

The Implementation of Effective Tuberculosis Infection Control: The Managerial Role at National and Sub-National Levels

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Tuberculosis (TB) alongside Human Immune Virus (HIV) are currently the leading causes of death worldwide. In 2014 alone, TB killed 1.5 million people (1.3 million HIV negative and 0.4 million HIV positive). The death toll comprise of 890,000 men, 480,000 women and 140,000 children. According to the World Health Organization [1], about 9.6 million people are estimated to have fallen ill with TB in 2014. Among people who have fallen ill with TB in 2014, about 5.4 million were men, 3.2 million women and 1.0 million children. The Global TB report [1] reveals that 6 million new cases of TB were reported to the WHO in 2014. The prevalence of new cases means that the spread of TB is not yet abated. Thus, the sustainable development goal of eliminating TB by 2020 might be difficult to realize. Are we missing the point? The Stop TB Partnership [2] believes that the goal of eliminating TB by 2020 depends on the development of new diagnostic, drugs and vaccines. Yes, new diagnostic tools will accurately diagnose resistance early and provide effective treatment. Yes, vaccines will protect people from getting falling with TB. However, it's like we are missing something very important.

The World TB Day 2016 theme says “Unite to end TB”. This means that over and above developing new diagnostic tools, drugs and vaccines, infection control measures need to be intensified in congregate settings, household and health care facilities. Infection control measures play a very vital role in the elimination of TB. Thus, since World TB Day is a time to reflect on the progress that has been made towards TB elimination, the implementation of TB infection control measures in household, congregate settings as well as health care facilities should also be reflected worldwide. Looks like the world is overlooking this important weapon to eliminate TB. Tshitangano, Maputle and Netshikweta [3] discovered that rural hospitals in South Africa do not have TB Infection Control (**TBIC**) plans; no person was designated as TBIC officer at hospital level; and there was lack of TBIC committee and teams leading to varying Health Care Workers (**HCWs**) practices resulting in TB nosocomial infection transmission. Hence, the development of new TB cases. In addition, Tshitangano [4] revealed that rural hospital in South Africa practice ineffective measures of isolating infectious TB patients. Further revelations by Tshitangano, Maputle and Netshikweta [5] stated that HCWs in rural hospitals generally adopt ineffective measures of TBIC.

The presence of many HIV-infected and immune compromised patients in healthcare and congregate settings and the absence of, or non-adherence to, appropriate TB infection control measures, create a favourable environment for the transmission of TB among hospital patients, HCWs and the community. There is therefore an urgent need to refocus attention on TBIC measures, particularly in high risk settings and to accelerate the scale-up of TBIC activities. Healthcare-associated infections can exact a heavy price, both in terms of human lives and also in resources. Successful infection prevention and control include applying basic infection control strategies, quality management practices, and effective work practices, which avoid transmission of infectious organisms. The WHO Policy on TBIC in Health-Care Facilities, Congregate settings and Households [6,7] outlines effective TB infection control strategies in health care facilities, congregate settings and household. However, effective TB infection control measures should not be viewed as an isolated intervention; rather it is part of general Infection Prevention and Control (**IPC**) and an important part of a TB prevention and treatment package, alongside Isoniazid Preventive Therapy (**IPT**), Intensified TB Case Finding (**ICF**), TB treatment and access to early Anti-Retroviral Therapy (**ART**). All healthcare facilities, both public and private, and all other settings where TB patients or persons suspected of having TB congregate, should implement TBIC measures. This book chapter describes the role of TBIC programme manager in the trio of TBIC in the form of administrative, environmental and respiratory protection controls in healthcare facilities.

THE ADMINISTRATIVE TB INFECTION CONTROL MEASURES INCLUDE

- Promptly identify people with TB symptoms (triage), separate infectious patients, control the spread of pathogens using cough etiquette and respiratory hygiene and minimize time spent in healthcare facilities.

- Provide a package of prevention and care interventions for staff, including HIV prevention, ART and IPT) for HIV-positive staff. The administrative controls include (in addition to the items listed above) reduction of diagnostic delays, use of rapid diagnostic tests, reduction of turnaround time for sputum testing and culture, and prompt initiation of treatment.

ENVIRONMENTAL TB INFECTION CONTROL MEASURES INCLUDE

- Use ventilation systems.
- Use Ultraviolet Germicidal Irradiation (**UVGI**) fixtures, at least when adequate ventilation cannot be achieved.

PERSONAL PROTECTIVE TB INFECTION CONTROL EQUIPMENT INCLUDE

- Use particulate respirators.

