control Committee: A multidisciplinary committee that deals with infection prevention and control issues. Each member of the committee makes inputs as they relate to his /her discipline in order to share information and to cooperate. The committee is made up of medically trained microbiologists, clinicians, management representatives, and other health care workers representing, pharmacy, sterilizing service, housekeeping and training services.

Infection Prevention and Control Programme: A comprehensive programme that encompasses all aspects of infection prevention and control, covering education & training, surveillance, environmental management, waste management, outbreak investigation, development and updating of infection prevention and control policies, guidelines and protocols, cleaning, disinfection and sterilization, employee health, and quality management in infection control.

Hospital-associated or nosocomial infection: An infection acquired in a health care facility by a health care user, health care worker, or a visitor who was in the facility for a reason other than that infection. Such an infection should have neither been present nor incubating at the time of admission or at the time when the initial contact with the health care facility was made. This includes infections acquired in the hospital, but appearing after discharge, including any infection in a surgical site up to six weeks post operatively. Also included are occupational infections among staff of the facility.

Multidrug-resistant tuberculosis (MDR-TB): TB caused by strains of M. tuberculosis that are resistant to both Isoniazid and Rifampicin with or without resistance to other drugs.

Risk management: All the processes involved in identifying, assessing and judging risks, assigning ownership, taking actions to mitigate or anticipate them, and monitoring and reviewing progress.

Risk assessment: Includes analysis, collection and review of surveillance data and in-depth description of a facility.

Separation: Placing patients infected or colonized with the same known pathogen in a designated unit (i.e. one that has the same space and staff), to which patients without the pathogens are not admitted.

ABBREVIATIONS

ACSM	Advocacy, Communication and social mobilization
BCG	Bacille Calmette-Guérin
CHC	Community health centre
CHW	Community health worker
HCT	HIV counselling and testing
HEPA	High Efficiency particulate air filtration
HIV	Human immunodeficiency virus
MDR-TB	Multidrug-resistant tuberculosis
PHC	Primary health care
PMTCT	Prevention of mother-to-child transmission of HIV infection.
PPE	Personal protective equipment
TB	Tuberculosis
TBIPC	Tuberculosis Infection Prevention and Control
TST	Tuberculin skin test
UVGI	Ultraviolet germicidal irradiation
XDR-TB	Extensive Drug-Resistance Tuberculosis

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These guidelines should be used in conjunction with the National Infection Prevention and Control Policy & Strategy, 2007 to provide guidance to health care workers on prevention and control of TB infection.

1. BACKGROUND

Most people with undiagnosed, untreated and potentially contagious TB are frequently seen in health care facilities but are missed. In an area with high HIV prevalence, this poses a risk for HIV positive patients who are particularly vulnerable to TB with a 10% annual risk of developing TB compared to a 10% lifetime risk in those with normal immunity. The numbers of patients with diagnosed or undiagnosed TB, immune compromised patients (HIV positive, children <5 years/ malnourished, diabetic) presenting to our health facilities creates a potential for transmission of TB. People who are immune compromised may become infected or re-infected with TB if they are exposed to someone with infectious TB disease. They can progress rapidly from TB infection to disease – over a period of months rather than a period of years as is common for persons with a normal immune system.

An increased risk of TB has been documented amongst all categories of health care personnel (including facility staff, community health workers and volunteers) compared to the general population. The prevalence of HIV amongst health care personnel correlates with that in the general population. Health care personnel are at risk due both to frequent exposure to patients with infectious TB. The rising incidence of Multidrug-Resistance Tuberculosis (MDR-TB) and Extensively Drug-Resistance Tuberculosis (XDR-TB) with high mortality have led to a stronger focus on TB infection control.

It is the responsibility of management and staff to minimise the risk of TB transmission in health settings. Infection control measures should be established to reduce the risk of TB transmission to both the general population and to health care personnel. Since the majority of patients are seen at primary health care level, it is important to ensure that infection prevention and control measures are implemented not only in the hospitals but clinics, community health centers and community or household level.

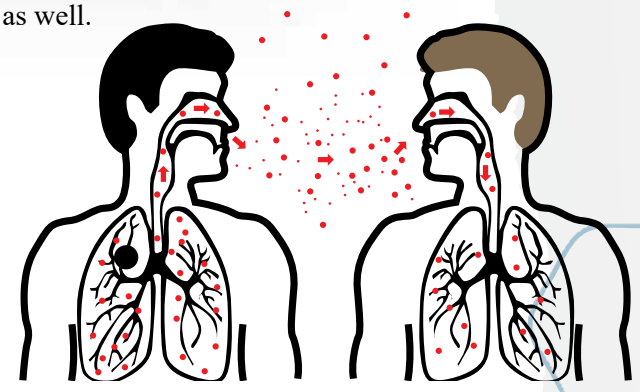
2. TRANSMISSION OF TUBERCULOSIS

Tuberculosis is spread from person to person by droplet nuclei that are produced when a person with pulmonary or laryngeal tuberculosis coughs/ sneezes and by aerosol-producing investigations such as bronchoscopy and sputum induction.

People with active tuberculosis generate droplets of different sizes. The larger droplets which contain higher numbers of bacilli do not remain airborne for long periods. If they are inhaled, they do not reach the alveoli because they are trapped by the mucous in the upper airway and from there transported by mucociliary action to the oro-pharynx and swallowed or expectorated. The smaller droplets which are 1 to 5 µm in diameter containing fewer (±1 - 5 bacilli), are highly infectious. They remain airborne for long periods of time in any indoor space. When inhaled they can easily reach the alveolar spaces within the lungs, where the organisms replicate. It is estimated that one cough can produce 3,000 droplet nuclei and a sneeze up to a million droplets; about 10 - 200 droplet nuclei are sufficient to cause infection. The most infectious people are those who have smear positive pulmonary TB (coughing up the bacilli), particularly with lung cavities. People with smear negative pulmonary TB cases are much less infectious and those with extra-pulmonary TB are almost never infectious, unless they have pulmonary tuberculosis as well.

Exposure to TB Bacilli

- When someone with pulmonary TB coughs, invisible droplets containing TB bacilli are dispersed into the air;
- The remain suspended in the air and fall at a rat eof 12mm/hr; and
- These droplets can then be inhaled by others.



Transmission generally occurs indoors, in dark, damp spaces where the bacilli can survive for several hours. Direct sunlight has a bactericidal effect on the tubercle bacilli. Close contact with a person who has infectious PTB for a prolonged time increases the risk of transmission. Three factors determine the likelihood of transmission of M. tuberculosis:

- The number of organisms expelled into the air; and
- The concentration of organisms in the air, determined by the volume of the space and its ventilation; and
- The length of time an exposed person breathes the contaminated air

Once infected, the progression to active disease is dependent on the immune status of the individual. The risk of progression to active disease is dependent on the following factors:

i. Age: children <5 years of age and the elderly are less infectious as they have paucibacillary disease
ii. HIV: people who are HIV positive and have a high CD4 count would be as infectious as HIV negative patients. Those with low CD4 count are considered less infectious as they would have paucibacillary disease.
iii. silicosis,
iv. diabetes mellitus,
v. malnutrition,
vi. corticosteroids and other immuno-suppressive drugs and
vii. smoking

2.1 *Patient factors that determine the risk of transmission*

Infectiousness is dependent on the site of TB and extent of TB disease. Patients should be considered infectious if they have any of the following;

- Cough
- Sputum smear positive
- Chest x-rays shows cavities in the lungs
- Active affective TB Not on treatment
- Just started TB treatment (on treatment less than a week)
- Poor clinical response to TB treatment

2.2 *Environmental factors that determine the risk of transmission*

- **Ventilation:** Inadequate ventilation results in failure of air dilution or removal of infectious droplet nuclei thereby increasing the risk of transmission.
- **Duration of exposure:** Spending eight continuous hours with an infectious person poses a higher risk than two hours or occasional contact.
- **Concentration of the droplet nuclei:** The risk of transmission is higher if the concentration of the droplet nuclei in the air is high.
- **Space:** The risk is higher in a small enclosed space.
- **Air circulation:** Recirculation of air poses a risk when it contains infectious droplets

The period of infectiousness ends when any of the following criteria are fulfilled:

- The patient has been on effective treatment for a period of at least two weeks
- There has been clinical improvement – symptoms and signs have subsided, patient feeling better and clinically looks well
- There has been satisfactory bacteriological response – smear conversion from positive to negative

TB Infection and Disease

Knowledge about TB infection and disease may be significant in understanding the models of TB infection prevention and control measures.

Infection is the invasion of an organism's body tissues by disease-causing agents, their multiplication, and reaction of host tissues to these organisms and the toxins they produce. Infections are caused by infectious agents including bacteria, viruses, parasites and fungi.

Disease is an impairment of normal physiological function affecting all or part of an organ. It is an indication of a medical condition, associated with signs and symptoms. It may be caused by external source such as infectious disease and internal factors such as autoimmune diseases.

Infectious disease, is a transmissible disease or communicable disease resulting from an infection.

TB Infection

- TB infection refers to a situation in which a person has TB bacilli in the body and the individual is not sick.
- It begins with the multiplication of tubercle bacilli in the body.
- An individual is infected with TB bacilli, but his/her immune system is strong enough to prevent the bacilli from multiplying:
  - TB bacilli remain in the body but are not active,
  - The individual shows no signs and symptoms of TB.
  - The individual is with latent TB infection is not infectious
  - It is also called latent TB infection.
  - A positive Tuberculin Skin Test (TST) is the only evidence of infection.

TB Disease

- Over time, or with risk factors, the immune system may loose control over the TB bacilli.
- The bacilli actively multiply
- TB disease will develop.
- The person presents with symptoms and signs of TB
- Chest radiology usually abnormal
- Sputum investigation for Xpert, smear and culture may be positive or negative
- TB disease may or may not be infectious

3. REDUCING THE RISK OF TRANSMISSION OF TB INFECTION IN HEALTH CARE FACILITIES

3.1 Management Control

The managerial control provides a framework for the implementation of the infection prevention and control measures. This framework outlines interventions that must be implemented at all levels - national, provincial, district, facility and community.

3.1.1 National and Provincial level managerial control activities include:

- The development of minimum standards for health facility design which take airborne infection control into consideration.
- Ensuring compliance to these standards for any new construction and renovations
- Developing occupational health policies for staff working in the health facilities
- Ensuring that regular TB medical surveillance for all health workers is conducted.
- Building capacity for staff to conduct facility risk assessments and developing IPC plans
- Ensuring that risk assessments are conducted in all health facilities annually
- The development and distribution information, education and communication (IEC) materials on infection control health care workers and communities
- Conducting social mobilization and awareness campaigns on TB infection control
- Engaging civil society in TB prevention and control activities
- Monitoring and evaluation of the implementation of the TB infection control measures.
- Support operational research activities in TB IPC.

3.1.2 District level managerial activities

The district level managerial activities include;

- The establishment of an Infection Prevention and Control committee and appoint infection prevention and control officer, where this exists ensuring that TB infection prevention and control is included in their responsibilities.
- Appointment of an IPC Officer to coordinate the implementation of infection prevention and control programme within the district
- Conduct health facility TB risk assessments annually
- Review facility TB IPC plans annually
- Provide occupational health services for all staff working in the health facilities
- Monitoring the number of health staff diagnosed with TB monthly
- Train and educate health workers on infection prevention and control measures.
- Ensure availability of appropriate commodities for TB IPC
- Monitoring of the implementation of TB Infection Prevention and Control interventions.
- Facilitate operational research activities in TB IPC.

