Risk Reduction and Inter-professional Collaboration for TB Infection Control

Information and Action Toolkit for those involved in TB worldwide

 ISBN : 978-92-95094-67-3

Table of Contents

About the Authors

This toolkit was developed by Uta Grosse, Florence Nightingale School of Nursing and Midwifery, King's College London (UK), Salvatore Cognetti, School of Medicine, King's College London (UK), and Gini Williams, International Council of Nurses.

Acknowledgements

We gratefully acknowledge all the helpful contributions and support to this toolkit from the following experts: Sheila Anazonwu, International Hospital Federation; Mônica Kramer de Noronha Andrade, Helio Fraga Reference Center for TB National School of Public Health - Oswaldo Cruz Foundation (Brazil); David Benton, International Council of Nurses; Claire Anne Crépeau, The Montreal Children's Hospital, McGill University Health Center Montréal (Canada); Tesfamicael Ghebrehiwet, International Council of Nurses; Lasha Goguadze, International Federation of Red Cross and Red Crescent Societies; Kenneth M. Hekman, Health Development International (USA); Patricia Hughes, Nursing, Health & Development (UK); Virginia Lipke, Centers for Disease Control and Prevention (USA); Drajoru Clare M. Obaya, Mulago Hospital (Uganda); Nona C. Rachel Mira, College of Public Health, University of the Philippines Manila (Philippines); Anne-Marie Rafferty, Florence Nightingale School of Nursing and Midwifery, King's College London (UK); Thelma Battaglia Rezende, Helio Fraga Reference Center for TB National School of Public Health, Oswaldo Cruz Foundation (Brazil); Julia Seyer, World Medical Association; Dani Theron, Brewelskloof Hospital (South Africa); Carrie Tudor, School of Nursing, Johns Hopkins University (USA); Qing Zhang Ward, Shanghai Pulmonary Hospital (China). We also wish to thank Helge A. Wurdemann, School of Natural and Mathematical Science, King's College London (UK) for the design and layout of the toolkit.

This toolkit was developed with the support of an educational grant from Eli Lilly and Company. Special appreciation is extended to Patrizia Carlevaro.

Abbreviations and Acronyms

AIDS	Acquired Immunodeficiency Syndrome
CDC	United States Centers for Disease Control and Prevention
DOT	Directly Observed Therapy
DOTs	Directly Observed Therapy, Short-course (internationally recommended strategy for TB control)
DR-TB	Drug-resistant TB
DST	Drug susceptibility testing
HCW	Health care worker
HEPA	High efficiency particulate air filters
HIV	Human Immunodeficiency Virus
IC	Infection control
ISTC	International Standards for Tuberculosis Care
ICN	International Council of Nurses
IFRC	International Federation of the Red Cross and Red Crescent Societies
IHF	International Hospital Federation IPT Isoniazid preventive therapy MDR-TB Multidrug-resistant TB
NGO	Non-governmental organisation
NTP	National Tuberculosis Control Programme
PIH	Partners in Health
PPM	Public-private mix
PPPs	Public-private partnerships
TB	Tuberculosis
UVGI	Ultraviolet germicidal irradiation
WEF	World Economic Forum
WHO	World Health Organization WMA World Medical Association XDR-TB Extensively drug-resistant TB

Introduction

Part 1 of this toolkit, "Risk Management in TB health care settings" addresses the reasons behind tuberculosis (TB) outbreaks in health care facilities, the occupational risk of TB infection for health care workers, the risk factors for TB transmissions, and the WHO's strategies to strengthen infection control (IC). Two risk maps are included in the chapter, and they may be used as a quick reference guide for anyone involved in TB care at any level who may be in doubt about the many different aspects of TB infection control. Fact sheets about the main environmental and personal protective equipment infection control measures are included in the appendices. In short, this chapter may be invaluable for health care providers and staff working in the front lines of TB care and control, as well as for patients and their relatives.

Part 2, "Collaboration in TB Infection Control", provides an overview of roles and responsibilities of all key players in TB management at hospital, community and national levels bearing in mind that "The foundation of infection control is early and rapid diagnosis, and proper management of TB patients" (WHO 2009a p. ix). Familiarising oneself with and applying these responsibilities and acting accordingly is key to understanding teamwork and collaboration practices among health care workers, staff and organisations/institutions at all levels in TB care and is essential to effective infection control.

This toolkit is directed at nurses, doctors, hospital managers and administrators, health care assistants, and every member of staff who is involved in TB care at every level, as well as for national and international organisations involved in TB care and control. Some pages of this toolkit have been designed as quick reference guides, and they may be easily photocopied and distributed to staff, patients and visitors as needed. This toolkit has been based on selected key literature, as well as the experience gathered through the International Council of Nurses (ICN) / International Hospital Federation (IHF) / World Medical Association (WMA) / International Federation of the Red Cross and Red Crescent Societies (IFRC) Interprofessional Workshops on Infection Control which have been run in South Africa, Brazil and Benin. Additional consultation with experts both in the field of TB and other areas are listed in the acknowledgements.

The reader is frequently invited to reflect upon the information presented in relation to their own work context, either alone or as part of a learning group. The reader can access further information on TB, its transmission, pathogenesis, signs, symptoms, and treatment on the ICN, WHO and UNION TB guidelines, which are freely available for consultation and listed in Appendix C. In addition a number of group exercises and planning tools have been included to encourage interprofessional teams to work on improving the local situation. These tools are based on those used in the Interprofessional Workshops mentioned above.

This toolkit aims to:

- Provide an overview of the risk factors associated with TB transmission, and the main measures for infection control;

- Outline roles and responsibilities of professionals and institutions involved in TB care and control at the different national and international levels;

- Optimise TB prevention, control, treatment and to increase quality of patient care by promoting teamwork in TB; and

- Encourage the reader to reflect on current teamwork and IC practices and enable those responsible for implementing effective infection control to work together to apply theory to practice.

Many sections of the document refer to the latest Infection Control Standards of the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC). This Toolkit for Infection Control complements the TB Guidelines for Nurses (ICN 2008) and draws on materials used in ICN TB training including the Trainers' Manual and the Union's guide: Best Practice for the Care of Patients with TB. Practical techniques and tools which are used by ICN to train trainers have been included in Appendix B to encourage active learning and collaborative working.

Background

In spite of the efforts undertaken by governments, researchers, health professionals, and other public and private stakeholders in the struggle against TB, the global burden of the epidemic is rising. Drug resistant strains are now more common than ever before, and the WHO's targets for case detection rates are far from being reached. Although there is a myriad of international publications on the issue, very few actually address the problem with an approach based on interprofessional collaboration and teamwork. Rather they tend to focus on the medical aspects of TB control. WHO predicts that between 2010 and 2015 over 50 million people will develop active TB, and over 10 million lives will be lost to it (WHO 2009b).

TB can be cured but its treatment is further complicated by two issues: the global HIV/AIDS burden and the increased resistance of drugs to the Mycobacterium tuberculosis.

- TB and HIV/AIDS facilitate each other and the combination is detrimental for the patient's health: HIV facilitates the onset of active TB, while active TB stimulates HIV replication.

- Some TB strains are resistant to the two main TB drugs (isoniazid and rifampicin) and are known as multidrug-resistant TB (MDR-TB). These drug resistant strains are difficult and costly to treat. Indeed, 500,000 people are estimated to be developing MDR-TB every year and fewer than 10% are receiving any treatment. There are now strains which are also resistant to second line injectable and oral drugs (fluoroquinolones) and described as being untreatable. These strains are known as extensively drug-resistant TB (XDR-TB) and are even more difficult and costly to treat.

These two issues also have a major impact on infection control:

- People living with HIV have a high risk of developing TB following expo- sure to the disease.

- People with untreated TB and drug-resistant TB continue to be infectious while they are not receiving treatment.

The major hurdles on the path towards the global WHO control targets are commonly identified as a lack of adequately qualified or trained health personnel (of all different service levels), inadequate distribution, low motivation, and poor staff retention. Through the joint efforts of IHF, WMA, IFRC and ICN, as part of Lilly's MDR-TB Partnership, training workshops for health professionals have been organised in high burden countries. The need for such workshops arose from differing standards of training for different health care practitioners, thus creating a demand for interprofessional education and training in the field of TB and infection control.

Given the critical shortage of health care providers and generally poor health care systems in low-income countries with a high TB burden, enhancing and fostering proper inter-professional collaboration is regarded as imperative. Recognition of its pivotal role in the fight against TB remains relatively low, yet it is only through an integrated holistic approach involving all providers that we can have a real impact on the expanding TB crisis (ICN et al. 2009b).

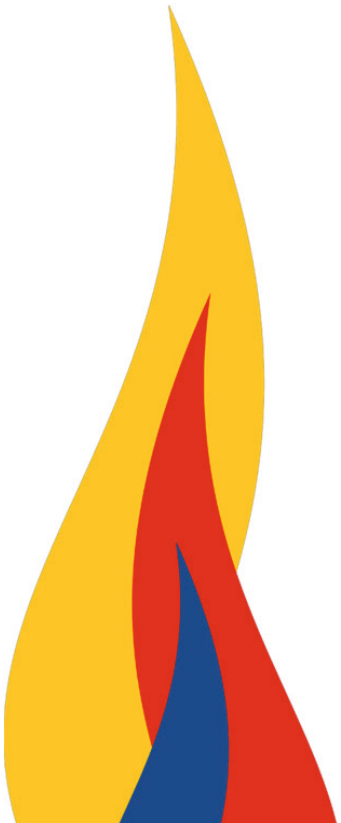
This toolkit has come about as a result of the Interprofessional Workshops held in 2007 and 2009 in South Africa, where it became apparent that there was a lack of suitable materials addressing interprofessional collaboration in TB. One key outcome of the seminars was that effective TB infection control can only be achieved through teamwork and inter-professional collaboration at all levels, from head government officials all the way to ward cleaners.