These three activities require to be managed by TBIC programme manager at national and sub-national levels. The national and sub-national managerial roles listed below provide the managerial framework for the implementation of TBIC in healthcare facilities:

- Identify and strengthen a coordinating body for TB-IC, and develop a comprehensive budgeted plan that includes human resource requirements for implementation of TB-IC at all levels.

- Ensure that health facility design, construction, renovation and use are appropriate.
- Conduct surveillance of TB disease among health workers and conduct assessment at all levels of the health system and in congregate settings.
- Address TBIC Advocacy, Communication and Social Mobilization (**ACSM**), including engagement of civil society.
- Monitor and evaluate the set of TBIC measures.
- Enable and conduct operational research.

Though the TBIC manages the programme at National and sub-national levels, the responsibility of overseeing organization of the TBIC activities at facility level falls under this person. As with all other functions of a healthcare facility, the ultimate responsibility for the prevention and control of TB infection rests with the hospital manager. The manager should:

- Establish an Infection Control committee which will in turn appoint an Infection Control team; and
- Provide adequate resources for effective functioning of the infection control program.

The Infection Control committee provides a forum for multidisciplinary input, cooperation and information sharing. This committee should include wide representation from relevant departments: e.g. management, physicians, other HCWs, clinical microbiology, pharmacy,

sterilizing service, and maintenance, housekeeping and training services. The committee should elect one member of the committee as the chairperson (who should have direct access to the head of the hospital administration) and appoint an infection control practitioner who is a HCW trained in the principles and practices of infection control (e.g. a physician, microbiologist or registered nurse) as secretary. The Infection Control committee should meet regularly (ideally monthly but not less than three times a year) to develop its own infection control manual/s and to monitor and evaluate the performance of the infection control program. The committee must have a reporting relationship directly to either the administration or the medical staff to promote program visibility and effectiveness. This committee has the following tasks and responsibilities:

- Oversee the implementation of the infection control program;
- Review and approve a yearly program of activities for surveillance and prevention;
- Review epidemiological surveillance data and identify areas for intervention;
- Develop hospital policies for the prevention and control of infection;
- Assess and promote improved practice at all levels of the health facility;
- Ensure appropriate staff training in IC and safety management;
- Ensure provision of safety materials such as personal protective equipment; and
- Organize the training of HCWs.

The infection control team is appointed by the infection control committee of the hospital. The team is responsible for the day-to-day activities of the infection control program. Health care establishments must have access to specialists in infection control, epidemiology, and infectious disease, including physicians and infection control practitioners. In some countries, these professionals are specialized teams working for a hospital or a group of healthcare establishments; they may be administratively part of another unit (e.g. a microbiology laboratory, medical or nursing administration, public health services). The optimal structure will vary with the type, needs and resources. The reporting structure must, however, ensure the team has the appropriate authority to manage an effective infection control program. In large facilities, this will usually mean a direct reporting relationship with senior administration. The team or individual/focal person is responsible for the day-to-day functions of infection control, as well as preparing the yearly work plan for review by the committee and administration. The infection control team should:

- Consist of at least an infection control practitioner who should be trained for the purpose;
- Carry out the surveillance program;
- Develop, disseminate and supervise infection control policies;

- Monitor and manage critical incidents; and
- Coordinate and conduct training activities.

The very first responsibility of managers of TBIC programme is to conduct assessments at all levels of the health system and in congregate settings. The national coordinating body is responsible for ensuring the assessments of healthcare facilities in the country, to determine the risk for TB transmission and to monitor the status of implementation of control measures. This is particularly important due to the increased risk of TB exposure of HIV positive patients who may also be at the facility. The aim of the assessments is to ensure that periodic facility assessments are undertaken at each facility, particularly prioritizing large hospitals, MDR-TB facilities and facilities which care for HIV patients, and that TBIC problems and infrastructure issues are addressed and promptly remedied. Promote a system for conducting TBIC facility assessments at regular intervals and develop a monitoring tool that ensures that TBIC problems have been corrected, in order to maintain a safer environment in which staff members can work and patients can receive care. It is important to adopt appropriate actions for different levels of the healthcare system and other relevant sectors and identify the persons responsible for those actions. e.g.

- Allocate a budget provision for facility assessments in the TBIC country or facility implementation plan;
- Consider engaging (international) technical assistance (Ventilation engineers, Infection Control Practitioners or Environmental Hygienists) to conduct the initial facility assessments which will provide a base of information;
- Ensure that a pool of national, regional and local assessors are trained and competent to conduct facility assessments;
- Modify the standardized TBIC facility assessment tool as needed to meet the needs of the facility;
- Reassess a large number of facilities every year, to see if TBIC standards are being applied in each site and where staff retraining and environmental/ building safety assistance is needed.
- Incorporate TBIC specific standards and indicators in an existing quality of care assessment tool or into the routine TB supervisory checklist; and
- Analyze findings and report all recommendations for improvement to the facility administration for action. Follow-up to ensure that changes have been made and adopted before the next planned site assessment.
- The following checklist may be used (Table 1)

Table 1: Facility Assessment Checklist.