3.1.3 Facility level managerial activities

Activities	Hospital	CHC/ Clinic
The establishment of an Infection Prevention and Control committee and appoint infection prevention and control officer, where this exists ensuring that TB infection prevention and control is included in their responsibilities	√	√
Appointment of an IPC Officer to coordinate the implementation of infection prevention and control programme within the district	√	
Conduct health facility TB risk assessments annually	√	√

Activities	Hospital	CHC/ Clinic
Review facility TB IPC plans annually	√	√
Provide occupational health services for all staff working in the health facilities – including staff from facilities without occupational health practitioners.	√	
Monitoring the number of health staff diagnosed with TB monthly	√	√
Train and educate health workers on infection prevention and control measures.	√	√
Ensure availability of appropriate commodities for TB IPC	√	√
Conduct IPC audits to monitor the implementation of TB Infection Prevention and Control interventions.	√	√
Facilitate operational research activities in TB IPC	√	√

Role of Infection Prevention and Control Committee (IPC Committee)

The IPC committees as articulated in the National Infection Prevention and Control Policy and Strategy, 2007 should provide oversight for TB infection prevention and control.

The roles and responsibilities of this committee in relation to TB IPC are to:

- Ensure development of the Infection Prevention and Control plans
- Provide technical support on TB prevention and control to district and facilities
- Review TB surveillance data trends (including MDR and XDR-TB)
- Advise on potential outbreaks and management thereof.

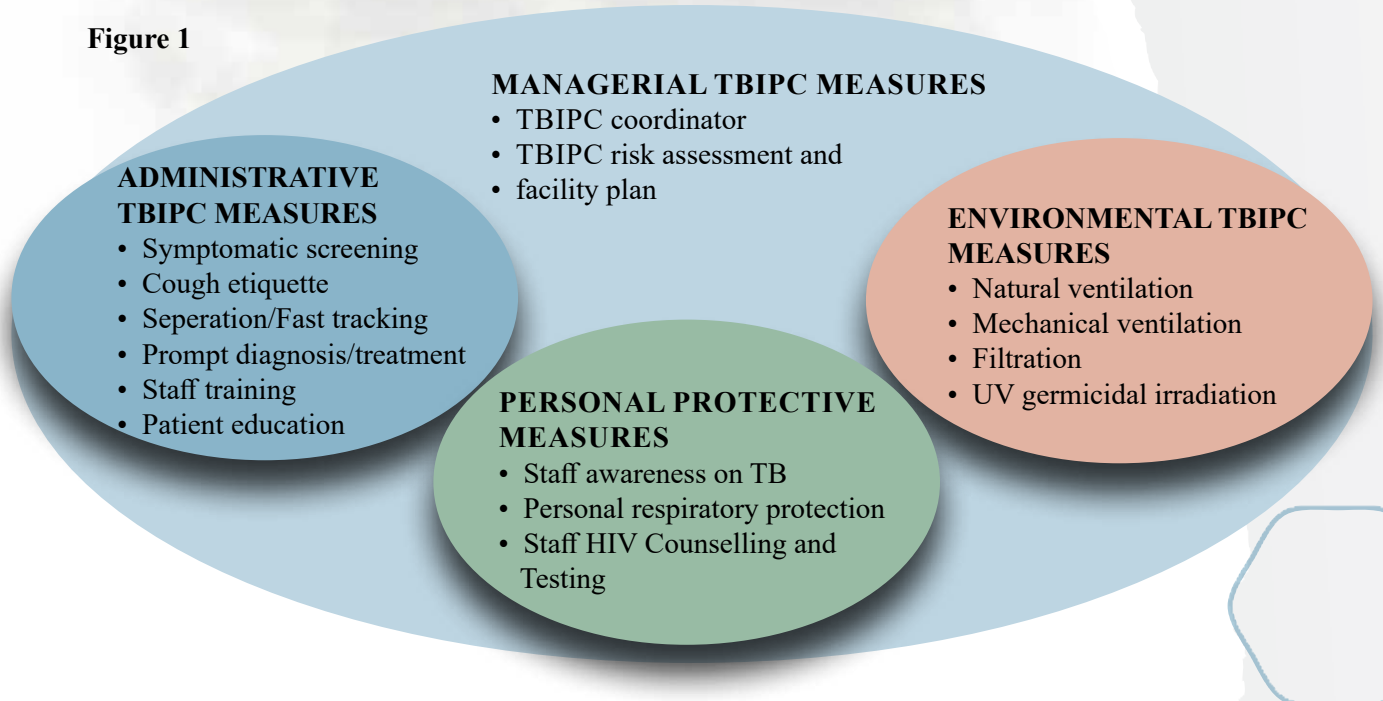
Role of infection Prevention and Control Teams (IPC Teams)

The hospital IPC Team as articulated in the National Infection Prevention and Control Policy and Strategy, 2007 should supervise and coordinate TB IPC activities in hospitals and clinics within its catchment area.

The TB infection-control program is based on three-levels of hierarchy of Infection Prevention and Control (IPC) measures:

- Administrative control, including appropriate work practices
- Environmental control
- Personal respiratory protection

Figure 1



3.2 Administrative control measures

3.2.1 Infection control plan

Each facility must have a written TB Infection Prevention and Control plan that outlines a protocol for the prompt recognition, separation, provision of services, investigation for TB and referral of patients presenting with TB symptoms or confirmed TB disease. The plan will include, but not be limited to, the following measures:

- Early recognition of people with TB symptoms through symptomatic screening of all patients entering facility or soon after arrival. A staff member should be assigned to screen patients using the TB screening tools (adult and children). The form must be completed and included in the patients file. Presumptive TB cases should be investigated immediately.
- People with chronic cough must wait in a designated, well-ventilated waiting area, for example in outdoor waiting areas, or a well-ventilated section of the waiting area.
- They must be educated on cough hygiene and provided with a face mask or tissue to cover their mouth and nose when coughing. Tissues and facemasks should be provided in the waiting areas and discarded in the bins after use. Hand washing should be encouraged after contact with respiratory secretions.
- Fast tracking confirmed TB cases coming for follow up appointments or to take/ collect their treatment to ensure that they spend as little time as possible in the facility.
- Educating health care personnel, patients and communities to seek health care early when symptoms of TB are present and to protect themselves and others e.g. through appropriate cough hygiene and good ventilation in the household.
- Improved TB and HIV integration in the health facility, with symptomatic TB screening of HIV positive patients at routine clinical visits and appropriate tests for those who are symptomatic, to aid early diagnosis.

3.2.2 Training of facility staff on IPC plan

Infection prevention and control is effective only if all staff working in a facility understands the importance of the infection prevention and control policies and their role in implementing them

Training should include the following:

- Basic concepts of M. tuberculosis transmission and pathogenesis;
- Risk of TB transmission to health care workers and staff;
- Symptoms and signs of TB;
- Impact of HIV infection on increasing risk of developing TB disease and the importance of TB as a major cause of disease and death in PLWHA;
- Importance of the infection prevention and control plan and the responsibility that each staff member has to implement and maintain;
- Specific infection prevention and control measures and work practices that reduce the likelihood of transmitting TB;
- Measures staff can take to protect themselves from TB; and
- TB disease surveillance among HCW

3.2.3 Community education and awareness

Educate communities and patients on the following:

- To recognize symptoms of TB and promptly seek health care;
- To undergo HIV Counselling and Testing;
- Cough hygiene; and
- Prevent ion of transmission in the community

3.2.4 Surveillance of TB disease among health workers

Surveillance of TB among Health Care Workers serves as an indication of performance of IPC Plan. All facility staff must be included in the TB medical surveillance programme in line with Occupational Health and Safety Act (Act No. 85 of 1993).

This medical surveillance programme consist of the following main components:

- **Pre-employment medical:** Baseline screening and testing for M. tuberculosis infection for all newly employed HCWs as part of the pre-employment. This serves as a baseline for comparison in the event that a person contract TB disease. It provides an opportunity to identify high risk individuals (HIV, diabetes etc) for appropriate placement and enables early detection and initiation of treatment.
- **Periodic medical:** Sceening and testing for TB every six months. This should also be conducted as part of outbreak investigations.
- **Exit medical:** Screening and testing for TB disease to exclude undiagnosed TB disease at the time of leaving the facility and ensure early treatment.
- **Training of staff** on TB medical surveillance programme, and
- **Education of staff** on the importance of using the service.

All staff with confirmed infectious TB disease pose a risk of transmitting TB infection and should be initiated on treatment promptly.

3.2.5 Administrative Control Strategies to prevent TB transmission in Health Care settings

In general, administrative control measures have the greatest impact on preventing TB transmission and they are the first priority in any setting regardless of available resources. These measures aim to reduce the droplet nuclei in health facilities by eliminating the generation of droplet nuclei and risk of exposure.

The administrative control activities include;

- Early recognition of people with TB symptoms through screening of all patients entering the health facility
- Separation of people who are coughing from the other patients, this will require identification of a well-ventilated area that can be used as a sub-waiting area.
- Prompt investigation for TB in symptomatic patients
  - Appropriate collection of sputum samples:
    - Sputum collection should take place in a designated private area away from other people.
    - The sputum collection area must have good air circulation
    - Hands must be washed after sputum collection.
- Sputum test results must be followed up and patient started on treatment immediately if diagnosed with TB.
- Educating all patients on respiratory hygiene:
  - Covering the nose and mouth with an inner part of the elbow or a tissue when coughing or sneezing and discarding it in a designated bin
  - Use of disposable surgical masks by patients who are coughing whilst in the facility and discarding them in a designated bin.
  - Hand washing
- Isolation of confirmed TB patients

Table 4.1: Seven steps for patient management to prevent transmission of TB

Step	Action	Description
1.	Screening	• Early recognition of patients with TB symptoms • Health care workers should screen all patients for TB symptoms using the TB screening tools (adult and children). • The screening may be conducted in vital signs station, reception/ waiting room, consulting rooms, on admission in wards, ANC/PMTCT, Pre Art/ ART clinic, Well baby clinic, Diabetic clinic
2.	Educate on Cough hygiene	• Educate patients by cough hygiene • Provide surgical masks for use whilst in the health facility • Provide bins for safe disposal of tissues and masks • Ensure access to hand washing facilities for patients
3.	Separation and Isolation	• Establish separate waiting areas for patients who cough • Isolate patients with confirmed infectious TB or suspected to have infectious TB admitted in hospital • Separate new TB patients from patients who are at various stages of TB treatment in TB wards (cohorting of patients)
4.	Fast-track	• Fast track patients already on TB treatment attending for follow up visits (appointment system)
5.	Investigate patients with symptoms for TB	• Collect sputum for testing from all patients with a cough • Diagnostic tests should be done onsite or referred to the nearest laboratory. • Laboratory results should be followed up within 2 days • All suspects should be offered provider-initiated HCT
6.	Prompt Treatment	• Appropriate TB treatment should be initiated at the earliest time possible (within 2 days) • ART should be initiated in all HIV/TB co-infected patients regardless of CD4 count
7.	Discharge plan	• For inpatient settings, discharge planning should be conducted jointly with the patient • Linkage with community healthcare workers to conduct comprehensive Infection Prevention and Control home assessment

3.3 *Environmental Control Measures*

Environmental controls are used to prevent the spread and reduce the concentration of droplet nuclei in the air. The managerial and administrative control must be in place for the environmental controls to be effective. The types of controls implemented will vary from one facility to another based upon the results of the risk assessments

There are three main types of environmental controls namely;

- Ventilation (natural and mechanical)
- High Efficiency particulate air filtration (HEPA)
- Ultraviolet germicidal irradiation (UVGI)

3.3.1 Ventilation

Ventilation is the movement and the replacement of air in a building with air from the outside or with re circulated air that has been sanitised. When fresh air enters a room, it dilutes the concentration of droplet nuclei in room air.