Although the workshops involved and brought together nurses, physicians, hospital managers, laboratory personnel, community health care workers and TB managers, their focus was not as much on interprofessional collaboration as it was originally intended, but rather on infection control and risk reduction. It is hoped that this toolkit will help to bridge this gap and provide practical guidance on inter-professional collaboration and risk reduction in TB care.

Chapter 1: Risk Management in TB Health Care Settings

By the end of this chapter, the reader will be able to:

- Identify the reasons for TB outbreaks in clinical settings.
- Explain the risk factors affecting TB transmission.
- Identify the occupational risk of TB infections in health care workers and relate to control strategies in their own work setting.
- Explain the purpose of infection control and prevention.
- Assess local managerial, administrative, environmental and personal infection control strategies.



1.1 Reasons for TB outbreaks in health care facilities

The recent occurrences of MDR/XDR-TB outbreaks in health care facilities have raised concerns among health care workers (HCWs) and government officials at all levels, and have created a need for greater awareness about TB and its trans- mission in health care settings. One such example was the 2005 XDR-TB outbreak in a hospital in Kwazulu-Natal, South Africa (ICN et al. 2009b).

Several contributing factors have been identified. The most important ones are a poor TB control programme, inappropriate use of antibiotics, inadequate public health infrastructures, the impact of the HIV pandemic, rapid population growth and quality of life issues such as increased poverty, overcrowding, malnutrition, poor ventilation and illiteracy. On top of all this, poor implementation of existing infection control (IC) policies fails to prevent otherwise avoidable transmission.

Preventing transmission of drug-resistant (DR-TB) strains is not an easy task. Firstly, the symptoms are no different from those of susceptible TB so patients who are unknowingly infected with DR-TB may well be mixed with other patients who can acquire the resistant strain. Secondly it can take up to 10 weeks to perform drug susceptibility testing (DST) and even longer when DST is not available within the country and samples (and results) have to cross borders. In both cases patients may deteriorate and infect others while DR-TB remains undiagnosed.

TB IC in health care settings has been largely neglected in policy and practice of health system interventions until recent outbreaks of DR-TB (WHO 2009c). With regards to this issue, this toolkit aims to both provide useful information as well as practical advice to minimise the risks of transmission, and to stress the importance of inter-professional collaboration and teamwork, which are crucial to the success of the fight against TB.

Opportunities for reflection:

Reflect on the various ways in which TB can be transmitted during your typical work day.

Identify moments and actions in your practice that put you at increased risk.

Identify where you or your facility could do better to reduce risk.

1.2 Occupational risk of TB infection for health care workers

The outbreaks mentioned above take their toll on HCWs at all levels. WHO has estimated that the risk of contracting TB is eight times higher for health care workers compared to the general population (WHO 2006b). For example, between 2005 and 2007, 13 health care workers at a hospital in KwaZulu-Natal were diagnosed with DR-TB, nine of whom lost their lives (Catterick 2009; O'Donnell 2010). Although it may seem obvious that health care workers have a greater chance of being infected because of their everyday exposure, there are measures which can be taken to minimise that risk, and which, for various reasons, are often disregarded (Joshi et al. 2006; Menzies et al. 2007). Some of these, can be remedied through collaboration and training, as many of the most important measures to control the spread of infection are virtually free of cost (e.g. enforcing open window policies, cough etiquette and hand washing), yet others require intervention at various institutional levels. For instance, while it may be very easy to keep windows open, many facilities were not built for that purpose and therefore are inadequate. At other times, the supply chain of drugs and protective equipment may be disrupted, leaving health care workers to do their job to the best of their ability, yet without the resources they need. In order to reduce occupational risk to staff (as well as improve the recovery of patients), much intervention is needed at the institutional level: those responsible for the organisation of health care must be made aware of the TB epidemic and of the measures which are required to tackle it, so that further improvements to health care systems are made with the necessary knowledge and focus.

Three factors in particular need to be evaluated in order to assess the risk of acquiring TB for staff in different hospital areas. Firstly, the number of infectious patients seen per year in the department is an indicator of the amount of exposure (ICN 2009a). Secondly, the amount of time that staff spends in contact with infectious patients needs to be kept in mind. The HIV status of staff is also an important factor; those who are infected are intrinsically at greater risk of contracting TB, and should be relocated to lower risk areas whenever possible. Finally, the risk assessment needs to take into account whether high risk procedures (such as sputum collection or bronchoscopies) are being undertaken, and identify the staff involved in performing such procedures. The risk is highest in the TB, pulmonary and infectious diseases departments, and it is higher for nurses and laboratory technicians than for doctors and administrative staff (Skodric-Trifunovic et al. 2009).

1.3 Risk factors for TB transmission

In order to communicate and allow visualisation of the various TB infection risks for patients and staff, two risk maps have been developed:

The Four Stages of TB: General Risk Map (Fig. 1.1) outlines the risk factors for the progression of the disease in the general population, focusing on five steps that separate a healthy individual from death. Following exposure, an individual may develop infection, which can lead to active disease, acquisition of resistance, and eventually death. The risk factors for each of these stages are identified and outlined in the risk map below.

Opportunities for reflection:

Reflect on what can be done to halt the patient's progress through "The four stages of TB: General Risk Map".

What could you do?

Who else needs to be involved?

The TB Infection Risk Map for Health Care Facilities (Fig. 1.2) focuses on a typical patient's experience on his or her road to recovery as a hospital inpatient, and highlights potential infection risks at the various stages of his or her stay. The map can be helpful to the management of health care facilities, as it provides a quick reference guide to IC measures, allowing assessment of those already in place and opportunities to investigate avenues for improvement, as well as enabling them to identify existing problems.

Opportunities for reflection:

Compare the risk factors in your health care facility with those listed in the 'TB Infection Risk Map for Health Care Facilities'. What can be done to minimise risks in your facility?

Analyse the greatest infection risks in your facility and identify who is responsible to take action to reduce them.

Figure 1.1: The four stages of TB: General Risk Map

Stage 1 Exposure	Risk of exposure increases with duration of contact, overcrowding, poor ventilation, and TB prevalence in the region.
Stage 2: Infection	Risk of infection depends on the number of bacilli inhaled (which increases with longer exposure), intrinsic virulence of bacilli, and the state of the individual's immune system (e.g. HIV, cancer, etc.). Another risk factor is contact with known infected individuals (e.g. family members and friends).
Stage 3a:	Risk of developing active disease depends on the individual's general

Active disease	health status, and the state of their immune system, as well as other factors such as HIV, smoking, alcohol abuse, malnutrition, poverty, age, and exposure to industrial fumes and vapours. Other factors include prior TB infection and contact with known infected individuals (e.g. family members and friends). Approximately 10% of those infected with TB will go on to develop active TB disease. After developing active disease immediate transfer to stage 5 is possible if the disease is not diagnosed or treated or if presented too late.
Stage 3b: DR-TB	The risk of developing DR-TB comes mainly from inadequate treatment of TB as a result of: poor patient education, lack of patient support, difficulties accessing treatment, poor quality of drugs (e.g. expired or improperly manufactured), prescription of an inadequate treatment regime, poor adherence and inconsistent supplies. An additional risk is exposure to individuals already infected with active DR-TB. To minimise this, TB and DR-TB patients should be separated, and DST performed as quickly as possible. MDR-TB bacteria do not seem to be more virulent than susceptible ones per se. However, DR-TB's longer infectious period leads to a more prolonged exposure for others.
Stage 4: Death	The risk of death from active untreated TB is 50-70% within 5 years. Although TB is theoretically curable in almost every individual, inadequate treatment is responsible for a much higher death rate. Concurrent HIV infection greatly increases risk for mortality.
(ICN 2008; Rieder 1999)	

Figure 1.2 TB Infection Risk Map for Health Facilities

General risk factors which apply to all steps

• Patients uninformed of IC measures may spread or catch infection. • Lack of proper ventilation (open window policy) increases risk of infection in all areas. • Lack or misuse of protective equipment poses a risk. • Incorrect application of IC measures increases risk of transmission. • Overcrowding and poor spacing of facilities lead to increased waiting times which in turn increase both closeness and duration of exposure. • UVGI lights must be installed and used properly, but are an addition, and not a substitute for other IC measures. • Nurses, doctors, and other members of staff may be unknowingly infected and put patients and visitors at risk.