Name of the Health Facility:			
Address:			
Telephone Number:			
Name of Responsible Person for Infection Control in this Facility:			
Services provided in this facility * Please tick with ✓	☐	Integrated TB-HIV Services	☐ TB Services
	☐	VCT/ART Services	☐ GOPD
	☐	In-patient Services	

TB Infection Control measures implemented in this health facility:

Managerial	Yes	No	Issues to be Assessed and Guide for Comments
1. Is there an IC team or responsible person in place?			- At which level? - Composition of the team? Comments:
2. Is there a Facility IC plan in place?			- Provide copy of the plan, policies, and standard procedures and / or describe. - Is the plan part of the facility plan? - Is the plan properly budgeted? - Is budget available for TB-IC? - Does IC plan include staff training on IC? - How many staff members have been trained in IC last year? - Is there continuous professional education in IC? - Is there coordination between TB and HIV departments? ART, VCT, CPT, IPT available? - How are planned IC activities monitored and evaluated? Comments:
3. Has an IC assessment been done?			- When was the last IC check or facility IC risk assessment done? - Is there a plan (renovation and/or re-location) to optimize implementation of IC controls at the facility? - Have any improvements been completed within the last year? Comments:
4. Is "on-site" surveillance on TB disease among staff being conducted (including monitoring and evaluation of IC)			"on-site" surveillance systematically / regularly performed? - Who is responsible for IC surveillance? - How is it performed? - How many staff developed TB disease? - Are data / reports available? - Give examples of indicators? Comments:
5. Is health education on IC ensured for HCWs, patients, and visitors?			- How is it performed? - Any evidence of activity? - Are materials available for IEC - Provide examples of materials. Comments:
6. Does the facility participate in operational research (OR)?			- Are there any OR activities on IC? - How is it organized? Comments:
Administrative	Yes	No	Issues to be Assessed

7. Which of the following recommended controls are practiced? • Triage; • Separation; • Cough etiquette; • Expedient service delivery (prompt services for “coughers”).			• Is there systematic screening of all patients for cough? • Are patients with cough separated early from other patients? • Are suspected or diagnosed TB patients separated from suspected or diagnosed HIV patients. • Is there a system established to prioritize smear positive cases such as creating an “express lane” to minimize the stay of these patients. • Is the flow of TB suspects / patients in the facility a risk for transmission? • Is there IEC regarding cough etiquette on site? How is it conducted? • What is the average waiting/turn-around time for lab investigations? • Are masks, tissues provided for coughing patients? Comments:
8. Package of prevention for HCWs, including HIV prevention, ART and IPT for HIV-positive staff			• Periodic and or symptomatic TB screening of staff? • If periodic, how often? • HIV testing offered to staff? • If necessary, where is (preventive) treatment offered? • Can HIV positive staff opt out from work in a high risk area? Comments:
Environmental	Yes	No	Issues to be assessed
1. Natural and/or mechanical ventilation in place, especially in waiting areas, examination room, sputum collection room and patient wards			• What ventilation is in place? • Provide sketch of windows, doors, fans and cross ventilation with measurements • State of moving parts of windows? • Check air flow (with smoke, vaneometer) • Calculate ACH • Maintenance of fans? Log complete? • What is the average waiting time? Comments:
2. Outdoor waiting areas or open space			• Are outdoor waiting areas large enough to seat patients without crowding. • Use low walls that facilitate movement of fresh air. • The roof of the structure should have sufficient overhang to protect occupants from sun and rain. Comments:
3. UVGI			• Sketch if available. • Functioning? Check with UVC meter • Last maintenance check? Log complete? • When were the lamps last replaced? Comments:
Personal protection	Yes	No	Issues to be assessed
1. Respirators available for staff			• Which respirator model/type is used? • In which departments? Comments:
2. Fit testing and/or fit check for respirators			• How is it organized? • Frequency of fit test Comments:

SPECIFIC ACTIVITIES OF THE ASSESSMENT

- Make a flowchart of the patient flow through the facility.
- Visit the OPD and TB wards and calculate the ACH at various sites.
- Sketch of the facility: Include main room, anteroom, hallway, UV lights, other controls, windows, doors, etc.