3.3.1.1 Natural ventilation

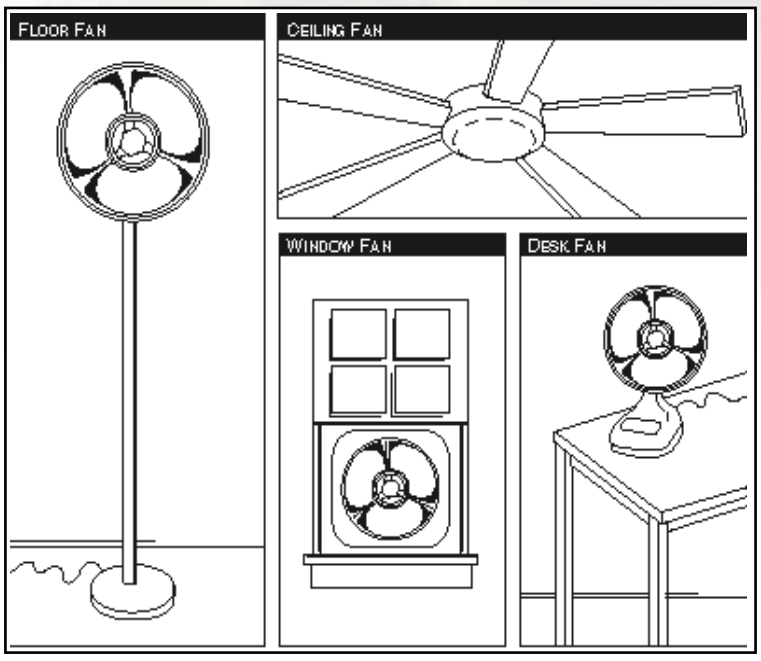
Natural ventilation is created by the use of external natural forces such as wind. It is however difficult to control the direction of the airflow as this depends on the wind speed or direction. It relies on open windows and doors to allow the air to move in and out of the room.

Designing waiting areas and examination rooms in such a way they maximize natural ventilation can help reduce the spread of TB. Open air shelters with a roof to protect patients from sun and rain can be used as waiting areas.

Controlled natural ventilation

Natural ventilation is controlled when openings are deliberately secured open to maintain adequate ventilation.
Assisted natural ventilation

Fans may be used to assist in air distribution and directing the flow.



Propeller fans increase the effectiveness of natural ventilation by increasing the mixing of airborne droplet nuclei. They also assist in directing the air movement by pushing or pulling the air.

There are different types of propeller fans – ceiling fans, desk top fans, free standing and wall/ window mounted fans.

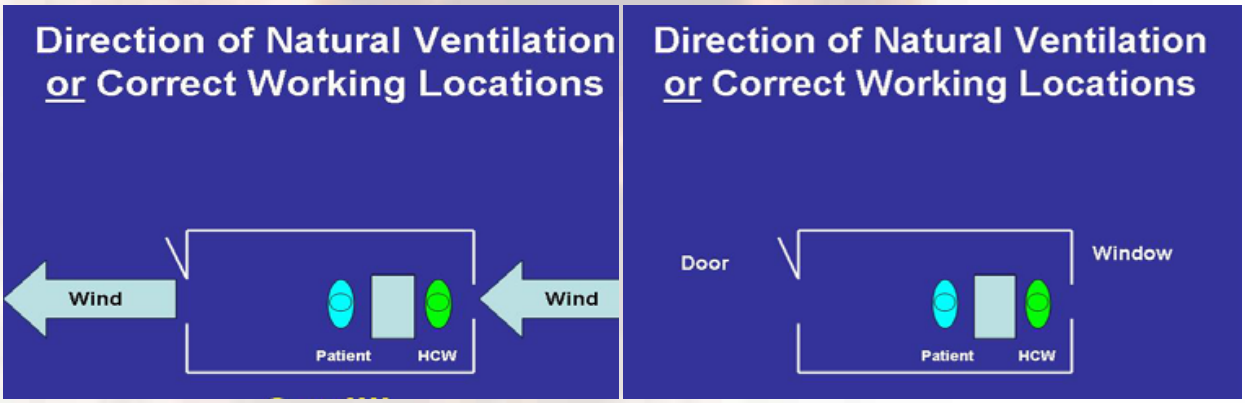
The aim is to reduce pockets of high concentrations in the vicinity of patients in areas where natural ventilation is inadequate. The total number of infectious particles in the room will not change with mixing; however, the concentration of particles near the source will be reduced, and the concentration in other parts of the room may increase. The combination of this mixing with air replacement in the room by opening windows and doors will result in marked reduction of infectious droplet nuclei in the room. Therefore the risk of infection is reduced by combining air mixing and removal.

3.3.1.2 Directional airflow

Fans can be used to enhance flow of air in and out of the room when installed in the windows or wall opening where there are inadequate windows. They can also be used to exhaust air outside, away from people. For example, in a room which has a door/ window on one side and nothing on the opposite side, when the door/ window is kept open, the overall effect of installing fans on the opposite side is to draw in fresh air through the front of the building and exhaust air out.

It is therefore important to be mindful of the direction of airflow in a room to ensure that the sitting arrangement is such that air will blow from behind the health care worker over the patient and out of the room.

Figure 3: Direction of natural ventilation



3.3.1.3 Assessment of natural ventilation

People can usually feel the existence or lack of air movement in a space. A ventilated space has a slight draft. In the absence of ventilation, air will feel stuffy and stale and odours will linger. Use the following checklist to assess natural ventilation in your waiting areas and examination rooms:

1) Check that all occupied rooms have a source of natural ventilation
2) Check that windows and doors are easy to open and to keep open
3) Check air mixing and determine directional air movement in all parts of rooms or areas. One way to visualize air movement is to use incense sticks as described in these six steps.
   - Hold two incense sticks together and light them.
   - As soon as the incense starts to burn, blow out the flame. Now the incense should produce a continuous stream of smoke.
   - Observe the direction of the smoke.
   - Observe how quickly the smoke dissipates. This is a subjective test that may require some practice. It does not give a definite result but is useful for comparing one room or area to another.
   - The test may be repeated for different conditions in the facility i.e. with closed and open doors and windows
4) Natural ventilation should be checked once a year or whenever changes in the physical environment have been made to confirm free movement of air.
5) Records of all routine activities and dates must be kept.
6) Check that all room fans are working and clean

3.3.1.4 Mechanical ventilation

This is created using an air supply or an exhaust fan to force air exchange and to drive airflow. Such ventilation works by generating negative or positive pressure in the room to drive air changes. To be effective, all doors and windows must be kept closed, with controlled air leakage into or out of the room.

Exhaust fans

Exhaust ventilation systems allow for exchange of air in the room as well as extraction of air to the outside. There are a wide variety of exhaust fan systems. The simplest could be a propeller fan installed in the window or wall; they can also be installed in air ducts for supplying air into or extracting air from a room. Over time, dust and lint accumulates on exhaust fan blades, motors, and ducts rendering the system less effective. For this reason, these systems should be cleaned regularly.

Negative Pressure system

Negative pressure is used in areas where it is essential to prevent the escape of contaminated air from an isolation room through the door or other gaps towards other patient areas. It is created by extracting more air from a room than is supplied to the room so that the infectious droplet nuclei are contained within a room by a continuous air current being pulled into the room under the door. The air in the room is kept at negative pressure compared to the other areas and the air must be safely removed from the room to the outside.

Positive pressure system

In a positive pressure system, the room is in positive pressure and the air in the room is leaked out through envelope leakages or other openings. This allows airborne microorganisms that may infect the patient to be kept away from the patient, an example of its use is in operating theatres.

3.3.1.5 Assessment and maintenance of fans

- Fans must be cleaned and checked monthly.
  - A cloth or vacuum cleaner may be used to remove dust and lint from fans, grilles and ducts.
  - To check the working condition of fans that have a grille, hold a tissue or piece of paper against the grille. If the exhaust fan is working, the tissue or paper should be pulled against the grille.
- Keep records of all routine activities and dates.

3.3.2 High Efficiency Particulate Air (HEPA) filtration

High efficiency particulate air filters are capable of removing 99.97% of particles that are 0.3 microns or greater in diameter. They are used to clean air which is recirculated to other areas of a facility, or recirculated within a ward/room, for rooms where there is no general ventilation system, where the system is incapable of providing adequate airflow, or where increased effectiveness of room airflow is required.

HEPA filtration may have a place as an additional measure to adequate ventilation in booths or enclosed areas designed for sputum collection/ induction. Portable units are available but have not been evaluated adequately to determine their role in tuberculosis infection control.

However, recirculating air from areas intended to isolate a patient with tuberculosis is not recommended and these units are also expensive and need regular engineering attention.

3.3.3 Ultraviolet germicidal irradiation (UVGI)

Priority should be given to achieving adequate ventilation. Where this is not possible because of climatic conditions for example where it gets very cold in winter or during the night and it is not feasible to keep windows opened or the design of the building makes it impossible to ensure adequate ventilation, UVGI may be considered as an adjunctive measure.

UVGI is dependent on room air mixing to be effective because contaminated air must be circulated to the irradiated upper part of the room where the organisms can be rapidly inactivated. Several studies have shown that well-designed UVGI upper room devices can disinfect mycobacteria in conditions that have an equivalent of 10–20 air changes per hour. It is ineffective in humid and dusty environments. UVGI devices have to be installed properly for maximum effect; testing and maintenance must be conducted regularly.

Upper UVGI devices are hazardous if not properly designed or installed. The NIOSH guidelines recommended the occupational exposure limit of 6mJ/cm2 over an 8 hour period for a short wave ultraviolet irradiation (254 nm). It has been reported that exposure above this limit may result in erythema/ photo dermatitis and photo-keratitis and/or conjunctivitis.

Monitoring and maintenance

Monitoring of UVGI is important to ensure that the radiation level is effective for disinfecting the air, and is safe for room occupants. A person preferably from maintenance or engineering department, must be designated to;

- Routinely conduct UVGI measurements to monitor radiation levels
- Clean the devices regularly – it must always be turned off before cleaning
- Replace the bulbs as recommended by the manufacturer of the devices
- Keep records of monitoring and maintenance activities

3.4. Personal Respiratory Protection

Personal protection refers to the use of respirators that contain a special filter material that protects the wearer from inhaling the bacilli. They are used as the last resort where the managerial, administrative and environmental controls have not completely eliminated the risk. The use of respirators can further reduce this risk in these settings.

3.4.1 Respirator masks

Respirator masks are designed to filter out the droplet nuclei thus protecting health care workers and visitors from inhaling the droplet nuclei. They are most appropriately used for short-term protection against high-risk exposures e.g. during sputum inducing procedures and bronchoscopy. The recommended respirator is the type that covers the mouth and nose and is fitted with a special particulate filter to filter out very small particles. NIOSH certified N95 or greater or E.U. specified filtering face piece FFP2 or greater are recommended for use in health care settings.

These face masks have a capacity to filter small particles thus protecting against inhaling infectious droplet nuclei. The N95 respirator has a filter efficiency level of 95% or more against particulate aerosols oil free when tested against 0.3 µm particles. The “N” indicates that the mask is not resistant to oil; the “95” refers to a 95% filter efficiency. The FFP2 respirator has a filter efficiency level of 94% or more against 0.4 µm particles and is tested against both oil and oil free aerosols.

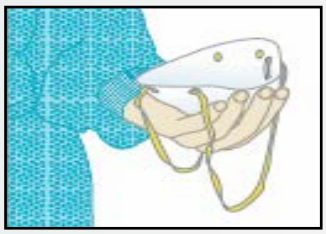
3.4.1.1 Fit testing

- Fit testing must be performed on all health care workers to determine which type or size of respirator fits properly.
- It makes use of a noxious substance that is sprayed in a hood covering the head
  - If the individual can smell the substance, it means the respirator does not fit well
  - If the individual cannot smell the substance, it means the respirator fits well

Once the correct type and size has been determined for an individual, fit testing does not need to be repeated.

3.4.1.2 How to put on and test seal an N95 respirator mask

1) Wash your hands using soap and water or clean with hand sanitizer
2) Inspect the mask to ensure that it is not damaged.
3) Cup the respirator in your hand with the nosepiece at your fingertips, allowing the headbands to hang freely below your hand



4) Position the nosepiece under your chin with the nosepiece up

5) Pull the top strap over your head resting it high at the back of your head. Pull the bottom strap over your head and position it around your neck below your ears

6) Place fingertips of both hands at the top of the metal nosepiece. Mould the nosepiece (using two fingers of each hand) to the shape of your nose.

7) Cover the front of the respirator with both hands, being careful not to disturb its position.
   1) Exhale sharply and adjust if leaking
   2) Inhale deeply and adjust if leaking

Source of graphics: WHO Epidemic and pandemic Alert and Response, 2008

3.4.1.3 Seal checking:

Seal checking is performed to check if the respirator is sealing the face off properly and that air is not leaking between the face and the respirator. This should be done every time the respirator is worn.