1. Patient arrives at facility.	.2. Patient in waiting area	3. Patient sees nurse	4. Patient undergoes diagnostic TB tests.	5. Sputum sample reaches the lab. .	6. Patient with suspected TB is admitted to ward.	7. Patient with confirmed smear positive TB starts DOT.	8. Patient stays on the ward to continue treatment (intensive phase).	9. Patient's sputum converts to smear negative.	10. Patient enters continua-tion phase
Receptionist is at risk due to frequency of exposure. Undiagnosed patients with no knowledge of TB or IC measures pose the greatest risk. Infections can spread between patients, visitors and staff, due to undiagnosed cases, lack of IC measures and overcrowding. Patients not properly educated about IC practices may spread infection.		Patients with symptoms suggesting active TB pose a risk to others and must be separated and diagnosed promptly. Patients with smear positive sputum, cavities on chest X-ray, and forceful, frequent coughing are the most infectious. Patient not adhering to IC measures may infect nurse (e.g. coughing on face). Sputum collection poses a great risk and thus must be performed properly (e.g. outdoors, not facing anyone, in a cough booth. Incorrectly produced samples may be wrongly diagnosed, putting others at risk. Radiology rooms are usually enclosed and poorly ventilated. The samples may be stored inadequately or kept for too long before they reach the lab, especially in facilities which have to outsource some tests. Incorrect handling of specimens and machinery puts lab staff at risk.			All risk factors from previous stages apply. Inadequate bed spacing may contribute to cross-infection between different strains. Improper separation of patient groups (HIV / smear positive / DR status). Rooms that host infectious patients (and especially DR cases) should not be located in areas that others may have to pass through. Patients and staff may lower their level of adherence to IC measures over time, putting others at risk. Improper treatment (e.g. not observed, wrong dosage, irregular administration, wrong drugs) hinders recovery and creates risk of developing DR-TB. Delay in diagnosing DR-TB leads to further spread of resistance. Side effects from treatment increase the risk of treatment interruption. Improper monitoring of patients' treatment regime and IC adherence may lead to re-infection. Inadequate hand washing facilities and practices. Patients moving around the ward without masks, using lifts and sharing toilets. Visitors may not be aware of risks and IC procedures.			Returning to the community may lead to stigmatisation and discrimination. Patients may also return to their previous lifestyle (e.g. alcohol abuse, homelessness, malnutrition). Once the patient feels better, they may discontinue treatment without ongoing education and support. As the patient recovers other priorities may distract them from their treatment. (Williams et al. 2007). Observation of treatment is more difficult in the community. The insurgence of side effects may go unnoticed and lead to interruption of treatment	

Team Exercise 1: Analysing the workplace context

Step 1:
Reflect on Figure 1.2. and compare the risk factors presented with the risk factors in your health care facility.

Step 2:
Use the table below to document the greatest risks faced in your workplace and who needs to take action to address them.

	What are the risks faced by:	How can these risks be reduced?	What responsibilities do you and others have?	What challenges do you and others face?	How can these challenges be overcome?
Staff					
Patients					
Visitors					

1.4 Strengthening TB infection control

This section aims to give a brief overview of the main TB infection control issues and measures, and is based on the WHO's "Policy on TB Infection Control in Health-Care Facilities, Congregate Settings and Households" (WHO 2009c). Fact sheets about personal protective equipment are provided in Appendix A. These fact sheets are largely based on the WHO's IC training materials (WHO 2010). They can be easily printed out, photocopied, and distributed as required.

WHO has set targets for TB infection control: by 2012, 50% of countries should have developed a national TB IC plan, set up a national surveillance programme for TB among health workers assessed major health-care facilities and congregate settings, and reported on the implementation of IC measures. By 2013, all countries should comply. Unfortunately, to this date, not many countries have implemented such measures (WHO 2009c).

In order to scale up TB infection control, WHO has recommended that three major issues be addressed to better fight the epidemic: leadership, technical expertise, and financial resources. Furthermore, four main categories have been identified and provide the framework for infection control: (1) managerial activities, (2) administrative strategies, (3) environmental control and (4) personal protective equipment. The feedback from the five Interprofessional Workshops run by ICN, WMA, IHF and IFRC reinforces the value of applying an interprofessional approach at every stage from developing the policy to having clear lines of responsibility with regard to who should do what.

Managerial activities include identifying and strengthening the coordinating body, and developing a facility plan; reassessing available spaces and potentially reallocating services in such a way to minimise risks of disease transmission (e.g. placing TB wards in well ventilated buildings, and allocating different areas for efficient patient group separation); assessing health workers for TB infection; monitoring and evaluation of IC measures; initiating advocacy and social mobilisation activities for health workers, patients and visitors; and engaging in TB research efforts.

Administrative strategies are a high priority, because they can contribute to stop TB transmission at its first step, by preventing the spread of droplet nuclei and reducing exposure. The main strategies identified by WHO in this section are:

- Identify, separate and fast track those with suspected TB symptoms, so that others' exposure to them can be minimised.

- Encourage proper cough etiquette (i.e. ask patients to cover their mouth when coughing, dispose of sputum safely and wash their hands). Keep the time spent in health care facilities as short as possible.

- Provide free diagnostic testing for TB to HCWs should they develop symptoms.

- Provide free HIV testing and counselling services for HCWs; provide antiretroviral therapy and isoniazid preventive therapy (IPT) to those who are HIV positive.

- Provide HCWs with training on TB signs, symptoms, prevention, treatment and IC.

Environmental control refers to the use of engineering technologies to help prevent the spread and concentration of infectious droplet nuclei in the air. They are most effective when combined with work practice and administrative controls. The main strategies for reduction of infectious particles are ventilation and ultraviolet germicidal irradiation (UVGI). Ventilation can be natural (open windows), mechanical, or mixed, and aims to transport the infectious air away from other patients and health care workers, replacing it with fresh air from the outside environment. UVGI is an additional measure that can complement proper ventilation in order to further reduce the concentration of bacteria. Some of the factors which can impact environmental control are the facility's design and architecture (e.g. presence, frequency, and orientation of windows), the location's climate, the number of the patients who visit the facility and, quite importantly, the facility's available resources. Fact sheets about environmental control are provided in Appendix A. These fact sheets are largely based upon the WHO's IC training materials (WHO 2010).

Personal protective equipment essentially refers to particulate respirators (of- ten referred to as N95 masks) and should be used, along with administrative and environmental controls, whenever there is an increased risk of TB. Patients can be given surgical masks to wear in order to reduce transmission; staff and others in contact with infectious patients need to wear a fit-tested N95 mask. Fit testing is essential for the correct functioning of N95 masks and should not be con- fused with user seal check. Staff and patients must all receive appropriate training on the use of personal protective equipment, and such devices must be available at all times. Remember: a surgical mask protects others from the wearer and the N95 mask or particulate respirator protects the wearer. It is a waste of resources for TB patients to wear N95 masks and it is a waste of time for anyone else to wear surgical masks.

Opportunities for reflection:

Familiarise yourself with the four main WHO measures of infection control outlined in Section 1.4.

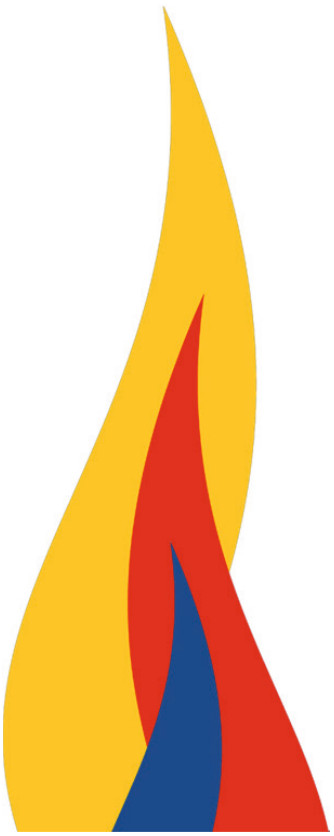
Reflect on how well each measure is being undertaken in your facility, or whether some areas need improvement.

Improvements in infection control are made possible by advocating for change. Reflect on how your voice and the voices of the other people you work with could make a difference.

Chapter 2: Collaboration in TB Infection Control

By the end of this chapter, the reader will be able to:

- Understand the importance of collaboration between health care workers and organisations at all levels in TB care and control.
- Be familiar with the roles and responsibilities of all key players in TB management at hospital, community, national and international level.
- Evaluate current collaboration and IC practices and compare them with those suggested in this toolkit.
- Take a more collaborative approach in the assessment of the current situation and the planning of potential solutions.



2.1 Why is collaboration critical in TB management?

Interprofessional collaboration can be defined in various ways:

> "Working together with one or more members of the health care team who each make a unique contribution to achieving a common goal. Each individual contributes from within the limits of her/his scope of practice" (CNO 2008).

> "Interprofessional collaboration occurs when health professionals from different disciplines work together to identify needs, solve problems, make joint decisions on how best to proceed, and evaluate outcomes collectively. Interprofessional collaboration supports patient-centred care and takes place through teamwork. Team interactions, wider organisational issues, and environmental structures, such as safety, quality, efficiency and effectiveness issues influence this model of care." (McDonald and McCallin 2010).

> "Health and social care professionals, such as doctors, nurses, physiotherapists and social workers, need to work together effectively to take care of patients effectively. Unfortunately, professionals may not always work well together" (Reeves et al. 2009).

Although these definitions are different, they all underline the need for health care workers to work with each other for the patients' benefit. As shown in the previous chapter every actor in TB health care settings has his or her own duties to fulfill, in an environment where their duties and interests overlap with others.

Collaboration does not stop when the patient leaves the hospital: it needs to continue at the community, national and international level. Therefore, this toolkit proposes collaborative models at these levels.

The authors invite the readers to reflect on Bligh's quote, 'no one profession possesses a monopoly of the truth' (Bligh 1980).

Opportunities for reflection:

Identify the duties and potential contributions of each team member.

Compare and contrast them, in order to identify areas of overlapping and contributions which are unique.

Consider how the service can be optimised, based on the analysis of the various team members' contributions

2.2 Teamwork for TB Infection Control

Many patients receive their TB treatment at home, but others may be admitted to hospital for the first few weeks of treatment. This is more likely if they are very ill at the time of diagnosis or if they are thought to be highly infectious to other people.

The prevention and control of infection is only achievable if each and every one of the facility's workers and health care professionals understands his or her roles and responsibilities, and the importance of adhering to, implementing, monitoring, and communicating relevant infection control guidelines.