SUMMARY OF THE ASSESSMENT

Strength	Weaknesses
Problems identified	

Prioritization Table for IC Assessment:

Priority High/Medium/ Low	Description	How to Implement? Who is responsible?	When?	Estimate Budget	Comment
Managerial activities					
Administrative TB infection control measures					
Environmental TB infection control practices					
Personal respiratory TB infection control practices					
Date of assessment					
Date of next assessment					

After prioritization of problems identified through facility assessment, the first step is to develop a facility TBIC plan.

TB INFECTION CONTROL PLAN DEVELOPMENT

Every facility should also have an integrated budgeted IC plan and a focal person or team responsible for the implementation. The facility IC plan describes the high risk areas for TB transmission, provides information and targets on reducing TB and HIV rates among HCWs and patients. If the site has a laboratory, it should have its own biosafety plan and procedures. Set priorities for implementation, reporting and accountability tasks for those persons responsible for performance indicators/ targets, time lines, budget and funds. All funding gaps should be reported to the local and national audiences noted above. The following activities need to be done in order to develop a facility TBIC plan:

- Assign a coordinating body to develop and cost the country or facility action plan;
- Identify funding sources (core budget, program budget, gaps) to the plan;
- Merge planned activities in 'Over-arching' Strategic Plans;
- Copy and send the country action plan to provincial, regional and district health offices, other collaborative partners responsible for high risk congregate settings;
- Include TB-IC in the annual Guidelines for provincial, regional and district health planning, including determined budgets for integration in their annual plans;
- Review provincial, regional and districts health plans and visit some of their sites to see if TBIC activities are being done; and
- Report back periodically to the Ministry, Provincial, Regional or District health offices and other interested departments on the findings, suggestions for improvement and the timeline for improvements to be completed.

The plan should also include responsible actors, performance indicators and targets, estimated budget, funding sources and gaps, time lines and the means of verification for each activity. It is important to take into consideration personal perceptions, motivations and people's beliefs which can derail the best intentions of an Infection Control Plan. The type of clinical focus (TB, HIV general services, etc.) the number of beds, the number of employees, location, disease prevalence in the community, volume of patients and the risks of exposure to employees and patients should all be evaluated prior to the creation of the action plan. A key part of the strategy is engaging administrators, managers and other healthcare professionals and workers to visibly support the adoption of the plan and to diplomatically address and resolve issues with employees, patients and families through education. Written IC policies often relate to patient care activities, employee health or those practices related to prevention of illness. For instance, there might be general policies which affect all workers regardless of duty or status, or one might write specific policies for a particular unit or area. Either way the policies need to be supported by science and reflect the needs of the facility. Lastly, any policies be consistently implemented if they are to benefit

both patients and staff members whilst achieving the desired outcomes. The facility plan will include, but not be limited to, the following areas:

- Identification / description of prioritized risks and risk areas related to infection control.
- Risk and Area-specific infection control recommendations and strategies to minimize, reduce or eliminate the identified prioritized risks.
- Assessment of TB disease among HCWs.
- Assessment of TB and HIV prevalence in the patient population.
- Assessment of HCW training needs.
- Training staff on TB, TB control and the TB infection control plan.
- Educating staff periodically on signs and symptoms of TB disease, specific risks for TB for HIV-infected persons, and need for diagnostic investigation for those with signs or symptoms of TB.
- Assessment of patients to identify persons with symptoms of TB disease or who report being under investigation or treatment for TB disease.
- Providing face masks or tissues to persons with symptoms of TB disease (“TB suspects”) or who report being under investigation or treatment for TB disease (“TB suspects or cases”), and providing waste containers for disposal of tissues and masks.
- Patient flow and placing TB suspects and patients with TB in a separate waiting area or ensuring that they receive services faster.
- Carry out laboratory investigation where facilities exist or immediately refer TB suspects to TB diagnostic services.
- Using and maintaining environmental and respiratory control measures such as ensuring adequate ventilation and respirators, if applicable.
- Time-line and budget (e.g. material and personnel costs).
- Monitoring the implementation of the plan.

The TBIC plan of the facility dictates the activities that need to be done to control TB infection in the facility. One of those activities is provision of training to TBIC stakeholders.

DEVELOP HUMAN RESOURCES AND BUILD CAPACITY

Training on TBIC work practices should be incorporated into the existing pre-service and in-service training programs. The HCWs at all levels and all facilities should receive training and be engaged in improving safety for their patients and themselves. All HCWs, trainers-of-trainers, managers and program coordinators, medical schools and nursing schools, credential bodies, professional bodies and associations should be involved.