- *Positive seal-check:* Exhale sharply. A positive pressure inside the respirator means that there is no leakage. If there is leakage, adjust the position and/or the tension straps. Retest the seal. Repeat the steps until the respirator is secured properly.

- *Negative seal-check:* Inhale deeply. If there is no leakage, negative pressure will make the respirator cling to your face. Leakage will result in loss of negative pressure due to air entering through gaps in the seal. Adjust the position and/or the tension straps and check for damage. Retest the seal. Repeat the test until the respirator is secured properly.

Respirators are ineffective in people with facial hair because the hair prevents the seal between the mask and the face.

3.4.1.4 How to remove an N95 Mask

- Wash hands using soap and water
- Avoid touching the front part of the mask with wet and greasy hands
- Support the front part of the mask and remove by lifting the top and then the bottom elastic over the head.

Respirators are disposable but can be re-used repeatedly over the course of an 8 hour shift for up to 5 days, if they are properly stored in a clean dry place, used by one person, not soiled or wet, do not contain holes, tears or damaged in any other way. If the respirator has been breached it must be disposed of and a new respirator should be used.

Things to avoid

- Do not write on the mask.
- Do not store in a plastic bag
- Do not leave mask hanging around your neck.
- Do not fold and do not share

3.4.2 Surgical masks

Surgical masks are meant to prevent the spread of droplet nuclei into the air by capturing the expelled them near the source (mouth). They do not provide adequate protection from inhaling infectious droplet nuclei in the air because they are not sealed and have limited filtration capacity. They should be worn by patients who are coughing

3.4.2.1 Use of surgical masks on patients

Although not the highest priority intervention, disposable surgical masks can be used to reduce droplet nuclei generated from potentially infectious TB patients. These masks should also be considered for people with chronic cough and known infectious TB patients leaving the ward for medically essential procedures or other reasons. The concern is that they could perpetuate stigma therefore education of communities, patients and staff must be conducted.

How to put on a surgical mask	
1	Wash your hands with soap and water or clean with hand sanitizer before touching the mask.
2	Remove a mask from the box and make sure there are no obvious tears or holes on both sides of the mask.
3	Determine which side of the mask is the top. The side of the mask that has a stiff bendable edge is the top and is meant to mould to the shape of your nose.
4	Determine which side of the mask is the front. The coloured side of the mask is usually the front and should face away from you, while the white side touches your face.
5	Bring the mask to your nose level and place the ties over the crown of your head and secure with a bow.
6	Mould or pinch the stiff edge to the shape of your nose.
7	Then take the bottom ties, one in each hand, and secure with a bow at the nape of your neck.
8	Pull the bottom of the mask over your mouth and chin.

How to remove a surgical mask	
1	Wash your hands with soap and water or clean with hand sanitizer before touching the mask.
2	Avoid touching the front of the mask. The front of the mask is contaminated. Only touch the ties.
3	Untie the bottom bow first then untie the top bow and pull the mask away from you as the ties are loosened.
4	Throw the mask in the trash.
5	Wash your hands with soap and water or clean with hand sanitizer.

	MASK	RESPIRATOR
Purpose	• To reduce transmission by capturing bacilli expelled by a coughing TB patient into the air before they get into the air	• To reduce exposure to the bacilli in the air before the air is inhaled into the lungs
Who should wear it	• Patients with infectious PTB (sm+) • People with a chronic cough	• Health facility staff • Visitors to the TB isolation wards
Where should it be used	• In the waiting rooms, consulting rooms and when leaving the isolation ward for any reason • During transportation i.e. ambulance, patient transport vehicles or other • At home if isolation is not possible, ventilation inadequate and there are children <5years or people living with HIV in the household.	• TB isolation wards • Sputum induction areas/ booth • Other high risk areas based on the risk assessment • During transportation especially when sharing the vehicle with a person who has infectious TB • Community health workers/ visitor in the home of a patient with infectious TB

4. INFECTION PREVENTION AND CONTROL IN CONGREGATE SETTINGS

4.1 TB wards

One of the most effective means to reduce the risk of transmission of M. tuberculosis in hospital settings is to manage TB patients in the outpatient setting whenever possible. Many patients can be managed entirely as outpatients, thereby avoiding hospitalization and the risk of exposing other patients and staff. If hospitalized, patients should be re-evaluated frequently for possible discharge with continuation of treatment as outpatients. Ideally, infectious TB patients should be isolated from other patients to prevent others from being exposed to the infectious droplet nuclei that they generate. If sputum smear is performed at the time of admission, those who have positive sputum smear results, and thus most infectious, should be isolated or separated from other TB patients already on treatment.

The hospital administration should ensure that:

- There is a limited number of areas (preferably none) in the facility where exposure to potentially infectious TB patients may occur.
- Separate wards for confirmed infectious TB patients are established. These wards should be located away from wards with non-TB patients, especially wards with paediatric or immuno-compromised patients.
- In the outpatient setting, early identification, diagnosis, and treatment of TB cases is the highest priority.
- X-ray departments schedule inpatient chest x-ray appointments for patients with confirmed or unconfirmed PTB during non peak times.
- Surgical masks are provided to coughing patients to wear when leaving isolation wards for any reason and in crowded waiting areas.

4.1.1 Isolation

Isolation may be in patient's homes, hospitals, or at designated TB or MDR-TB hospitals. Isolation is voluntary however; it may be legally enforced where a patient poses a risk to the public. Patients should remain in isolation until they are not infectious. People with infectious tuberculosis who are ill must be admitted in separate wards from other patients and their movement restricted to prevent the spread of infection.

Ideally patients with suspected or confirmed infectious PTB should be admitted in a single ward that has;

- Monitored negative air pressure
- 6 –12 air changes per hour
- Appropriate discharge of room air to the outside
- Monitored high efficiency filtration of room air before the air is circulated to other areas of the hospital.
- Simple extraction fan providing at least 6 air changes per hour or
- Open windows and adequate ventilation.

When single wards are not available the patient should be placed in a ward with patients who are infected with the same micro-organisms. Patients at the same stage of treatment may be admitted in the same wards – cohorting. The same environmental measures as mentioned above apply in such a ward.

4.2 Patient transportation

The ventilation system in the ambulance should be circulate air within the vehicle but facilitate dilution by bringing in air from outside. If the vehicle has a rear exhaust fan, the fan must be on during transport. Air should flow from the front of vehicle, over the patient, and out through the rear exhaust fan.

After transporting the patient the vehicle must be ventilated by opening all doors and windows switching on the fans to flush out the air inside the vehicle.

If patient transport vehicles are used to transport a patient with infectious TB disease;

- If possible separate the infectious patients from other patients.
- The patient must wear a surgical mask
- Ensure that all windows are open.
- Educate patients in transit, driver and the accompanying staff on the use of masks and respirators.

4.3 Correctional facilities

Compared with the general population, TB prevalence is higher among inmates and it is associated with a higher prevalence of HIV infec¬tion, overcrowding, suboptimal ventilation, longer duration of potential exposure and limited access to health care services. TB is a public health concern in correctional facili¬ties; employees and inmates are at high risk of infection. All correctional facilities must therefore have a written TB infection prevention and control plan based on the TB risk assessment report.

Advocacy, Communication and Social Mobilisation (ACSM)

ACSM is an integral part of infection control activities. The ACSM activities should focus on the following:

- Imparting knowledge about the benefits as well as consequences of not implementing TB IPC measures in a given setting
- Mobilising communities to demand infection control measures for prevention of the spread of TB infection.
- Mobilisation of resources to fund infection control activities.

IEC material

Develop TB IPC posters and pamphlets with clear and consistent messages.

Awareness and education campaigns

Identify key populations to target for TB awareness and infection prevention campaigns. These include schools, correctional services, mines and informal settlements and key populations to conduct

Media coverage

- Make use of TV slots, radio and news papers to communicate concise and consistant messages on TB infection prevention and control.
- Engagement of all relevant stakeholders (e.g Metrorail, Busses, taxis) to advocate Infection Prevention and Control
- Brading of taxis on infection prevention messages
- Bill boards in strategic points on Infection Prevention messages - short, consistent messages.

5. TB RISK ASSESSMENT

5.1 *The purpose of a TB risk assessment*

Risk assessments are undertaken to identify potential risk areas for infection transmission so that proper IPC measures can be introduced. Every type of health-care setting should conduct initial and ongoing evaluations of the risk for transmission of M. tuberculosis regardless of whether or not patients with suspected or confirmed TB disease will be encountered in the setting.

The TB risk assessment determines

1) the risk of nosocomial transmission of TB by looking at a number of factors – incidence of TB in the community, number of patients with TB disease seen at the facility, timeliness of identification, isolation, testing and treatment of people with TB symptoms, evidence of transmission at the facility and types of control implemented in the facility.
2) the types of administrative, environmental, and respiratory protection controls that need to be implemented in the facility.

Risk assessments also serve as a tool for ongoing evaluation of the quality of TB infection control measures and the need to strengthen them. A TB risk assessment for healthcare facilities must be conducted and documented at least annually. The TB Risk Assessment Tools may be used as a guide for conducting a risk assessment for any health-care facility.

5.2 *Conducting a TB risk assessment*

The TB risk assessment is conducted as a first step in the process of developing the TB infection control plan for a facility. The seven principles of the risk assessment using the Hazard Analysis Critical Control Point (HACCP) risk analysis are:

1) Planning based on the HACCP process and determine what sections of the risk assessment tool will be used.
2) Assemble a multi-disciplinary risk assessment team
3) Establish procedures for documentation of all activities and the results of the assessment.
4) Establish procedures for validation and verification of the interventions currently being implemented and that they are periodically reassessed.
5) Conduct a hazard analysis by investigating all patient pathways to identify critical control points
6) Determine the appropriate IC intervention implemented for each critical control point by using the risk assessment questionnaire
    - Evaluate the management of the infection control plan in the facility in order to reduce risk against infection
    - Evaluate compliance with the use of personal protection
    - Evaluate facility environmental controls and maintenance practices, and determine their effectiveness
    - Establish what monitoring plan for the applied IC intervention has been implemented at each of the critical control points
7) Identify and recommend corrective action.

5.2.1 Planning the risk assessment of a facility.

A risk assessment should be carried out in all facilities identified by the District Infection Prevention and Control Committees. District Infection Prevention and Control Committees should submit their risk assessment and management plans to Provincial Infection Prevention and Control Committees.

In clinics, community health centers and gateway clinics, there are a number of areas where the risk of TB transmission to HCWs and patients may be high. Special consideration should be given to reducing nosocomial transmission and cross infection in such settings.

At the district and regional and referral hospitals, the risk TB transmission should be evaluated for the entire hospital with specific focus on areas within the facility where TB patients might receive care such as examination rooms, medical wards, X-ray Department, emergency room and sputum collection areas.