Health care workers of every role (clinical, paramedical staff, administrative staff and others like drivers, cleaners, cooks etc.) must receive training on the transmission, prevention, signs, and symptoms of TB, as well as on the facility's infection prevention and control plan. Furthermore, areas such as X-ray rooms, or sputum collection areas pose an increased risk of TB transmission, and therefore, all staff needs to be made aware of what additional precautions must be observed therein.

Figure 2.1 outlines a common patient pathway and highlights key moments of inter-professional contact and potential collaboration at various key stages of the patient's progress from the moment they arrive in the health care facility, through their stay in the facility until discharge.

Opportunities for reflection:

Are roles and responsibilities well defined in your facility? Are there areas in which collaboration could be improved?

Identify your team's strengths and eventual weaknesses, and reflect on avenues for improvement.

Figure 2.1 The Patient Pathway and Opportunities for Collaboration	
Patient's path	**1. Patient arrives at the facility**
Team member involvement	• Receptionist
Roles and responsibilities	• Receptionist welcomes patient, offers directions if needed and books him or her in. • Receptionist gives patient an estimate of the waiting time.
Collaboration	• Receptionist informs admission clerk of patient arrival. • Receptionist informs nurse or physician, as appropriate, if facing a very ill patient who needs immediate attention.

Patient's path	**2. Patient in waiting area**
Team member involvement	• Admissions clerk (AC), Hospital management, Infection control (IC) team
Roles and responsibilities	• AC looks out for coughing patients and provides separate well-ventilated waiting area, if possible, for patients who are potentially infected. • AC provides tissues, masks and cloths. • AC informs patients about basic cough etiquette and Infection Control measures. • AC informs nurse of suspected TB cases so they can be dealt with quickly. • AC ensures maximum ventilation in all areas (open windows and doors), ensures that mechanical ventilation and UC lights, if available, are functional and in use. • Hospital management provides masks, tissues, cloths, hand-washing facilities, litter bins and, where possible, other infrastructures such as mechanical ventilation and UV lights. • Hospital management prepares and distributes warning posters and information leaflets in local languages. • IC team monitors the waiting area, ensuring procedures and guidelines are adhered to. • Restrooms should be supplied with disinfectant hand-wash and poster describing hand-washing technique.
Collaboration	• Hospital management liaises with IC team which reports inadequacies back to hospital management. • Hospital management provides informative posters and leaflets on important topics (general info on TB, cough hygiene, handwashing)

Patient's path	**3. Patient sees nurse**
Team member involvement	• Nurse
Roles and responsibilities	• Patient assessment: • Nurses records patient's personal details and medical history • Nurse checks for signs and symptoms of TB. • Nurse provides explanation of tests (e.g. sputum and x-ray) to the patient.
Collaboration	Nurse refers very ill patients to physician as soon as possible.

Patient's path	4. Patient undergoes diagnostic TB tests
Team member involvement	• Nurse, Driver, X-ray technician, Hospital management, IC team, Porters
Roles and responsibilities	• Sputum collection. • Make arrangements for X-ray. • Offer HIV testing and counselling. • Hospital management provides warning signs and posters for high risk areas such as the Lab, X-ray rooms, and sputum collection areas. • IC team monitors adherence to IC standards.
Collaboration	• Nurse informs driver of the samples' biological hazard, and instructs them on proper handling. • Nurse informs porters if the patient poses a significant risk of infection. Porter then relays the information to X-ray technicians as needed. • IC team liaises with hospital management to raise any issues encountered during their routine monitoring. • IC team liaises with nurses if IC procedures are not performed optimally.

Patient's path	5. Sputum sample reaches the lab
Team member involvement	Driver, Lab technician, Hospital management, IC team
Roles and responsibilities	• Drivers ensure that specimens are handled and transported correctly. • Lab technician performs Sputum smear microscopy. • Centrifugation of smears, TB cultures, and Drug Susceptibility testing. • Adhere to lab safety guidelines. • Hospital management provides safety measures and personal protective equipment, and ensures that machinery is in good working order and organises maintenance. • Hospital management provides safety measures such as ventilation systems in areas where culture and susceptibility tests are undertaken.
Collaboration	• Drivers hand over samples to Lab staff. • Report results back to nurse promptly. • Lab staff informs hospital management of faulty equipment and machinery. • IC team educates lab technicians on proper handling of samples and IC measures.

Patient's path	6. Patient with suspected TB is admitted to the ward
Team member involvement	Nurse, IC team, Hospital management
Roles and responsibilities	• Inform patient of hospital etiquette and IC measures. • Educate and provide information about TB. • Ensure that patient understands the importance of adhering to rules and IC guidelines. • Nurse establishes patient care plan. • Hospital management provides policies and procedures. • IC team responsible for ensuring proper separation/cohorting of pts (e.g. - smear+ and smear-, HIV+, etc).

Patient's path	**7. Patient with confirmed smear positive TB starts Directly Observed Treatment**
Team member involvement	Physician, Nurse, Pharmacy
Roles and responsibilities	• Physician initiates appropriate treatment promptly in accordance with national guidelines, keeping in mind the patient's HIV status if known. • If patient's HIV status is still unknown, persuade patient to test for HIV. • Nurse ensures patient compliance through directly observing treatment. • Nurse ensures that patient and his or her family are fully educated about the disease and its consequences
Collaboration	• Physician records initial prescription and treatment plan, and informs nurse. • In limited resource settings, where physicians are not available, nurses may prescribe medication themselves. • Nurses and physicians liaise with pharmacy as appropriate to ensure uninterrupted supply of drugs.

Patient's path	**8. Patient stays on the ward to continue treatment during intensive stage.**
Team member involvement	Physician, Nurse, Health care workers, Occupational therapists, Physiotherapists, Cleaners, Porters
Roles and responsibilities	• Nurse records intake of medication according to prescription. • Nurses and physicians recognise early signs of adverse side effects and takes appropriate measures. • Patients reports side effects in early stages of treatment • Health care workers assist patient with basic care needs, and offer further IC education if needed. • Occupational therapists and physiotherapists assist patients in retaining physical and social quality of life during their hospital stay. • Health care workers, Cleaners, Porters all must enforce IC procedures and offer explanations to patient when needed.
Collaboration	• Discuss adverse effects with physician who can prescribe alternative treatment plans. • Health care workers, occupational therapists, physiotherapists cleaners and porters report any concerns about patient (such as poor adherence to IC standards, or new signs and symptoms) back to nurses

Patient's path	**9. Patient's sputum converts to smear negative**
Team member involvement	Physician, Nurse, Lab technician, Driver
Roles and responsibilities	• Physician assesses the patient physically before changing treatment. • Nurse obtains further sputum samples to confirm conversion. • Sputum collection and transport procedures as detailed above. • If patient sputum remains positive after 2 months of treatment (3-4 for MDR-TB), re-assess patient as per guidelines. • Nurse documents patient's progress accurately.

Patient's path	**10. Patient enters continuation treatment phase. If his or her physical condition allows for it, the patient is discharged to the community (if smear-negative).**
Team member involvement	Physician, Nurse, OT, Physiotherapy, Cleaners, Porters, Drivers
Roles and responsibilities	• Physician writes letter of discharge and documents treatment plans. • Nurse educates patients about the importance of completing drug treatment. • Patient informs HCW when going away or anything else that may interrupt treatment. • Nurse contacts community support workers and refers patient to health care providers in the community. • Nurse provides patient with reasonable supply of medication to cover transit time. Nurse completes the WHO recommended TB referral/transfer form. • Nurse ensures patient has arrived in the community and is taken care of. • Nurse informs district TB coordinator.

Team Exercise 2: Assessment and Planning

Instructions:

Step 1:
Consider the four main WHO measures of infection control outlined in the previous chapter.

Step 2:
In your reflection of these measures what did you decide needed improvement?

Step 3:
Draw the table below on a large piece of paper and complete it with your colleagues.

	Priority for improvement	What needs to be done?	Who needs to do what?	Expected output	Timeframe: by when?
Management activities					
Personal protective equipment					
Administrative strategies					
Environmental controls					

2.3 Collaboration in the community

Once the patient is discharged back to the community, treatment does not stop, and neither do the risks associated with it. In fact, it is then that patients are most at risk of interrupting or mismanaging their treatment. While patients are less likely to be infectious while on treatment if it is interrupted there is a risk that their condition will deteriorate. Patients who return to their previous life may think that treatment is less important because they have been, after all, discharged (Williams et al. 2007).

Precautions do need to be taken with regard to patients who are suffering from MDR-TB and are receiving treatment in the community while still infectious (sputum smear positive). The patients themselves should be advised about cough etiquette and given surgical masks to wear when indoors in the presence of others. Ventilation of the living space should be maximised and, it is helpful if patients can spend long periods outdoors, weather permitting. If space allows, patients with infectious TB should sleep separately from others and spend as little time as possible on public transport or mixing with large groups of people in confined spaces (WHO 2009c). Patients, families and community health workers all need to be educated about such precautions.

Patients may well suffer from stigma, discrimination and isolation and the types of precautions listed above, although necessary, may contribute to these. This may result in various economic, social and psychological consequences, such as employment loss, increased alcohol and substance abuse, poverty, rejection, loneliness, depression or social isolation. All these factors can affect the patient's ability to adhere to treatment. The Union guide, Best Practice for the Care of Patients with TB (Williams 2007) gives detailed information about supporting patients as they become more independent and have to deal with many competing priorities.

Collaboration between patient, family members, community members, nurses, social workers and medical staff is therefore crucial at this step, in order to ensure that the patient is motivated to continue treatment as long as necessary without interruption.