- The TBIC programme administrators should complete a training needs assessment and determine the relevant groups and numbers of personnel;
- As necessary modify job descriptions to incorporate responsibilities for TBIC;
- Determine the groups and numbers of staff to be trained annually on TBIC. Consider adding
- TBIC training to all newly hired staff at all levels;
- Define professional standards, performance criteria and evidences of compliance of HCWs at key positions in implementing TBIC;
- Develop an integrated training plan, a performance-based TBIC curriculum, trainers' and participants' manual, and training materials; Modify existing pre- and in-service training curricula, refresher courses, continuous medical education programs and training materials to include TBIC;
- Determine the resources and funding needed to support a national training and supervision plan;
- Conduct parallel cascade training courses or incorporate TBIC into current training efforts in
- TB, HIV, IC and/or OHS programs;
- Document the names of trainees and the dates that training was received in both training registers/log books and the worker's personnel files. Maintain these numbers for reporting to
- MOH and other reporting bodies; and
- Monitor, assess and document changes in work practices after training and intervention.

After the training, the TBIC programme manager evaluates and document changes in the work practices. The following assessment tool may be used for that purpose:

Assessment Tool to Evaluate and Document Changes in Work Practice

Assess if the following changes in work practice occurred after	YES (tick)	NO (tick)
Develops an IC facility plan based on the population served, the organization goals, services provided and community disease burden.		
Evaluates periodically the effectiveness of the facility plan and modifies as needed. Measures compliance to regulations and standards.		
Develops and reviews infection control policies and procedures to be current with evidence-based methods and approaches.		
Serves as Infection Control Liaison for health facility, medical staff, community and local Health Department.		
Identifies opportunities for improvement based on observation, process indicators, outcome measures and other findings.		
Prepares, presents and coordinates educational workshops, lectures,		
discussions or instruction on a variety of infections control topics, and		
assists in the infection control orientation for new HCWs.		
Instructs patients/families in methods to prevent infection and illness.		
Recommends policies and procedures to screen HCWs annually for healthcare acquired illnesses.		
Supports evidence based Infection Control best practices and customizes the methods to the clinical situation.		
Uses data to support cost effectiveness of Infection Control methods and approaches to prevent infection.		

Training alone cannot guarantee effective TBIC in health care facilities. Some building renovations or constructions need to be designed to enhance TBIC efforts.

BUILDING DESIGN, CONSTRUCTION, RENOVATION AND USE

Building designs for hospitals, clinics and any other facility where TB patients are housed should incorporate features which reduce TB transmission. The location of a facility, climatic conditions, prevailing wind, space, national construction standards, actual and foreseen population volume and the types of services provided, patient flow and specimen movement, number of staff, furniture arrangements, capital investment budget and contracting regulations, all may need to be considered prior to any renovation or new construction. Develop standards for airborne precautions specific for healthcare facilities which will be incorporated into the design of any construction or renovation project to the site. Require that engineers, architects, etc. share their plans for implementing TB-IC and risk reduction measures prior to the start of construction and renovation.

The following activities need to be carried out to ensure effective renovations:

- Define and prioritize high-risk facilities and areas for greatest risk of airborne transmission;
- Specify national building standards and examples for those identified high-risk facilities and areas;
- Assemble a multidisciplinary team including an infection control point person, an architect and ventilation engineer before the design phase of every construction / renovation project;
- Evaluate the use and utilization of a facility and designated high risk spaces for example: MDRTB clinics and wards, TB/HIV clinics, isolation rooms, waiting areas, interior corridors, sputum collection areas, laboratories and consultation rooms for maximum ventilation;

- Periodically inspect the construction/renovation site. Question all deviations from the original plan and make notations for the provincial or district health department follow-up;
- Garner high-level political commitment i.e. ministerial or cabinet, given the capital investment involved in construction and renovation.
- Create a ventilation rate of a minimum of 12 Air changes per Hour in TB/MDR-TB wards, waiting areas and all other areas with high risk.
- Place new building or select existing building for converting into TB ward/clinic in windy areas, such as mountains and coastal areas. Natural ventilation will improve infection control at minimum cost compared to mechanical ventilation.
- Position new buildings or select existing buildings for converting into TB ward/clinic separate from other buildings or urban settings, keeping in mind the need for access to care.
- If possible, construct buildings at least 4m apart to allow for adequate ventilation.
- Design buildings/spaces with openings in opposing walls transverse to the prevailing wind direction; place new buildings or select existing building for converting into TB ward/clinic on site where there is a good cross breeze.
- Separate staff areas from patient areas with additional doors in the halls as needed and reallocate the different sections within the building.
- Create anterooms before entering high risk areas, i.e. isolation wards, laboratories, sputum collection points indoor, between staff and patients areas.
- Create multiple separate waiting areas for different patients; big waiting areas can be subdivided for the separation of different groups of patients.
- Construct open-air sheltered or half-open spaces – with a roof to protect patients from sun and rain to function as waiting areas, sputum production & collection points and day-time recreational areas.
- If possible, allocate 8-10m² of space for each smear positive patient bed. Create separate night accommodation for guardians.
- Construct rooms with high ceilings (2.5m minimum). Spaces with upper room UVGI require high ceilings.
- Design sloping ceilings/roofs with open gaps at the highest points that allow for the “stack” effect and will create a natural airflow as hot air rises.
- Using wind driven turbines on roofs is another way of increasing the ventilation.
- Openings at the end of passage ways allow for a constant draft of fresh air through often crowded passages.