5.2.2 Assemble a risk assessment team

Ideally a multi-disciplinary team should be assembled and trained to undertake the risk assessments. The team should have a person who can measure or validate the functions and performance of the building and determine what building systems are required to minimise the risk of transmission. The presence of administrative staff may assist in resolving issues related to administrative control decisions such as staff needs, space utilisation and financing. The functions and responsibilities of the identified members of the assessment team should include:

- Facility administrators and facility managers
- Infection control personnel, risk-management personnel and microbiologist.
- Occupational Health and Safety personnel,
- Architectural, engineering and maintenance personnel

5.2.3 Establish procedures for the risk assessment.

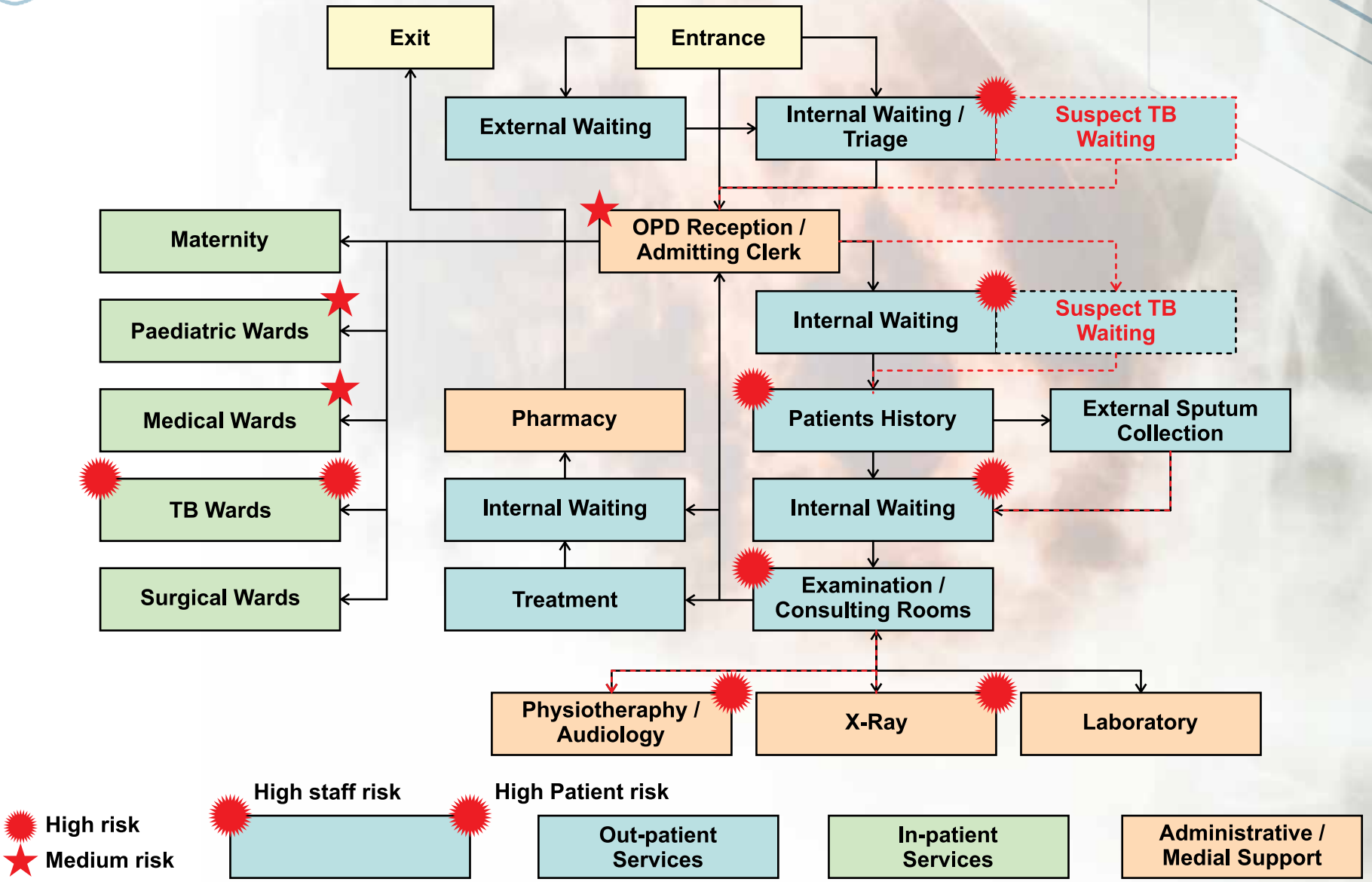
The objectives of the team should be to:

1) Undertake a facility risk assessment utilising the techniques of "root cause analysis", or hazard analysis and control (HACCP).
2) Identify the critical control points where above normal risk of nosocomial transmission or cross-infection exist and special precautions need to be taken.
3) Evaluate the management of the infection control plan in a facility in order to reduce risk against infection
4) Review the existing infection control plan with respect to relevant control protocols in terms of the guidelines.
5) Evaluate compliance with personal protection practices in terms of the guidelines.
6) Evaluate facility engineering controls and maintenance practices, to determine their effectiveness in reducing or preventing the likelihood of infection transmission within the facility.

5.2.4 Conduct the Hazard Analysis and Critical Control Point (HACCP)

By following the patient referral pathway through the health facility the multi-disciplinary assessment team can determine the areas within the facility where there is an above normal risk of cross-infection and where special precautions need to be taken. The recommended methodology is the Hazard Analysis and Critical Control Point (HACCP), illustrated in the example below (Figure 1).

Figure 1: Patient flow in District Hospital with specific reference to TB and suspect drug-resistant TB patients and identification of risk areas (Abbott GR, Parsons SA, CSIR, 2008).



By using the HACCP process, the Critical Control Points in the Hospital are identified and are then listed in Section 9 of the *Administration Controls form (RA ADM-1 Hospitals)*. These points should be plotted onto a facility plan as indicated in Figure 1. Detailed assessments of the critical control points must then be undertaken to systematically ascertain whether the specific control measures, that could be applied to prevent, eliminate or reduce the hazard, are being implemented in these critical control points.

A risk assessment form for Environmental Controls *(RA EC-Hospitals) and Personal Protection Equipment (RA PPE-Hospitals)* must be completed for each CCP identified.

5.2.5 Utilising the risk assessment questionnaire and reporting methodology.

A risk assessment questionnaire is to be completed for each of the areas identified as CCP's. The report on the identified risks (if any), should provide the location where a risk was identified and the control measures recommended. The identified risks, must be classified as follows:

1) **Administrative (A):** These are risk items that can be addressed by an administrative process.
2) **Transient Environmental (T):** These are risk items that indicate shortcomings in environmental controls. It may however be classified as a transient environmental infection control problem in that the risk can be addressed via an administrative process.
   The risk may be reduced by perhaps relocating the procedure to another location where adequate environmental control is achieved, or by ensuring that a protocol is followed, such as an open window policy.
3) **Fundamental Environmental (F):** These are risks that have been identified due to the absence of required environmental controls. As these desired controls will have financial resources or might be disruptive to the service provision, the lack of controls identified in this category are fundamental in nature and are therefore critical, needing urgent attention.

   The resolution to this identified risk will require changes to the service procedure, modifications to the building, and/or installation of ventilation equipment.

5.2.6 Recommend corrective action to the TB Infection Control Plan for the facility.

As the Provincial Infection Prevention and Control Committee should monitor the implementation of the risk management plans, a standardised reporting system should be developed to enable the district, provincial and national structures to extract instant data on the outcomes of each of the assessments, with recommended corrective action by the assessment team.

5.2.7 Periodic risk assessments

Periodic assessments must be conducted annually to ensure;

- proper implementation of the TB IPC plan,
- ongoing HCW training and education regarding TB and facility TB IPC plan.
- prompt detection and evaluation of people with TB symptoms,
- prompt initiation of precautionary measures for confirmed or unconfirmed TB patients
- recommended medical management of patients with suspected or confirmed TB disease
- functional environmental controls,
- implementation of the respiratory protection measures

6. TB INFECTION PREVENTION AND CONTROL PLAN

Every facility must have a written TB IPC plan based on the risk assessment conducted. The plan must contain information about how the facility;

1) Defines employees who at high risk of occupational TB exposure
2) Identifies suspected TB cases
3) Isolates or controls exposures when a suspected or confirmed TB patient is identified
4) Minimises the risk of exposure for employees
5) Alerts the employees to hazards
6) Screens employees for TB
7) Uses environmental controls to reduce risk of exposure
8) Maintains environmental control
9) Uses respiratory protection
10) Trains employees on TB
11) Monitors the implementation of the facility TB IPC

6.1 Level of risk

The TB ICP must document the risk level and the practice at the facility. Examples shown below;

- This clinic has been assessed as a medium-risk facility for M. tuberculosis trans¬mission. All patients will be screened for TB and those with symptoms tested for TB
- This clinic has been assessed as a high-risk facility for M tuberculosis transmission. All patients will be screened for TB and those with symptoms tested for TB

6.2 Employees at high risk of occupational TB exposure

- Identify all employees that are in close contact with the patients with infectious TB and therefore at risk for TB exposure. These may include administration clerks, cleaners/ housekeeping, counsellors, maintenance / engineering, nurses (all categories), doctors, radiographers, community health workers, contracted workers and security guards who spend time in the clinic.
- Outline how TB education, screening will be provided for all staff categories.

6.3 Work Practice Controls

1) Define the patients who are at high risk of acquiring TB who should be screened for TB in the facility.
2) Outline the process for identifying suspected or confirmed infectious TB patients on entry in the clinic
3) Assign responsibility for TB screening, testing and triaging
4) Outline which patients should wear a surgical mask during their stay in the facility.
5) Identify which waiting rooms/ wards are designated for isolation of people with suspected or confirmed in¬fectious TB. See example below;
6) WARD 3 has been designated for isolation of persons with suspected or known infectious TB. A sign will be placed to alert staff to use proper respiratory precautions when entering the ward.
7) Describe how a patient with suspected or confirmed infectious TB who needs other medical tests or investigations will be fast tracked to the other departments.
8) For example, a patient suspected of having infectious TB who needs a chest x-ray will have to be given a mask and escorted to the x-ray department to ensure that they do not wait in the queues or get lost on their way there. The x-ray department will have to be notified before to enable them to prepare or an appointment made when the Department is not busy for admitted patients.
9) Tissues or surgical masks must be readily available for patients throughout the facility. Posters and pamphlets available in all waiting areas to educate patients about cough hygiene.
10) Nurses and administration staff must be trained on cough hygiene

11) Health education talks must be provided to patients on cough hygiene and use of tissues/ masks to prevent spreading TB infection.
12) Outline how patients with suspected or confirmed infectious TB will be handled and transported when transferred to another facility.

6.4 Employee Education

1) Training for all staff on TB prevention and facility plans annually. Training must also be offered to all new employees upon employment.
2) Identify the person responsible for training of all staff
3) A record of all people trained must be kept
   - These records must include the topic covered in the training, name of the trainer, employee name, position, department, and date of training.
   - Employee must sign attendance registers for such training
   - The records should be kept for at least one year.
4) The following topics maybe considered for inclusion in the training programme:
   - The facility IPC plan and where to obtain a copy if desired
   - Groups at risk for occupational TB
   - Modes of TB transmission
   - Symptoms of TB
   - TB screening and TB treatment and TB preventive therapy
   - MDR TB
   - Employer and employee responsibilities (Occupational Health and Safety Act)
   - Use and limitations of methods that will prevent TB transmission, including administra¬tive and work-practice controls, environmental controls, and respiratory protection
   - Fit testing, reuse and disposal of respirators

6.5 Environmental Controls

1) Describe the facility's ventilation system.
2) List the type of ventilation used for each room and or wards in the facility
3) Add any additional items that may be in place at your facility.
4) Outline additional measures that should be used in high risk areas such sputum collection room/ area
5) Indicate the name of the person responsible for the maintenance and monitoring of IC equipment used in the facility

6.6 Respiratory Protection

1) If the facility uses respiratory protection, the areas where they must be used should be clearly listed in the plan
2) Indicate the type of respirators used
3) Identify the person responsible for fit testing
4) Outline how and where the respirator masks should be stored
5) Outline the often respirator masks maybe re used and how to dispose them
6) Outline alternatives for individuals unable to use a res¬pirator
7) Employee training on the use of respirators