Component 5 of the WHO's Stop TB strategy "Empowerment of people with TB, and communities" is a crucial part of the global strategy against TB. Many studies, reviewed by the WHO in the document "Community involvement in tuberculosis care and prevention - Towards partnerships for health" (WHO 2008) show that, in most locations, community treatment of TB is as effective, if not more, as hospital treatment, while lowering costs and increasing patients' satisfaction. A study in Botswana, for example, suggested that home-based care of people living with HIV and TB was 42% more cost effective than conventional hospital-based care (WHO 2001). H owever, many issues need to be tackled once the patient is in the community, as the players involved in the patient's care will not be the same as the ones who were doing so while the patient was in hospital.

Some patients may disappear and cut all contacts with medical professionals. Strategies need to be in place to locate missing patients and those who do not turn up for appointments and ensure that treatment is reinstated (Williams et al. 2007).

The burden of remembering to take medications does not necessarily need to fall upon the patient at this stage. In fact, the WHO recommends that DOT be continued throughout the entire treatment phase. The question as to who will do it is a complicated one. The possibilities include family members, close friends and neighbours, i.e. the people closest to the patient's everyday life, and often the first to offer care and advice. Community health-care workers, volunteers and patient support groups are other important avenues for treatment observation to continue. Whoever does provide DOT will themselves require adequate support and supervision as it can be a difficult and demanding task (Williams et al. 2007). Such community based approaches tend to provide more personalised service to TB patients than clinic visits and can bridge the gap between TB patients and the health agency (Dick and Schoenemann 1996; Williams et al. 2007). Further, the involvement of community members at the Primary Health Care level was found to be superior for re-treatment patients, if compared to self-administered therapy (Kironde and Kahirimbanyi 2002). However care is arranged, the ultimate responsibility remains with the health care provider and adequate supervision needs to be in place.

There have been studies with the involvement of traditional healers (Banerjee et al. 2003; Colvin et al. 2003; Wilkinson. 1996), whose success points to one often overstated yet under implemented concept: collaboration between all potential health care providers results in better care.

There are often other hurdles in continuing treatment. Some of the more obvious ones are geographical isolation, and inequality in access to services. Also, where services exist, they must be known and accessible enough - financially and culturally - to be used. It is therefore important not only that health care be free, but that patients be made aware of it.

The presence of social services can increase accessibility of health care and awareness, and therefore, adherence to treatment. The public's awareness of TB as a disease that could affect anyone personally needs to be raised. For that purpose, a member of a community who have had TB and recovered may become an invaluable advocate against stigma, providing a realistic and believable account of what to expect if admitted as a patient, as well as concrete encouragement for others to seek medical attention. Such talks could, for example, be given at schools, in churches and other public gatherings - and such talks probably hold an excellent impact-to-expense ratio. Active involvement of all of the community will benefit all of its members.

Those who provide treatment support, whatever their relationship to the patient, must receive appropriate basic training in IC, and should be able to recognise adverse effects, as well as signs and symptoms of TB in themselves or third parties who may inadvertently become infected.

Community health care workers and other treatment supporters may need to receive monetary compensation and other support such as transport, in relation to the amount of time spent. There is evidence that suggests that the drop-out rate in community volunteer programmes tends to be higher after the initial novelty and remuneration wear off. Volunteers often come from low socio-economic status neighbourhoods. Therefore, incentives for the work delivered are very much expected. The National Tuberculosis Programmes (NTPs) could take upon themselves the role of providing funding, defining allowances and organising remuneration.

Further, the NTPs need to provide infrastructure for primary TB care services as well as financial resources. The NTP also needs to train health professionals, provide diagnostic services, availability of drugs free of charge, and free follow- up consultations at facilities.

At national level, the Stop TB Partnership or other mechanisms may coordinate the work of local partnerships and collaborations. It can establish agreements with non-governmental organisations (NGOs) and private practitioners to refer and diagnose TB suspects, and to support ongoing treatment. If more stakeholders are working together, they can tackle more complex issues such as MDR-TB.

Advocacy and communication are important at community level to raise awareness among the general population. As in many communities the majority of people are illiterate, interventions such as speeches from community leaders, spiritual pastors, or traditional healers can be as invaluable, as is the involvement of celebrities as Stop TB ambassadors.

NGOs, faith-based organisations and community-based organisations play a role in complementing public health services, whether by providing TB control or providing specific services which are not offered by the public sector.

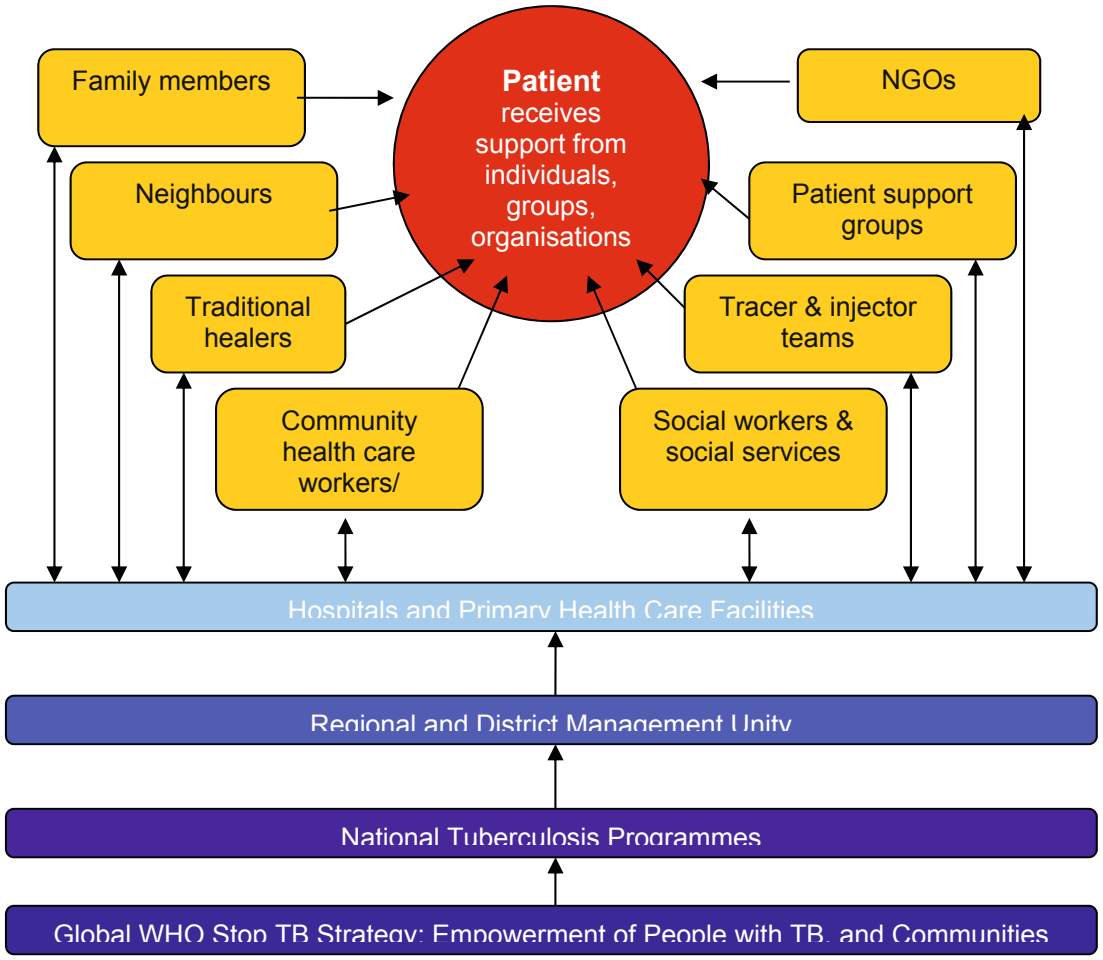
Practical recommendations to reduce risks for patients continuing TB treatment in the community:

When somebody is treated at home for TB there is no need for special measures, such as separate dishes or cutlery. Special diets are not required but eating well helps recovery. Most people find that their appetite increases once they start taking tablets. The patient needs reminding:

- To take every dose of their medication;
- To make sure they get a new supply of medication before the old one runs out;
- To follow advice about good ventilation, cough etiquette and other infection control precautions according to their home circumstances;
- To speak to a community health care worker, nurse or doctor if they are worried about their symptoms or treatment;
- That TB is curable, but only if the tablets are taken regularly over the whole treatment course (MDR-TB patients must also receive daily injections in addition to oral medications during the intensive phase);
- To report any adverse drug side effects including jaundice (yellowness of the skin), a rash, feeling of sickness, itchiness, giddiness, difficulty in seeing or experiencing tingling in fingers and toes as soon as possible. The treatment can be changed, but must not be stopped completely until they are fully cured.

Figure 2.2 outlines the most important agents that should collaborate to support the patient throughout each step of his or her recovery within the community and how, in order to function properly, all these agents must receive support from the infrastructures at various national and supranational levels through monetary support, advocacy, and education (Williams et al. 2007).

Figure 2.2 Patient Support Resources



Opportunities for reflection:

- Identify the agents involved in patient care and support in your community. Are they all working together and collaborating at their best? If not, identify the areas where collaboration needs to be improved.
- Analyse how the treatment compliance is achieved in the community with particular focus of the different roles played by all actors involved.

2.4 Collaboration at national and international level

Governments, NGOs, pharmaceutical companies and other organisations all have a role to play in delivering TB health care. A core component of the WHO Stop TB Strategy is to engage all providers of TB care and control through public- private mix of service provision (PPM). Strengthening health systems through the involvement of all relevant health care providers is essential to meet the TB-related Millennium Development Goals and reach the TB targets set out in the Global Plan to Stop TB (WHO 2006a).

There are many different forms of public-private partnerships (PPPs) which are set up to increase quality of existing TB services, while decreasing costs for patients and their families, and engaging all health care providers.