- Consider large functional windows and grills/ventilation openings in and above entrance doors to create cross ventilation even if doors are closed.
- Additional high level windows, airbricks or vents just under the ceiling can improve ventilation during the night without the effect of a cold breeze directly over the patients.
- For natural ventilation a window with different opening parts is recommended above the window with one opening part. More openings allows for the regulation of the air flow.
- Construct showers and toilets which are well ventilated, especially as they are confined spaces used by many patients. In warm climates, the use of walls with holes will allow ventilation and privacy, a row of these in the wall at face level is recommended. Windows should be as large as possible. Opaque glass in louvers/shutters is another suggestion for the windows.
- Position furniture and seating within patient areas so as to allow for free airflow over desks and tables without affecting other patients and HCWs.

Knowing how to position you in a room can reduce the risk of acquiring TB. Make sure that everyone knows how to reduce their risk. Just by something as simple as allowing air to escape through skylights, increased airflow and reduced the risk of transmitting TB to other patients and staff.

By raising the glass sky light by 1m, it changed the amount of air exchanges per hour from 5.5 to 15.

This significantly reduced the risk of TB transmission in the crowded waiting area. Outside waiting areas remove patients from waiting rooms with poor ventilation, whilst providing a safe protected area with a higher rate of fresh air movement.

After renovating buildings to ensure effective TBIC, it is necessary to collect baseline data especially regarding the prevalence of TB disease among staff.

CONDUCT SURVEILLANCE OF TB DISEASE AMONG STAFF

Surveillance of TB disease among staff, and assessment of the burden of TB, MDR/XDR-TB and HIV in different settings and geographical areas will provide national data that is essential for gauging the effectiveness of TB-IC measures. Results from surveillance will also provide a basis for setting targets and prioritizing more intense action. Human Resource Department, NTP, Occupational healthcare workers, HCWs, managers, supervisors and staff should be involved. The TBIC programme manager should develop a confidential data collection system for TB disease among staff and a means to share the aggregate data with the workers. The following activities can assist:

- Utilize the global indicator for surveillance of TB disease among staff;
- Develop a case notification & data collection system and tools i.e. TB registry, staff risk assessment forms, analysis reports;

- Identify persons responsible for confidential recording, collecting and reporting;
- Explain to staff the importance of prompt disease notification, stigma reduction and support for their ill colleague(s);
- Recognize the difficulty of conducting surveillance and at the same time the importance of doing so;
- Identify role-models to give talks to others; and
- Evaluate the impact of control measures and if needed re-adjust interventions.

The following tool can be used to determine the prevalence of TB disease among staff. This tool can be used by a supervisor for the surveillance of TB among staff (Table 2).

Table 2: TBIC Staff Risk Assessment Log.

Name of staff member or unique personnel number	Category of worker	Date of assessment	Do you Have symptoms of TB? (Y/N)	Do you Know your HIV status? (Y/N)	Do you know that if you are HIV + INH prophylaxis will reduce your chances of developing TB disease? (Y/N)	Staff member Requested referral for further investigation? (Y/N)

Involvement of stakeholders beyond the health sector is increasingly recognized as an essential component of modern public health programs.