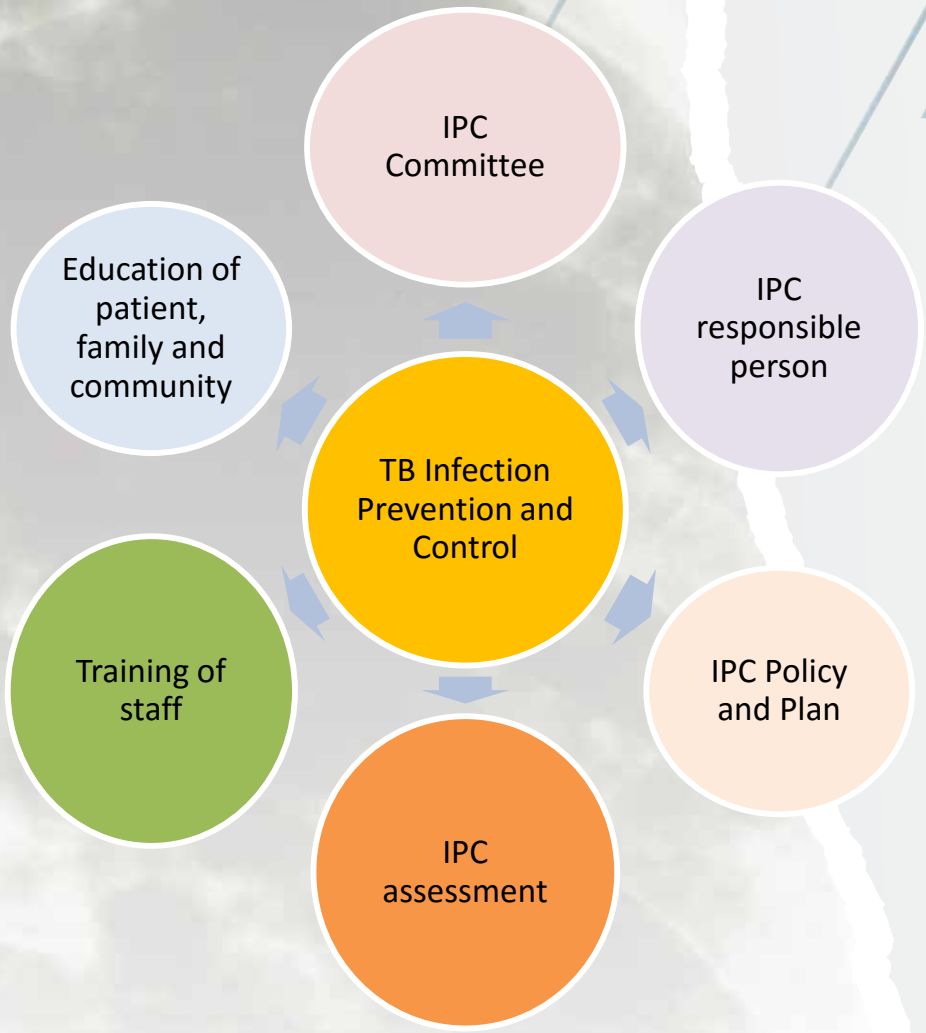
6.7 Determine the frequency of the infection prevention and control plan evaluation.

a. During initiation of procedures, monitoring and evaluation should be done frequently, perhaps monthly or bi-monthly.
b. When procedures are running well, less frequent evaluation will be necessary – at a minimum, annually.

6.8 Evaluation

1) Identify the person responsible for evaluating the ICP
2) Revise the TB IPCP to reflect changes in staff responsibilities, policies, and procedures.
3) Develop a plan for correcting inappropriate practices or failure to adhere to the plan

Key aspects of TB Prevention and Control measures



Hierarchy of TB Control

- **The first and most important level** of a TB infection control program is the use of administrative measures to reduce the risk for exposure to persons who might have TB disease
- **The second level** of hierarchy is the use of environmental controls to prevent the spread and reduce the concentration of droplet nuclei.
- Respiratory-protection control is **the third level** of a TB infection control program and consists of the use of protective equipment in situations that pose a high risk for exposure to TB disease.

7. MONITORING AND EVALUATION

Ongoing tracking and periodic evaluation of performance of the TB IPC programme is required at every level. The effectiveness of the national IPC programme and implementation plan should be monitored and evaluated with a clear set of indicators and methodology in order to provide the data needed to guide the planning, coordination, implementation and identify areas for program improvement. Monitoring the results of IPC program will allow health facilities to determine if the IPC measures being implemented are working well or if changes are required to achieve better results.

7.1 Purpose of monitoring and evaluation

The purpose of TB infection control M&E is to measure the effectiveness of the TB IPC plan and progress towards optimising the infection control measures at all levels.

7.2 Core indicators for monitoring TB IPC

In order to clearly conceptualize the effectiveness of the IPC plans and the performance of IPC programme, there is a need to identify core indicators. A minimum set of indicators to measure the performance at every level ideally must include input, processes, output as well as the desired outcomes and impact. The established trends should be used to strengthen the risk assessment report and inform the infection prevention and control plan.

The following set of core indicators should be used to monitor the performance of IPC interventions at all levels.

Table 3: Core indicators for TB Infection Prevention and Control

No	Indicator	Definition	Indicator type
1	Proportion of health care facilities or congregated settings with written IPC Plan	Number of health care facilities or congregated settings with IPC plan	Process
2	Percentage of health care workers trained in infection prevention and control.	Number of health care workers trained in Infection prevention and control.	Process
3	Proportion of health care facilities or congregated settings conducting surveillance of TB disease.	Number of health facilities or congregated settings conducting surveillance of TB disease.	Process
4	Proportion of HCWs diagnosed with TB in health facilities and congregated settings.	Number of HCWs in health facilities and congregated settings diagnosed with TB expressed as a proportion of HCWs diagnosed with TB out of the total number of HCWs. This is to assess the risk of TB infection among Health Care Workers.	Impact

8. HOUSEHOLD INFECTION PREVENTION AND CONTROL

Patients who have confirmed infectious TB disease are frequently sent home after starting initiation of treatment, even though they are still infectious. At the time of diagnosis they have most likely transmitted infection to household members. Therefore steps must be taken to prevent further spread of infection at home and to screen all household contacts for TB disease or infection. Community health care workers who provide services in the patient's homes must be trained on the following;

- educating patients regarding the importance of reporting symptoms or signs of TB disease early and the importance of reporting any adverse effects to treatment
- counselling of patients on treatment adherence
- administering DOT and providing support to the patient
- precautions to be taken when collecting sputum
- educate the patient and family members on cough hygiene and importance of ventilation
- the importance of using N95 masks when entering a home/ room of a person with confirmed or suspected infectious TB
- the importance of undergoing routine medical screening for TB disease and screening for risk factors

8.1 Administrative controls

Ensure treatment compliance at home: Care and support must be provided to the patient by community health workers.

Screen all close contacts for TB symptoms: people who are symptomatic must be investigated for TB, children less than 5 years and all people living with HIV in the household must be offered IPT.

Education: Educate patients, family members, care providers, and close contacts on the importance of isolation and infection control measures to be implemented at home.

Hospital isolation: Patients with confirmed infectious TB disease and family support or homeless must be admitted and isolated in the hospital. This will ensure that risk of infecting others is minimised and treatment compliance.

8.2 Environmental controls

Windows and doors must be kept open (weather permitting) to increase the ventilation and dilution of infectious droplet nuclei in the house. If a sputum sample needs to be collected at home, this must be done in a well-ventilated preferably outside.

8.3 Personal protective equipment

Patient: Mask

Patients do not need to wear masks at home once they are on adequate treatment (after two weeks of appropriate treatment). Give patients surgical masks and advise them to wear them at home if necessary, during transportation and medical consultations until they are no longer infectious.

Healthcare Worker: Respirator

Healthcare workers should wear respirators when entering the home of a patient with infectious TB disease or when transporting a patient with infectious TB. The respirators should be NIOSH-approved (N-95 or higher) or E.U. specified filtering face piece FFP2. Healthcare workers should be provided with respirators after appropriate education and testing.

Table 9.1: TB Infection control measures in the home environment

STEPS TO BE TAKEN BY PATIENTS TO PREVENT TRANSMISSION OF TB IN THE HOME.	PRECAUTIONARY MEASURES FOR HEALTH-CARE WORKERS
Cover their mouth and nose when coughing or sneezing	Instruct patients to cover their mouth and nose with a tissue when coughing or sneezing
Where possible, sleep alone and not in a room with other household members	Wear a respirator when visiting the home of a patient with infectious TB disease or when transporting a patient with infectious TB disease in a vehicle
Refrain from having visitors in the home until they are noninfectious.	Collect specimens in a well-ventilated area, away from other household members

ANNEXURES

Annexure A: References

Annexure B: PHC Risk Assessment Tool
Administrative Controls
Environmental controls
Personal Protection Equipment

Annexure C: Hospital Risk Assessment Tool

Annexure D: Report Template For Facility TB Risk Assessment

ANNEXURE A: REFERENCES

1. World Health Organization. Guidelines for the Prevention of Tuberculosis in Health Care Facilities in Resource-Limited Settings. Geneva, World Health Organization, 1999.

2. World Health Organisation. Policy on TB Infection Control in Health-Care Facilities, Congregate Settings and households. Geneva, World Health Organisation, 2009

3. Nachega J et al. Tuberculosis active case finding in a mother-to-child HIV transmission Prevention programme in Soweto, South Africa. *AIDS*, 2003, 17:1398-1400.

4. Burgess A et al. Integration of tuberculosis screening at an HIV voluntary counselling and testing centre in Haiti. *AIDS*, 2001, 15:1875-1879.

5. Corbett E et al. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. *Archives of Internal Medicine*, 2003, 163:1009-1021.

6. Centers for Disease Control and Prevention. Multi-drug resistant Tuberculosis outbreak on an HIV ward – Madrid, Spain, 1991-1993. *Morbidity and Mortality Report*, 1996, 44:330.

7. World Health Organization. Preventive therapy against tuberculosis in people living with HIV. *Weekly Epidemiological Record*, 1999, 46:385-397.

8. Strategic framework to decrease the burden of TB/HIV, Geneva, World Health Organization, 2002. *http://www.who.int/docstore/gtb/publications/tb_hiv/2002_296/pdf/tb_hiv_2002_296en.pdf*

9. Francis J. Curry National Tuberculosis Center, Institutional Consultation Services. A guideline for establishing effective practices: Identifying persons with infectious TB in the emergency department. 1998

10. Francis J. Curry National Tuberculosis Center, Institutional Consultation Services, and California Department of Health Services. TB in Homeless Shelters: Reducing the Risk through Ventilation, Filters, and UV. 2000.

11. Talbolt EA, Jensen P, Moffat HJ, Wells CD. Occupational risk from ultraviolet germicidal irradiation (UVGI) lamps. Int J Tuberc Lung Dis. 2002;6(8):738-41.

12. Nardell EA, Bucher SJ, Brickner PW, Wang C, Vincent RL, Becan-McBride K. Safety of upper-room ultraviolet germicidal air disinfection for room occupants: results from the Tuberculosis Ultraviolet Shelter Study. Public Health Rep. 2008;123(1):52-60.

13. Talbot EA, Jensen P, Moffat HJ, Wells CD. Occupational risk from ultraviolet germicidal irradiation (UVGI) lamps. Int J Tuberc Lung Dis. 2002;6(8):738-41.