Public sector collaboration with private providers can vary from provision of information and education to formal PPPs with small scale contracting of service components or larger-scale sharing of health care provision and financing.

Public sector:	includes the government and international agencies controlled by the government.
For-profit sector:	includes private health care providers, pharmaceutical and biotechnology companies.
Civil society sector:	includes academia, non-governmental organisations and philanthropic institutions. Faith institutions could also be considered as part of the civil society sector, as they play a key role in many communities around the world.

Example of a public sector programme with private sector participants:

The Global Partnership to Stop TB was formed in 1998. In line with the global TB-related Millennium Development Goals to halt and begin to reverse the incidence of TB by 2015, the Stop TB Partnership set targets to halve TB prevalence and death by 2015 (WHO 2006a).

The Stop TB Partnership's DOTS Expansion Working Group established a PPM Subgroup in 2003 with members from the private sector, academia, national TB programmes, policy makers, field experts, international technical partners and donor agencies. It aims to engage all care providers in PPM approaches and promotes the use of the International Standards for Tuberculosis Care (ISTC).

Example of a PPP orchestrated by a company from the private sector

The Lilly MDR-TB Partnership is a public-private initiative led by Eli Lilly and Company to address the expanding crisis of MDR-TB together with 20 global health and development organisations, academic institutions and private companies in over 80 countries. The partnership is pursuing a comprehensive strategy to fight MDR-TB by providing access to medicines, transferring manufacturing technology, training health care workers, raising awareness of the disease and providing resources for prevention, diagnosis and treatment of people living with MDR- TB. Partners are: Aspen Pharmacare, Eli Lilly and Company, Harvard University and Partners in Health (PIH), Hisun Pharmaceutical, International Council of Nurses (ICN), International Federation of Red Cross and Red Crescent Societies (IFRC), International Hospital Federation (IHF), Purdue University, RESULTS Educational Fund, Shasun Chemicals and Drugs, SIA International/Biocom, Stop TB Partnership, TB Alert, The Advocacy Partnership, U.S. Centers for Disease Control and Prevention (CDC), World Economic Forum (WEF), World Health Organization (WHO) and the World Medical Association (WMA).

Lilly has invested USD 135 million so far in the fight against TB. It recognises the need to fund a variety of partners with encouragement to tackle key problems such as infection control together, which is why it financed the Interprofessional workshops mentioned at the beginning of this toolkit.

Potential benefits of PPPs are, for instance, increased access to TB services, additional leverage of resources, improvements on the private providers' technical limitations and further implementation of national guidelines for the prevention of DR-TB.

Opportunities for reflection:

- Synthesise the main national and supranational organisations involved in TB care in your region. Reflect on how their work affects your institution, and whether it is obtaining as much support from them as it could.

.

Team Exercise 3: SWOT Analysis

Step 1:
Refer to both parts of this toolkit.

Step 2:
Explain the aim of this SWOT analysis as follows:

What is it?
You can use SWOT analysis to identify and analyse the Strengths and Weaknesses of your infection control practices and your potential for interprofessional working. In addition you can analyse the Opportunities and Threats revealed by the information you have gathered on the external environment.

Why use it?
To develop a plan that takes into consideration many different internal and external factors, and maximises the strengths and opportunities while minimising the impact of the weaknesses and threats.

How to use it?
To perform SWOT analysis, use a large blank sheet divided into four (see below) and list the key factors in each quadrant. If the group is larger than six you need to consider splitting the group up with smaller groups either working on different segments or each completing the whole thing. Whatever happens there needs to be a final discussion to ensure all the ideas are shared with the whole group.

Step 3:
Draw the table below on a large piece of paper and complete it with your colleagues.

Strengths: e.g. What is being done well? What specific resources are available?	Weaknesses: e.g. What is being done less well? What specific resources missing?

Opportunities: e.g. Are there any consultations due? Who is keen to help at a strategic level? Have any reports highlighted the issue?	Threats: e.g. What other competition is there for resources? Which policies hinder progress in IC? How well do the authorities understand the issue?

PLEASE NOTE: You may find it helpful to complete a SWOT analysis on both your infection control practices and the opportunities and challenges involved with interprofessional working. Having completed your SWOT analysis refer back to teamwork exercises 1 and 2 and see if there is anything that needs to be amended.

Conclusion

TB is undoubtedly a complex issue to tackle. There are many ways that can help prevent the spread and just as many hurdles to their implementation. Now that we have started to implement inter-professional collaboration and are taking constructive steps towards a joint approach to tackle the global TB burden we have a better chance of getting over these hurdles. Although there is cause for optimism, major challenges remain. Only when everyone involved in the care of TB - at any level, no matter how humble their role - does their part and is recognised for their contribution, can a health system aspire to excellence and attempt to eradicate TB. Many IC measures do not require much effort or expense: as mentioned before, simple actions like triaging coughing patients, proper cough etiquette, natural ventilation and hand washing cost very little, yet provide immense benefits as long as they are implemented and adhered to consistently by everyone. For example, an open window policy still requires people to stand up, open the windows in question, and keep them open: without such efforts from everyone involved, the policy would remain on paper possibly printed and taped onto a closed window for every passerby to read and do nothing about. As crude as that may sound, it is in many cases nothing but the plain reality.

There is an urgent need to develop new and strengthen existing partnerships. If joint efforts are made by all stakeholders involved in TB care and control, TB IC measures will be successfully implemented. Although suggesting courses of action for present and future partnerships would be far beyond the scope of this toolkit, it is hoped that it will stimulate awareness and encourage teams of front- line workers to critically reflect on current practices and identify potential avenues for actual IC and teamwork improvement. ICN and its partners are committed to strengthening teamwork and collaboration and will continue to work to strengthen TB care and control in what is one of the most complex challenges of our time.

Appendix A: Fact Sheets Infection Control

A.1 Ventilation systems

A.2 Use of UV-lights

A.3 Personal Protective Equipment

A.4 Cough etiquette

A.5 Hand hygiene

A.1: Ventilation systems

- Good ventilation can help reduce the risk of infection by diluting and/or removing infectious particles in the air. The better the area is ventilated, the lower the risk of transmission of TB and other airborne infections.
- A well-ventilated space has air constantly entering and leaving, allowing an effective mixing and replacement of air. This dilutes the concentration of infectious particles.
- Ventilation works much better when it is controlled, so that the air movement flows in the way it is meant to.
- This is the case with mechanical ventilation (as long as it is properly planned, installed, and maintained), but not with natural ventilation since it is difficult to control the direction of the wind.

Natural ventilation

- Air enters and leaves building through doors and windows.
- Needs to be effective in settings without centralised air systems, particularly in areas where people congregate (e.g. waiting rooms).
- It is important to have doors and windows open as much as possible.
- During extremely cold temperatures windows and doors should be left partially open and patients, visitors as well as staff be encouraged to wear extra warm clothing.

How to improve natural ventilation?

- Ensure all occupied rooms have access to fresh outside air.
- Keep doors and windows open as much as possible. Openings on opposite walls are preferable as they improve the air flow.
- Use fans and keep them running in occupied spaces.
- If possible, fans should be placed in areas where they add to natural air currents and flow from clean to less clean areas.

Mechanical ventilation

- Mechanical ventilation systems circulate air in a building mechanically.
- Mechanical ventilation dilutes the air, which helps to prevent the spread of TB.
- Mechanical ventilation systems must be well-designed, maintained and operated.
- A room under negative pressure has a lower pressure than adjacent areas, so air is drawn into the room. This prevents infectious particles from escaping.
- Mixed mode ventilation systems combine the use of mechanical and natural ventilation.

CAUTION: mechanical ventilation systems may also inadvertently spread TB through recirculating air to another room or other areas. The risk of spreading TB through mechanical ventilation can be reduced by using filters to remove infectious particles, replacing room air with fresh outside air; and by using ultraviolet germicidal irradiation (UVGI) lamps to disinfect recirculating air (see separate fact sheet).

Air recirculation

- Mechanical system supplies air to the room.
- Air mixes with room air and is drawn back to the central unit.
- Air is filtered, heated and/or cooled before returning to the room.
- UVGI lamps can be used along with high efficiency particulate air filters (HEPA filters) to further clean the air.
- Appropriate filters can remove many airborne particles (including TB bacilli) from the air.
- HEPA filters fit in most central ventilation systems and remove approximately half of all TB droplet nuclei from the air.
- Lint filters will generally not remove TB droplet nuclei, but are less expensive than HEPA filters.
- Any contaminated air that might be recirculated into a room or exhausted near people must be filtered.
- Maintenance of filters is critical because as dust accumulates, the fan can move less and less air through the filter, resulting in reduced dilution and removal of infectious particles.
- Adequately maintained HEPA filtration devices can help clean room air if there is sufficient room air mixing and the device's airflow is adequate to the size of the room.

Monitoring of environmental controls

- Develop a maintenance schedule.
- Designate one person to monitor environmental control measures and keep a log of progress, ensure written records for all routine maintenance activities.
- Check windows and doors daily including at night.
- Fans should be checked on a monthly basis.
- Filters should be checked monthly and replaced when coated with dust (HEPA filters can last up to 5 years).
- Air ducts of central ventilation system should be checked annually and cleaned with vacuum cleaner.
- Ventilation units and thermostats should be checked annually.

Air changes per hour (ACH)

- ACH = Volume of air moved in one hour. One ACH means that the volume of air in the room is replaced in one hour.
- Calculating ACH is a simple way to assess ventilation.
- WHO recommends 6 to 12 ACH to prevent airborne infection. Notice that even at this ventilation rate, it takes 23 minutes after droplet nuclei are released to clear 99% of them from the room.
- The higher the ACH, the better the dilution and the lower the risk of airborne infection.