TB INFECTION CONTROL ADVOCACY, COMMUNICATION AND SOCIAL MOBILIZATION (ACSM) INCLUDING ENGAGEMENT OF THE CIVIL SOCIETY

Involvement of affected communities is particularly important for measures such as TB-IC, which can occasionally produce conflicts between societal needs and the rights of individual patients. Control measures may include receiving healthcare in a community setting to avoid unnecessary admissions to hospitals. Creating demand for TB-IC is likely to expedite implementation of all country-level activities and help to maintain standards at the facility level. Key target audiences include international and country-level organizations representing the TB and HIV community, managers of TB and HIV/AIDS programs, other Ministries responsible for congregate settings, donors, OHS, patient safety advocates, prisoners and prisoner rights organizations, and managers of other settings such as homeless shelters, refugee and displaced person camps, nursing homes and worker dormitories should be involved. The following activities are said to be helpful in establishing ACSM:

- Present solid evidence to decision-makers and broader non-technical audiences to convince them that TB-IC is critical amongst their many competing priorities to ensure that healthcare facilities and congregate settings do not become a source of life threatening infections;
- Mobilize large constituencies which have connections to national (e.g. professional associations of doctors or nurses) for widespread dissemination of IC advocacy messages;
- Devise different sets of messages for different target audiences in part to minimize the stigma in HCWs, PLHIV and TB patients;
- Add TB-IC to meeting agendas to bring TB-IC to the attention of others in the community;
- Include TB and airborne IC in the formulation of policies, work plans and expert consultations, particularly those addressing pandemic preparedness and seasonal respiratory diseases.

Thus, HCWs need to treat the following issues very seriously:

- Know your facility IC plan.
- Monitor IC practices.
- Screen patients to identify persons with a cough that lasted two weeks or more.

The unsuspected, undiagnosed coughing patient in general outpatient and inpatient departments is the main concern.

- Provide prompt TB diagnosis and treatment.
- Educate people about cough etiquette when coughing.
- Separate persons suspected of having pulmonary TB and diagnosed TB patients, in particular sputum smear positive patients, from other patients, in particular, HIV positive patients and children.
- Encourage your patients to know their HIV status.
- Know your HIV status.
- Know the signs and symptoms of TB.
- Make sure that some windows remain open at all times.
- Wear a respirator when attending to MDR/XDR-TB patients, especially in enclosed spaces.
- Include congregate settings and local communities in advocacy campaigns.
- Evaluate close contacts, in particular household members, if they have TB signs and symptoms and educate them on IC practices.
- It should be stated clearly by means of posters that TB-IC is practiced in the Healthcare Facility. The following figure is an example of a poster stating the TBIC declaration of a health facility (Figure 1).

TB Infection Control

is practised in this Health Care Facility



Figure1: Poster Stating TB-IC is practiced in the Healthcare Facility (Source: RHRU, HIV Management Cluster, South Africa).

When all is said and done, efforts need to be monitored and evaluated by the TBIC programme manager.

MONITORING AND EVALUATION OF TB-IC MEASURES

Monitoring annual TB cases among staff should provide useful information on transmission of TB in facilities. Additional indicators to monitor the implementation of TB-IC are optional depending on the perceived local priorities. As a minimum, the Global Report indicators should be reflected in the national TB M&E framework. Identify sources and methods of TB-IC data collection. There should be a M&E system to this effect.

- Adopt a set of indicators for TB-IC, which include the international global report indicators and
- TB-IC related TB/HIV indicators;
- Revise the current monitoring system and forms to include data collection for TB-IC;
- Collect the global TB-IC indicators (do not adapt these) for global comparison of data and trends at regular intervals;
- Determine how the data once collected will be compiled, reported and analyzed at national, sub-national and local levels;
- Compare data to prior data sets for improvement and compliance. Work with local and district/ provincial health departments if additional actions are warranted.

- Compare TB case rates to those of the surrounding community. This may help to determine if there is transmission in the facility.

The following are useful TB Global Report Indicators

- Number of staff diagnosed with TB in year... (Regardless of job position)?
- Number of staff working in the country in the public and private sector in year...?
- Have staff been trained in TB-IC in year..? Y / N
- Number of tertiary (referral) hospitals with the following?
- Person in charge of TB-IC
- TB-IC assessment done in year....
- Training on TB -IC conducted in year...
- Total number of tertiary (referral) hospitals?

A tool is necessary for monitoring clinical sites. The following is an example of a tool for monitoring clinical sites (Table 3):

Table 3: Focused Monitoring Tool for Clinical Sites (Courtesy of CDC).