ANNEXURE B: PHC RISK ASSESSMENT TOOL

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

TUBERCULOSIS INFECTION PREVENTION AND CONTROL RISK ASSESSMENT FORM FOR CLINICS AND COMMUNITY HEALTH CENTERS

FACILITY DATA SHEET

Facility Identification	
Facility Name:	
Facility Type:	
Physical Address	
Building Name:	
Street Number:	
Street Name:	
Suburb:	
Town/City:	
Location	
Province:	
District:	
Local Authority:	
Information Source / Lead facility representative	
Name:	
Designation:	
Contact Numbers:	
Email Address:	
Data Control	
Lead Assessors Name:	
Designation:	
Contact Numbers:	
Email:	
Assessment Date:	

ADMINISTRATIVE CONTROLS

Section 1: Facility Staff Details

Facility Staff Complement	

Section 2: Facility Patient Access / Occupancy Data

Patient Visits *per* Quarter (Number of Patients):						Year:	
First Quarter		**Second Quarter**		**Third Quarter**		**Fourth Quarter**	
Total visits (all):		Total visits (all):		Total visits (all):		Total visits (all):	
No: screened		No: screened		No: screened		No: screened	
No: TB suspects		No: TB suspects		No: TB suspects		No: TB suspects	
New Susceptible TB		New Susceptible TB		New Susceptible TB		New Susceptible TB	
Total SusceptibleTB		Total SusceptibleTB		Total Susceptible TB		Total SusceptibleTB	
New Drug Resistant TB		New Drug Resistant TB		New Drug Resistant TB		New Drug Resistant TB	
Total Drug Resistant -TB		Total Drug Resistant -TB		Total Drug Resistant -TB		Total Drug Resistant -TB	

Section 3: Staff Screening for TB

3.1. Is there a TB screening programme in place for facility staff?	Yes	No	
3.2. Are base-line chest X-rays undertaken for facility staff?	Yes	No	
3.3. Is sputum collected for all identified facility staff?	Yes	No	
3.4 Is completing a screening questionnaire part of the program?	Yes	No	
3.5. How frequently are the facility staff screened?	Every		Months

Section 4: TB among Staff

4.1.1. How many staff members have been diagnosed with TB in the past 12 months?		
4.1.2. How many staff members have been diagnosed with TB in the past 3 years?		
4.1.3 Did you submit occupational illness report(s) to the compensation commission?	Yes	No
4.1.4. Have you investigated the case(s) of occupational illness & took corrective actions?	Yes	No
4.1.5. Do you have access to occupational health services and advice?	Yes	No
4.1.6. Are you aware of support services available to help you with staff health matters?	Yes	No

Section 5: Management of Infection Control (IC) Program

5.1. TB Infection Control Policy

5.1.1. Is there a facility-specific infection control policy for airborne infections?	Yes	No
5.1.2. Do (all) staff have access to the infection control policy?	Yes	No
5.1.3 Are the HCWs being routinely trained on TB IC practices and requirements?	Yes	No
5.1.4. Is there someone appointed in writing to be in-charge of infection control?	Yes	No
5.1.5. Is there a functional infection control committee?	Yes	No
5.1.6. Are the infection control committee members appointed in writing?	Yes	No

5.2. Is the IC Policy supported by an IC Plan that allows implementation of the following?

5.2.1. Screening of all patients arriving at the hospital?	Yes	No
5.2.2. Separation of patients with suspected or confirmed TB disease?	Yes	No
5.2.3. Fast-tracking of patients with suspected or confirmed TB disease?	Yes	No
5.2.4. Appointment of person(s) to assist in triaging & fast-tracking suspects?	Yes	No
5.2.5. Provision of surgical masks to patients?	Yes	No
5.2.6. Health education and cough etiquette?	Yes	No
5.2.7. Inclusion of respiratory protection programme?	Yes	No
5.2.8. Inclusion of an open window policy (If not relying fully on mechanical ventilation)?	Yes	No
5.2.9. Appointment of open window marshals with access to “open window registers”?	Yes	No
5.2.10. Integration of TB screening with HCT and TB/HIV in general?	Yes	No
5.2.11. Conducting a TB risk assessment frequently or updating one for the hospital?	Yes	No
5.2.12. If yes, when was the last assessment undertaken?	Date	

Comments:

Section 6: Turn-Around Times (Average number of days it takes for the following)

6.1. Collection of patient sputum until laboratory test results are returned to the facility?		Days
6.2. Time between receipt of tests until initiation of anti-tuberculosis treatment?		Days
6.3. Time taken by laboratory to provide outcome of culture results		Days

Comments:

Section 7: Additional Comments

Comments:

Section 8: Summary of Recommendations

Comments:

ENVIRONMENTAL CONTROLS

Section 1: Sputum Collection

1.1. Where is sputum collection undertaken? (Tick all that apply)	
1.2. An inside room or other (toilet, consulting room, ward etc.)	
1.3. Designated, purpose made outside area for sputum induction	
1.4. No designated area (outside etc.) – Just an open space	
1.5. Local exhaust ventilation booth	

Comments:

Section 2: Natural Ventilation

2.1. If facility relies on natural ventilation, are the spaces open directly to the outside?	Yes	No
2.2. If naturally ventilated, are all openable windows always open?	Yes	No
2.3. Does the facility have "open window stickers and register"?	Yes	No

Comments:

Section 3: Mechanical Ventilation (Where applicable)

3.1. Are air changes per hour measured in this facility or unit?	Yes	No
3.2. Are any of the air changes per hour measured below 12 ACH?	Yes	No
3.3. Are ventilation systems regularly checked, maintained&maintenance logbook kept?	Yes	No
3.4. Are these results readily available?	Yes	No

Comments:

Section 4: Air Disinfecting Systems by Upper Room UVGI (Where applicable)

4.1. Were the UVGI units installed using an electrical engineer? (if by supplier state No).	Yes	No
4.2. Were the UVGI units validated for operation by an independent authority?	Yes	No
4.3. Are the UVGI units regularly checked and maintained?	Yes	No
4.4. Are each of the UVGI unit performance results recorded in maintenance logs?	Yes	No
4.5. Has the staff been trained to ensure safe operation of the UVGI Units?	Yes	No

Comments:

Section 5: Additional Comments

Comments:

Section 6: Summary of Recommendations

Comments:

PERSONAL PROTECTION EQUIPMENT

Section 1: Respiratory Protection Program (RPP)

1.1. Does the facility has a respiratory protection program (RPP)	Yes	No
1.2. Are respirators used in this setting for all health-care workers who may be at risk?	Yes	No
1.3. If YES, specify manufacturer, model and specific application below.		

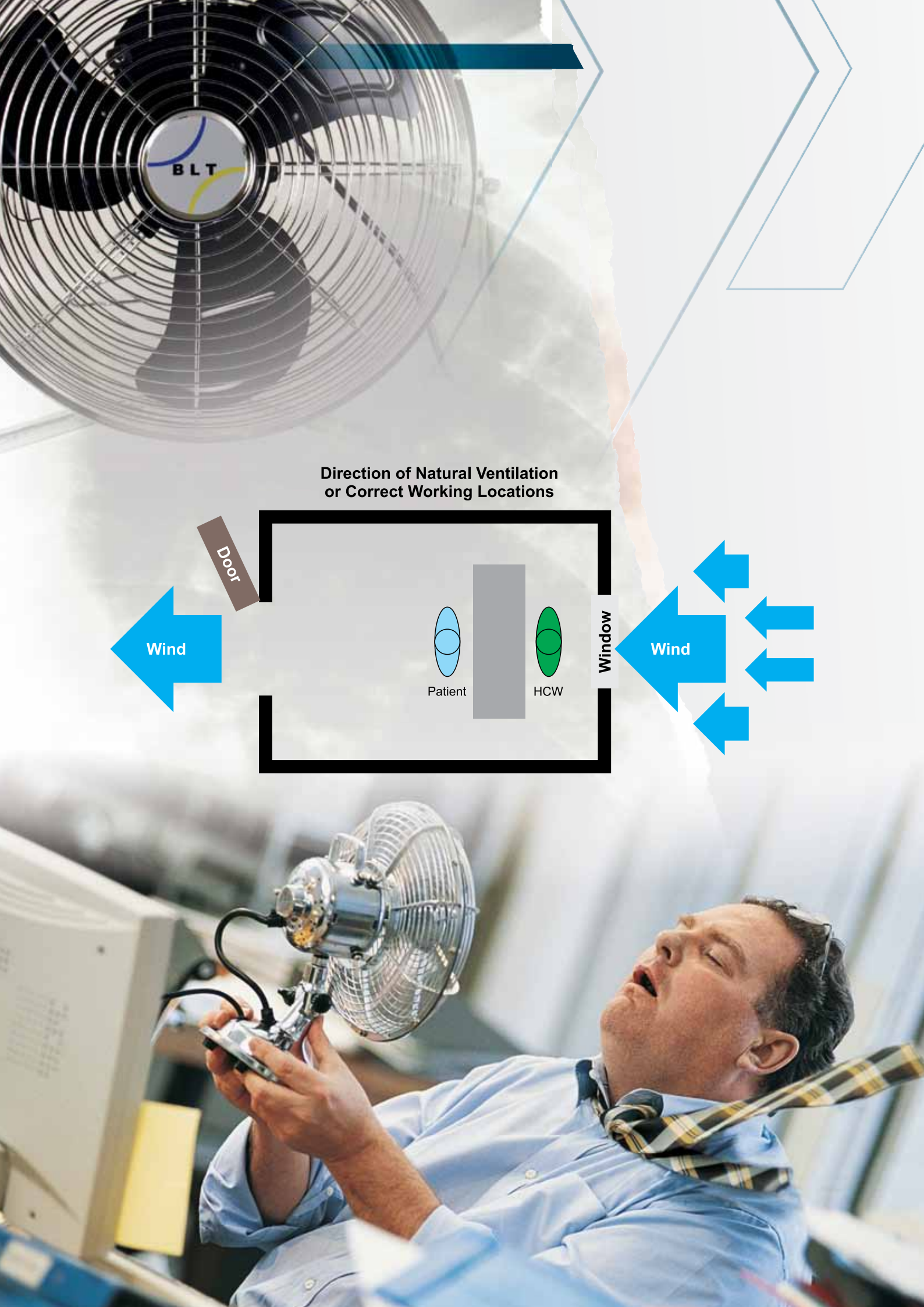
Manufacturer:	
Class: (NIOSH - N95 or CEN-FFP2)	
Serial Number (e.g. TC number for NIOSH approved respirators)	
Describe the practice and method of respirator donning, use and storing:	

1.4. Is respiratory-protection training conducted for HCWs?	Yes	No
1.5. If YES, is it conducted every six months?	Yes	No
1.6. After direct observation of selected staff, can they perform fit-checking?	Yes	No
1.7. Have the relevant health-care workers undergone fit-testing for respirator use?	Yes	No

Comments:

Section 2: Summary of Recommendations

Comments:


Direction of Natural Ventilation
or Correct Working Locations
Door
Wind
Patient
HCW
Window
Wind

ANNEXURE C: HOSPITAL RISK ASSESSMENT TOOLS

HOSPITAL DATA SHEET

Risk assessment form No.: RA HOSPITAL D-1

Facility Identification

Facility no. E C | Alternate Facility no.

Hospital Name

Previous Name

Facility Type | Active / Inactive

Geographic Location

GPS Position Latitude (S) - . | Longitude (E) .

Local Authority

Physcial Address

Building no. | Building Name

Street no. | Street Name

Suburb

Town / City | Street Code

Postal Address

As physical address | Box no | Private Bag

Suburb | Postal Code

Responsibility

Provincial DoH

District

Local Authority

Phone no. | Cell no.

email

Information Source

Name

Designation | Cell no.

Data Control

Assessor name | Assessment date 2 0 0

Quality controller | Quality control date 2 0 0

Data capturer | Data capture date 2 0 0

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An assessment method and management tool for TB exposure at South African healthcare settings

Administration controls

Risk assessment form No.: RA ADM-1 Hospitals

V2 June, 2009

A. Facility / Building Identification

Facility name

Section 1. Hospital staff details

Number of staff per day shift (F = full time, S = Sessional):

Professional Nurses	F	S	Trainees and students	F	S	Receptionists	F	S
Medical Offices	F	S	Physio therapists	F	S	Maintenance staff	F	S
Nursing assistants	F	S	Cleaning staff	F	S			
Administrators	F	S	Volunteers	F	S			

Other (specify)_____

Section 2. Facility patient access / Occupancy data

Year 2 0

Drug Susceptible TB patient visits? (No. of patients):

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Total visits for previous year	0	0	0	0
Average daily visits	0	0	0	0
Peak daily visits	0	0	0	0
Defaulters per month (ave)?	0	0	0	0

Multi (Extreme) Drug Resistant TB patient visits? (No. of patients)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
MDR-TB suspects	0	0	0	0
Cases confirmed during quarter	0	0	0	0
Refered cases transferred	0	0	0	0
Home care MDR-TB cases	0	0	0	0

Section 3. Does evidence exist of patient-to-staff transmission of *M.tuberculosis* ?