A.2: Use of UV-lights

- Ultraviolet Germicidal Irradiation lamps disinfect recirculated air.
- Priority should be given to achieving adequate ACH using ventilation systems. UVGI is a complementary IC measure; it requires air mixing to be effective.
- Upper room UVGI devices must be properly designed, installed, maintained and operated.
- May be capable of air disinfection equivalent to 10-20 air changes per hour.
- Air disinfection is decreased by as much as 80% with incomplete air mixing.
- Precautions are necessary to avoid adverse effects to the skin and eyes.
- UVGI monitoring is important to ensure that the radiation level is effective for disinfecting the air, and is safe for room occupants.
- Scheduled/routine measurements of UVGI should be performed by specialised technicians (according to the standards provided by the producer and in line with existing regulations) to determine the performance of the devices.

Appropriate settings for UVGI

- Large, overcrowded congregate settings where TB is often undiagnosed and where ventilation is insufficient.
- Examples include Casualty (Emergency) departments, waiting areas in health facilities, hospital wards, homeless shelters and sputum induction booth.

Upper-air UVGI is suitable for a particular room if:

- There is a high ceiling (so people cannot look into the lamp).
- Fans or ventilation system mix the disinfected upper room air with the potentially contaminated air below.
- Although upper-air UVGI will help dilute the overall room concentration of droplet nuclei, it cannot protect a HCW from airborne infection occurring at very close proximity to the patient (called the "near field"). The HCW should use respiratory protection.
- Other IC measures are important in this situation.

A.3: Personal Protective Equipment

- The selection of protective equipment must be based on an assessment of the risk of transmission of TB bacteria to the patient or to staff or to family/community members.
- Everyone involved in TB care and management should be educated about standard principles and trained in the use of protective equipment.
- Adequate supplies of single use gloves and masks/respirators should be made available wherever care is delivered. Disposable plastic aprons or gowns should be made available when advised by the infection control team.

Four types of personal protective equipment:

1. Masks/respirators (fit testing, duration of usage, storage)

It is essential to understand the difference between face masks and respirators:

Facial masks /Surgical masks:

- Do prevent the spread of micro-organisms from the wearer to others by capturing large wet particles.
- DO NOT provide protection to the wearer from inhaling small infectious droplet nuclei in the air.
- Must be large enough to fully cover the nose, lower face, jaw and facial hair.
- Must be made of fluid resistant materials.
- Should be considered for suspect and known TB patients leaving isolation rooms for medical essential procedures.

Respirators:

- Protect the wearer from inhaling droplet nuclei.
- Filter out infectious aerosols.
- Fit closely to the face to prevent leakage around the edges.
- N95 respirators (USA standard) or FFP2 and FFP3 (European standard) effectively filter out ≥95% of the particles 0.3µm in aerodynamic diameter.
- Use of N95, FFP2 or FFP3 respirators are recommended for HCWs caring for patients with confirmed or suspected infectious TB (in particular MDR-TB) and HCWs performing aerosol-generating procedures on infectious TB patients: bronchoscopy, intubation, sputum induction, use of high speed devices for lung surgery or autopsy.
- They are disposable but may be re-used.
- Humidity, dirt or crushing are main factors that lead to deterioration of respirators.

- HCWs should be fit-tested for personal protective equipment because if the respirator is not fitted correctly, infectious droplet nuclei can easily enter, potentially resulting in infection.
- HCWs need training on proper respirator use.
- Respirators need to be worn by all personnel entering high-risk areas, such as sputum induction rooms, bronchoscopy rooms, autopsy rooms, DR-TB patient rooms or any location where there are known or suspected patients with TB.

WHENEVER RESPIRATORS ARE USED, A RESPIRATOR PROGRAMME IS NECESSARY.

- One person should be given the authority and responsibility to manage the programme.
- Written procedures should describe when and how respirators are to be used.
- Health screening is done to be sure that HCWs are physically capable of performing job duties when wearing a respirator.
- Training should include information on the risk of TB transmission and how to prevent it, and the appropriate use of respirators.
- Respirators should be selected that meet standards for protection (N95, FFP2 or FFP3).
- Several sizes are necessary to fit a range of faces.
- The respirator programme should be evaluated periodically.
- Annual fit testing.
- Ordering, supplying and stocking appropriate respirators.

EMPLOYEES SHOULD PASS A FIT TEST:

- Prior to initial use.
- Whenever a different respirator face piece (size, type, model or make) is used.
- Periodically thereafter.
- Whenever changes in the worker's physical condition or job description that could affect respirator fit are noticed or reported. Storage of respirators only in dry and clean place (not in a plastic bag); never try to decontaminate a respirator.

2. Gloves

- Wearing gloves does not replace the need for hand washing.
- Gloves must be worn for all activities that have been assessed as carrying a risk of exposure to blood, body fluids, secretions and excretions, for collecting sputum samples, handling contaminated items or surfaces, for contact with sterile site, and non-intact skin or mucous membranes, and when handling sharp or contaminated instruments.
- Gloves must be worn as single use items. They are put on immediately before an episode of patient contact or treatment and removed as soon as the activity is completed. Gloves are changed between caring for different patients, or between different care/treatment activities for the same patient.
- Gloves must be disposed of as clinical waste and hands decontaminated, ideally by washing with liquid soap and water after the gloves have been removed.

- Gloves must be available in all clinical areas.
- Sensitivity to natural rubber latex in patients and staff must be documented and alternatives to natural rubber latex must be available.

Glove DOs:
- DO wear the correct size.
- DO change gloves during prolonged cases.
- DO keep fingernails relatively short.
- DO use water-soluble hand cream and moisturizers.

Glove DON'Ts:
- DON'T use oil-based hand lotions or creams.
- DON'T use perfumed hand lotions or creams.
- DON'T store gloves in areas with extreme temperatures.

3. Plastic aprons/gowns
- Plastic aprons and gowns need to be made out of fluid resistant material to provide protection from body fluids. They must be worn when in close contact with the patient and when there is a risk that clothing may become contaminated with pathogenic microorganisms or blood, body fluids, secretions or excretions.
- Plastic aprons/gowns should be worn as single-use items, for one procedure or episode of patient care, and then discarded and disposed of as clinical waste.

4. Eye protection
- Includes clear plastic goggles, safety glasses, face shields, and visors. However, goggles provide the best eye protection.
- Eye protection must be worn where there is a risk of blood, body fluids, secretions or excretions splashing into the face and eyes.

A.4 Cough etiquette

The health care facilities should:

- Ensure the availability of materials for adhering to cough etiquette in waiting areas, patient and treatment rooms for patients, visitors, and staff:
- Provide tissues and non-touch waste containers to dispose of used tissues.
- Provide surgical masks to TB suspects and visitors.
- Promote cough etiquette and hand washing by using posters in high traffic and high risk areas.
- Provide respirators for staff.
- Provide dispensers of alcohol based hand rub and/or antiseptic wipes.
- Provide clean clear water, soap and disposable towels for hand washing.

To minimise the spread of TB germs, all persons with signs and symptoms of TB should be asked to:

- Cover the mouth and nose when coughing, speaking or sneezing.
- Avoid coughing directly into hands and use a tissue.
- Dispose of the tissues in the nearest waste container immediately after use.
- Wash hands with soap and water and antiseptic hand rub after contact with respiratory secretions and contaminated objects/materials.

Patients and visitors need to be educated in cough hygiene. This includes instructing them to cover their noses and mouths when coughing or sneezing, and providing surgical masks or tissues.

A.5 Hand hygiene

Hand hygiene is an effective measure in the prevention of the spread of infection yet compliance is often poor because it is perceived to be a chore, it is time consuming and may lead to skin irritations. Effective hand hygiene can significantly reduce infection rates and should not be omitted even when gloves are worn. Hand hygiene can be achieved by hand washing and by the use of alcohol based hand rub.

Hand washing should be performed using:

- Liquid soap/skin disinfectant.
- Warm running water.
- Friction.
- Thorough drying with disposable paper towels.

Hands should be washed with skin disinfectant, e.g. chlorhexidine:

- Before an antiseptic procedure.
- After contact with body secretions and excretions, e.g. sputum.
- After handling contaminated laundry or equipment.
- After spillage cleaning.
- After removal of items of contaminated protective clothing, e.g. masks, respirators, gloves, aprons.

Hands should be washed with liquid soap:

- Before commencing duty and at the completion of duty span.
- Before and after caring for any patient.
- Whenever hands are visibly soiled or contaminated with dirt or organic matter (i.e. following the removal of gloves).
- Before serving meals or drinks.
- Before the administration of medication.
- After toilet use.

- Hands should be decontaminated between caring for different patients or between different care activities for the same patient.
- Cuts and abrasions must be covered with waterproof dressings.
- Fingernails should be kept short, clean and free from nail polish. False nails should not be worn by clinical staff.
- Hand hygiene resources and individual practice should be audited regularly and the results fed back to health care workers.
- Education and training in risk assessment, effective hand hygiene and glove use should be part of the health care workers regular training update.

Use of antiseptic hand rub:

- Alcohol-based hand rub is a convenient and efficient alternative to hand washing between caring for different patients or between different caring activities for the same patient as long as hands are not soiled, they must be free of dirt and organic material.
- The hand rub solution must come in contact with all surfaces of the hand. The hands must be rubbed together vigorously, paying particular attention to the tips of the fingers, until the solution has evaporated and the hands are dry.
- Hands should be washed with soap and water after several consecutive applications of alcohol and rub.
- Staff should be aware of the potentially damaging effects of hand decontamination products. They should be encouraged to use an emollient hand cream regularly, before going on duty and when off duty, to maintain the integrity of the skin.
- Alcohol-based hand rub should be made easily available to patients in all health care facilities.