Name of Infection Control Officer:	Pt. Population: HIV TB MCH Peds	Date:
Site:	General OPD	Auditor:
Type of Site:	Inpatient	Outpatient
TB Infection Control M&E Tool for Clinical Sites		
Managerial		scoring
An Infection Control Committee or Person is designated in this site.		Y or N
A written Infection Control (IC) plan or check list is available for this site.		Y or N
TB-IC training for all staff has been done.		Y or N
Facility design and patient flow have been assessed (best use of space & ventilation).		Y or N
Monitoring and evaluation of TB-IC data forms are routinely reviewed.		Y or N
A tracking system for all TB suspects, referrals and their sputum smear results is in place.		Y or N
A register is kept of all TB patients reported to the National TB Program.		Y or N
All patients with TB disease are managed on DOT as per the national guidelines.		Y or N
Patient and visitor information on TB-IC is available for all and offered by the staff.		Y or N
Operational research to improve TB-IC measures is conducted at this site.		Y or N
Administrative TB infection control measures		
Patients are routinely asked about cough upon entering facility.		Y or N
Patients which are coughing are separated from others and "fast tracked" to caregivers.		Y or N
A "Cough Monitor" gives cough etiquette guidance and assists with triage.		Y or N
Signage for cough etiquette is present in the clinic.		Y or N
Sputum samples are collected in a designated area and away from others.		Y or N

Health care workers that assist during sputum collection take precautions.	Y or N
Processing of sputum samples is expedited to lab. There is a tracking mechanism to monitor turn-around time of lab results.	Y or N
There is a tracking mechanism to monitor turn-around time of patient within the healthcare facility.	Y or N
A log is kept of all staff who are diagnosed with TB disease.	Y or N
Staff receive an evaluation for TB at least annually.	Y or N
Staff are offered an HIV test annually and offered ART if positive as per the national guidelines.	Y or N
HIV-infected staff are reassigned if requested.	Y or N
INH preventive treatment is offered to HIV-infected staff.	Y or N
Environmental TB infection control practices	
Natural and/or mechanical airflow is monitored daily by staff (especially in waiting rooms, sputum collection room if available, and at least one exam room).	Y or N
Regular maintenance for directional and extractor fans is conducted.	Y or N
Signage is in place to keep doors and windows open when feasible.	Y or N
If UV lighting is used, routine maintenance is scheduled.	Y or N
Patients are not crowded in hallways or waiting areas.	Y or N
Personal Protective TB infection control equipment	
N95 or FFP2 respirators are readily available for staff.	Y or N
Staff have been trained on proper fit of respirators.	Y or N
Supplies are available to coughing patients (tissues, cloths, masks, trash bins, etc.).	Y or N
Staff are provided continuing education opportunities and annual exams on TB-IC.	Y or N
Use the back side of form for additional comments, room design, patient flow, etc.	
You may also use the back to identify the facility's Strengths/Weaknesses and your solutions or recommendations for improvement.	

The last managerial activity in the implementation of effective TBIC measures is:

ENABLE AND CONDUCT OPERATIONAL RESEARCH

Operational research is essential to adapt general recommendations to the needs of individual countries, to evaluate the effectiveness of interventions and to develop evidence-based policies to improve TBIC. A comprehensive research agenda on TBIC should be developed. Budgeting to fill the research gaps is essential, and advocating for additional resources to conduct more research aimed at improving TBIC is needed. The country's monitoring and evaluation and research unit(s), Academic institutions (national and international), Infection control practitioners, National TB program management, National medical ethic committees/boards, Healthcare facilities, especially those with high TB burden, Epidemiologists, public health specialists, civil society activists and non-governmental organizations based in communities at high risk for TB should be involved. The TBIC programme manager should establish a research committee (if one does not exist); promote the importance of medical ethics when considering protocols to accept and allocate sufficient funding for the research and write a policy to this effect. The following activities may assist in enabling and conducting operational research:

- Identify strategic technical partnerships to support the development of a research committee and those that can mentor others on the committee;

- Enhance research capacity through training and technical assistance;
- Identify priority research problems and possible solutions;
- Write operational research protocols;
- Obtain ethical clearance and approval;
- Conduct operational research and document all data;
- Disseminate results of research to key stakeholders and write up results;
- Report and, if applicable, publish internationally in peer-reviewed journals; and
- Utilize operational research results to guide policy development and alter direction of patient or HCW care. Make sure that HCWs, TB patients and communities are the beneficiaries of the results of operational research, leading to policies which minimize their risk of TB.

CHAPTER SUMMARY

This chapter presented some guidelines of implementing effective TBIC measures. The issues covered pertain the role of TBIC programme manager namely,

- Identify and strengthen a coordinating body for TBIC, and develop a comprehensive budgeted plan that includes human resource requirements for implementation of TBIC at all levels.
- Ensure that health facility design, construction, renovation and use are appropriate.
- Conduct surveillance of TB disease among health workers and conduct assessment at all levels of the health system and in congregate settings.
- Address TBIC advocacy, communication and social mobilization (ACSM), including engagement of civil society.
- Monitor and evaluate the set of TBIC measures.
- Enable and conduct operational research.

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