Number of staff tested positive (N = number, Y/Q = Year and quarter):

Year 2 0

Professional Nurses	N	Y/Q	Trainees and students	N	Y/Q	Receptionists	N	Y/Q
Medical Offices	N	Y/Q	Physio therapists	N	Y/Q	Maintenance staff	N	Y/Q
Nursing assistants	N	Y/Q	Cleaning staff	N	Y/Q			
Administrators	N	Y/Q	Volunteers	N	Y/Q			

Other (specify)_____ N Y/Q

Section 4. Airborne Infection Control plan

Is there a facility-specific infection control policy for airborne infections (i.e. *M.tuberculosis*)?	Yes ☐	No	A
Is there someone In charge of TB infection control at the facility?	Yes ☐	No	T
Do (all) staff have access to the infection control policy?	Yes ☐	No	T
Are they written with facility-specific standard operating procedures (S.O.P's) in mind?	Yes ☐	No	T
Are the HCWs being routinely trained on TB infection control practices and requirements of the SOP's?	Yes ☐	No	T
Are the patients being routinely trained on TB infection control practices and requirements of the SOP's?	Yes ☐	No	T

Section 4.1 Does the infection control plan allow for the following?:

* Screening of all patients arriving at the hospital?	Yes ☐	No	T
*Early detection?	Yes ☐	No	T
*Screening of patients with suspected or confirmed TB disease?	Yes ☐	No	T
*Separation of patients with suspected or confirmed TB disease?	Yes ☐	No	T
*Early detection and treatment of indentified TB patients?	Yes ☐	No	T
Is the infection control plan being properly implemented?	Yes ☐	No	A

Section 5. Evidence of cross infection of *M.tuberculosis* in facility?

Does evidence exist of patient - to - patient transmission of *M.tuberculosis*?	Yes A	No	☐
Is there a high incidence of immunocomprimised patients or HCWs in the facility?	Yes A	No	☐

Section 5.1. What is the average number of days for the following:

Identifying patient with possible TB until collection of specimen?	☐☐ Days
Collection of patient sputum until laboratory smear test results are sent to the hospital?	☐☐ Days
Time between receipt of smear tests until initiation of standard anti-tuberculosis treatment?	☐☐ Days
Time taken by laboratory to provide clinic outcome of culture diagnosis?	☐☐ Days
Time taken for admission of drug resistant patient to referral MDR-TB facility?	☐☐ Days

Is there a concern that the days taken for any of the above are to long? Yes T No ☐

Section 6. Screening for facility staff for *M. tuberculosis*:

Is there a TB screening programme in place for facility staff?	Yes ☐	No	A
Are base-line chest X-rays undertaken for facility staff?	Yes ☐	No	A
How frequently are the facility staff screened?	Every ☐☐	Months	

If YES, which of the facility staff are included in the TB screening programme? (Tick all that apply)

Professional Nurses ☐	Trainees and students ☐	Receptionists ☐
Medical Offices ☐	Physio therapists ☐	Maintenance staff ☐
Nursing assistants ☐	Cleaning staff ☐	
Administrators ☐	Volunteers ☐	

Other (specify)_____

All staff at the clinic_____

Does the TB screening programme for facility staff require urgent attention/review? Yes A No ☐

Section 7. Management of Infection Control and environmental controls:

Is the person responsible for the facilities Infection Control plan supported by a representative from the Sub-district?	Yes		No	T					
If yes, is the assistance by a qualified environmental health / Occupational Health practitioner/engineer	Yes		No	T					
Is a TB risk assessment conducted frequently or updated for the hospital?	Yes		No	T					
When was the last assessment undertaken?					2	0			
Did the administrative controls need to be revised as a result of the last TB risk assessment?	Yes	A	No						

What problems were identified during the previous TB risk assessment?

Comment:

What actions were taken to address problems identified during the previous TB risk assessment?

Comment:

Section 8. Notes from IC assessment related to administration controls

What actions are recommended to address problems identified during this TB risk assessment?

Section 9. HACCP Invesigation

Hazard Analysis date | | | | | 2 | 0 | 0 | |

Previous Hazard Analysis date | | | | | 2 | 0 | 0 | |

HACCP team names		Discipline	
		Discipline	
		Discipline	
		Discipline	

Note* All areas identified as critical control points during the HACCP investigation must be identified below.

Critical areas identified*	No	Hospital functional unit / department name:

Note: An environmental control assesment sheet (RA EC-1 Hospitals) and PPE asssesment sheet (RA PPE-Hospitals) must be completed for each of the above identified critical areas.

Section 10. Summary

Number of critical areas identified by HACCP ____ (*EC and PPE assessment forms for each area to be included in report))

Number of risks related to administrative issues A ____

Number of risks that are transient* T ____ (*Can be resolved by administration intervention)

Risk assessment comments A ____

Risk assessment comments T ____

All risk items identified by A T must be transferred to the risk assessment outcomes form.

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ENVIRONMENTAL CONTROLS

Risk assessment form No.: RA EC-1 Hospitals

V2 June, 2009

Facility / Building Identification

Facility no. E C ____ Building no. B ____

Facility name ____

Department* ____ Department No* ____

Note*: This form, RA EC-1 Hospitlas, must be completed for each hospital area/Department identified as a critical risk point by the HACCP Process.

Section 1. Which environmental controls are in place in the department identified? (Tick all that apply and describe)

	applicable		
Local exhaust ventilation (Sputum collection)	☐	Description of system:	**Go to Section 2.**
Natural ventilation using open window principle (describe)	☐	Description of system:	**Go to Section 3**
General ventilation (e.g. single-pass, supply and exhaust ducted system)	☐	Description of system:	**Go to Section 4**
General ventilation (e.g.exhaust only ducted system)	T	Description of system:	**Go to Section 4**
General ventilation (e.g. individual fan exhaust only system)	T	Description of system:	**Go to Section 4**
Air-disinfecting system (e.g. ultra-violet germicidal irradiation (UVGI))	☐	Description of system:	**Go to Section 5**
Other (e.g. describe)	☐	Description of system:	**Go to Section 6**
None	F	Comment:	

Section 2: Sputum Collection

Where is sputum collection undertaken in your unit? (Tick all that apply)

designated outside area for sptum induction ☐ an inside room or other (toilet etc.) T A purpose built booth ☐

No possible solution (outside etc.) F

Other (specify) _____

Comments: ____

Should any comment be noted as risk? No ☐ Comment: ____

Yes T or F

Section 3: Natural Ventilation:

If department relies on naturally ventilation, are the spaces open directly to the outside?	Yes		No	F
Is the "open window area" for each of the spces greater than 15 to 20%	Yes		No	F
If naturally ventilated, are the windows permanently open?	Yes		No	T
If naturally ventilated, is there a open windows policy?	Yes		No	A
Does the facility have "open window stickers"?	Yes		No	A

Comments: (Provide comment if air flow is possible to and from "clean" and "contaminated" areas?)

Possible?: Yes ☐ No A or T or F

Section 4: Artificial Ventilation:

Are air change hours measured in this department (functional unit)?	Yes		No	T

If YES, what are the actual air changes per hour (ACH) for various rooms in this department (functional unit)?

	ACH	Design
Room _____	0	0
Room _____	0	0
Room _____	0	0
Room _____	0	0
Room _____	0	0
Room _____	0	0
Room _____	0	0
Room _____	0	0
Room _____	0	0
Room _____	0	0

Are any of the air changes per hour measured below 6 ACH?	Yes	F	No	
Do these systems provide controlled air flow (pressure cascadingfrom clean to contaminated areas)?	Yes		No	F
Do any of the systems result in the exhaust air passing over patients or HCW's?	Yes	F	No	
Are the environmental controls regularly checked and maintained and maintenance logbook kept?	Yes		No	T
Is the directional airflow checked daily when in use with smoke tubes or visual checks?	Yes		No	T
Are these results readily available?	Yes		No	T

Comments: T or F

Section 5: Air disinfecting systems (Upper room UVGI etc.):

Where the UVGI units installed using an electrical engineer? (if by supplier state No).	Yes		No	F
Where the UVGI units installed and validated for operation by an idependent authority?	Yes		No	F
Are the UVGI units regularly checked and maintained ?	Yes		No	T
Are the each of the UVGI unit perfmance results recorded in maintenance logs?	Yes		No	T
Have the maintenance staff been trained to ensure safe operation of the UVGI Units?	Yes		No	T

Comments: T or F

Section 6: Other technologies utilised as IC environmental controls:

Describe:

Was the technology installed using a qualified engineer?	Yes		No	F
Was the technology installed and validated for operation by an idependent authority?	Yes		No	F
Is the Technology regularly checked and maintained ?	Yes		No	T
Are performance results recorded in maintenance logs?	Yes		No	T
Have the maintenance staff been trained to ensure safe operation of the Technology?	Yes		No	T

Comments: T or F

Section 7: General

Does the sub-district / district or provence, employ an environmental health / Occupational Health practioner/engineer (or other professional with appropriate building expertise), to assist the facility with all matters related to the installation/maintenance/performance of environmental controls? Yes ☐ No T

If Yes, specify:
(e.g. Professional engineer or Environmental / Occupational Health practioner etc.)

If YES, indicate which of the following services are provided :

specification ☐ Installation ☐ Maintenance ☐ Validation of operation ☐

Number of risks related to administrative issues A ☐

Number of risks that are transient* T ☐ (*Can be resolved by admininistration intervention)

Number of risks that are fundamental* F ☐ (*Cannot be resolved by admininistration intervention)

Risk assessment comments A

Risk assessment comments T

Risk assessment comments F

All risk items identified by A T F must be transferred to the risk assessment outcomes form.

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PERSONAL PROTECTION EQUIPMENT

Risk assessment form No.: **RA PPE-Hospitals**

V2 June, 2009

Respiratory protection programme

Facility / Building Identification

Facility no. E C ☐☐☐☐ Building no. B ☐☐

Facility name ☐☐☐☐☐☐☐☐☐☐☐☐

Department Name* ☐☐☐☐☐☐☐☐☐☐☐☐ Department No* ☐

Note*: This form, RA PPE-1 Hospitlas, must be completed for each hospital area/department identified as a critical risk point by the HACCP Process.

Does the health-care setting have a respiratory-protection programme? Yes ☐ No A

If YES, which health-care workers are included in the respiratory-protection programme? (Tick all that apply)

Professional Nurses ☐	Trainees and students ☐	Volunteers ☐	Construction staff ☐
Medical Offices ☐	Laboratory workers ☐	Contract staff ☐	Transportation staff ☐
Nursing assistants ☐	Respiratory therapists ☐	Cleaning staff ☐	Dietary staff ☐
Administrators ☐	Physical therapists ☐	Maintenance / engineering staff ☐	Receptionists ☐

Other (specify): _____ ☐

Are any of the above identified who are present at the facility not included in the programme? Yes ☐ No T

Are respirators used in this setting for all health-care workers working with TB patients? Yes ☐ No T

If YES, specify manufacturer, model, and specific application.

Manufacturer	Model:	Application/use/method of saving:
	Make:	
	Class.: (NIOSH - N95 or CEN-FFP2)	

Is respiratory-protection training for HCWs performed by a qualified person? Yes ☐ No T

If YES, is it conducted every six months? Yes ☐ No T

Have the health-care staff in the facility undergone a fit test for respirator use? Yes ☐ No T

If YES, when and how frequently is it conducted? ☐

What method of fit testing is used? Describe: ☐

Number of risks related to administrative issues A ☐

Number of risks that are transient* T ☐ (*Can be resolved by administration intervention)

Risk assessment comments A ☐

Risk assessment comments T ☐

All risk items identified by A T must be transferred to the risk assessment outcomes form.

ANNEXURE D:

REPORT TEMPLATE FOR FACILITY TB RISK ASSESSMENT

Situational analysis with recommended management strategy report

FACILITY TYPE:
NAME OF FACILITY:
DISTRICT:
PROVIENCE:
VERSION AND DATE OF TB POLICY IMPLEMENTATION PLAN:
DATE OF ASSESSMENT:

ATTENDEES:

Risks identified needing addressing:	*A*	*Number of items identified:*
	T	*Number of items identified:*
	F	*Number of items identified:*

Location	Risk type			Situational analysis	Recommended Management Strategy
	A	T	F	*(Risk described, refer to form #)*	*(Recommendations, refer to form #))*

Infection Control Assessment lead: *Name* :_____
Signature :_____
Date :_____