Appendix B: Tools and techniques to encourage collaborative working

Brainstorming

What is it?
Brainstorming is an interactive technique that helps a group generate as many ideas as possible in a short time period.

Who uses it?
Any group of any number who has interest in the problem. If you invite people with different perspectives to brainstorm, you are more likely to see innovative ideas generated by the group.

How to use it:
1. Explain the objective of the session: for example to select problems, analyse causes, or generate ideas.
2. Explain the technique to the group. Tell them that you are looking for a lot of ideas, and that you want their thoughts and ideas to flow freely. There is no right or wrong answer. The idea of brainstorming is to provide as many innovative ideas as possible.
3. Silent reflection: Ask the participants to think about the proposed objective or topic for approximately 5 minutes.
4. Brainstorm: The participants call out their ideas and add those that come to mind during the discussion. Write down the ideas using the words of the speaker. Ask for clarification if the meaning is not clear (approximately 20 minutes).
5. Once the list is finished, discuss it with the group:
   - clarify the meaning of some ideas;
   - combine similar ideas that are worded in different ways;
   - eliminate those ideas, which are not related to the objective of the session.

Issues

At the end of this stage, you will have reduced the list of ideas to those that represent most of the major ideas of the group (5-15 minutes).

Limitations of brainstorming

- Can be unfocused.
- Needs to be limited to 5 - 7 minutes.
- People may have difficulty getting away from known reality.
- If not facilitated well, criticism and evaluation may occur.

Discussion

Advantages of discussions

- Discussions ensure a two-way dialogue between facilitator and participants.
- Discussions help to actively contribute to the learning process.
- Quick way to review experience and thus reinforce what has been learnt.
- Rapid way to find out what group has learnt, understood or remembered.
- Quick method of giving immediate feedback to confirm or correct errors.
- Supports the development of attitudes and to encourage participants to give expressions to their ideas.
- Inexpensive.

Limitations of discussions

- Time may limit discussion period.
- Quality is limited to quality of questions and discussion
- Preparation of discussions
- Requires that questions be prepared prior to discussion.

Discussion methods and their uses:

Question and answer

This method is used in different circumstances, such as to find out what participants already know at the beginning of a session, when the facilitator wants to review what students have learned from an experience, or as an informal revision of knowledge or to lead to a discussion.

Class discussion

Useful at difficult points in a session or at the end of a topic as a review tool.

Syndicate discussions

This is an interesting way of covering a wide area where the group is divided into several subgroups. Each group prepares different assignments and reports back to the class.

Debates and panels

Support the thinking about controversial topics. Debates need to be carefully controlled by the facilitator to make sure arguments are based on facts. For a panel discussion, several participants prepare a topic and present it to the group, which will then ask the panel questions.

Snowball discussion

This method involves each participant in the discussion. The facilitator poses the question. Then it is discussed, first in pairs, and then pairs join to make a groups of four, later they join to make groups of eight. This ensures that each participant is involved and hears many point of views expressed.

Small Group Activity

What is it?
Small group activities involve splitting the participants up so they can work together on particular tasks or have in-depth discussions about particular topics.

Why use it?
- To allow participants to explore issues at a greater depth.
- To build problem solving skills.
- To strengthen independent learning.
- To encourage teamwork.
- To develop peer teaching through the sharing of ideas and experiences.

How to use it:
1. Explain the objective of the session: for example to work on specific problems, generate ideas as a team, consider particular issues in more depth.
2. Split students into small groups according to the focus of the group work activity
   a) randomly (e.g. give each a number 1-3 if you need 3 groups, 1-4 if you need 4 etc);
   b) by professional group;
   c) by work location.
3. Explain the activity to the group.
   a) what you would like them to discuss.
   b) what will they feed back to the whole group.
   c) how much time they have.
4. Invite them to select a scribe to write comments down and a rapporteur to give feedback on behalf of the group.
5. Encourage the groups to form circles so that everyone can participate easily in the discussion.
6. Facilitators can be used to make sure time is kept, the discussion remains focused and all the members of the group are encouraged to participate. If facilitators are not available it is important for the trainer to visit each group to monitor progress and answer questions.

Advantage of small group activities
- Permit a facilitator/participant dialogue.
- Facilitate evaluation.

Limitations of small group activities
High cost in personnel and time (unless peer teaching is used).

Demonstration

What is it?

A demonstration is used to show participants by example a particular technique or practice, for instance the correct way to wear a mask by actually using a mask and fitting it in front of them. This is even more effective if the students can practice themselves.

Why use it?

- To teach a specific skill or technique.
- To model a step-by-step-approach.
- To build skills/competence.
- To increase knowledge.
- To develop observation skills.
- To change attitude.

Advantage of demonstrations

- Inexpensive.
- Highly interactive.
- Easy to focus learner's attention.
- Shows practical application of a method.
- Assesses participant's mastery of topic

Limitations of demonstrations

- Can be expensive, depending on the material used in the demonstration.
- Number of participants is limited.
- Keeps the participants busy.

Role-play

What is it?
During role play students are given a particular scenario and a number of roles to act out in order to experience a situation from a different perspective from the one they may be used to. It is also used to test out alternative practices and examine their potential psychological, social and emotional impact on those involved.

Use of role-play
- To build skills/ competence.
- To increase knowledge, understanding and empathy.
- To change practice.
- To change attitude.

How to organise role-play
1. If the group is large it may be necessary to split them up (see small group activity).
2. Topics to be addressed in role play may be the trainer's decision or they could be decided by the whole group.
3. However the topics are decided it is useful to give the group(s) an outline of the scenario you want them to act out including the characters involved. Assist them with allocating roles if necessary.
4. Give the groups time to develop a short script and rehearse.
5. Give each group time to perform their scenario.
6. Allow time for discussion with the whole group.

Advantages of role-play
- Problem-oriented.
- Reality-oriented.
- Interactive.
- Problem-solving.
- Allows learners to explore alternative approaches to a situation.

Limitation of role-play
- Can be time consuming.
- Can be a challenge to maintain focus.
- Can be upsetting for some students.

Case study

What is it?

Using a case study involves the presentation of a situation, usually a real or common case, which is relevant to the topic being taught and encourages students to identify key issues and potential solutions.

Why use it?

- To discuss common problems.
- To develop problem-solving skills.
- To promote group discussion and group problem solving.

How to use it?

1. Either display or use handouts to present the overview of a case including the key elements which you would like students to pick up on and discuss.
2. It is useful to have a number of questions prepared in advance for the students to answer.
3. If a real case is being used it is essential to maintain patient and staff confidentiality, i.e. the names of patients, staff and health facility will need to be changed unless you are talking about yourself or you have the signed consent of those involved.

Advantage of case studies

- Problem-oriented.
- Reality-oriented.
- Interactive.

Limitation of case studies

- Can be time consuming.

SWOT analysis

S = Strength
W = Weakness
O = Opportunities
T = Threats

What it is?
You can use SWOT analysis to identify and analyse the Strengths and Weaknesses of your organisation (health care facility as well as TB programme). In addition, you can analyse the Opportunities and Threats revealed by the information you have gathered on the external environment.

Why use it?
To develop a plan that takes into consideration many different internal and external factors, and maximises the Strengths and Opportunities while minimising the impact of the Weaknesses and Threats.

How to use it?
1. Explain the objectives of the session and the process:

2. **Internal analysis:**
   Examine your/the group's capabilities. This can be done by analysing your/the group's strengths and weaknesses.

   Strengths:
   What are your advantages? What do you do well? What do other people see as your strengths?
   Consider this from your own point of view and from the point of view of the people you deal with. Do not be modest - be realistic.

   Weaknesses:
   What could you improve? What do you do badly? What should you avoid?
   Again, consider this from an internal and external basis - do other people seem to perceive weaknesses that you do not see? Are your competitors doing any better than you? It is best to be realistic now, and face any unpleasant truths as soon as possible.

3. **External analysis**:
   Identify those events, issues, trends, evidence that pose opportunities for your organisation/group, and those that pose threats or obstacles to performance. Decide whether the answers or the data collected reveal external opportunities or threats.

   Opportunities:
   What are the good opportunities facing you? What are the interesting trends you are aware of? Where are your support networks? Where is the evidence to support your case?

   Threats:
   What obstacles do you face? Do you have access to the information you need? Who is likely to oppose your position? What is the result of inaction?

4. Enter the information you have collected in steps one and two into a table as illustrated below:

Internal strengths	Internal weaknesses:
External opportunities:	External threats:

5. You can use this information to help you develop a strategy that uses the strengths and opportunities to reduce the weaknesses and threats, and to achieve the objectives of your organisation/group.

Appendix C: Useful reading

Centers for Disease Control and Prevention (CDC)
TB - related publications: www.cdc.gov/tb/

International Council of Nurses (ICN)
TB - related publications: www.icn.ch/projects/tb-mdr-tb/

International Federation of Red Cross and Red Crescent Societies (IFRC)
TB - related publications: www.ifrc.org/what/health/diseases/tb/resources.asp

International Hospital Federation (IHF)
Training Manual for TB and MDR-TB Control for Hospital/Clinic/Health Facility Managers: www.ihf-fih.org/en/Projects-Activities/Current-projects/Fighting-Multidrug-Resistant-Tuberculosis
www.ihf-fih.org/toolkit/index.html#PageReady

World Medical Association (WMA)
Treatment of Multidrug-Resistant Tuberculosis (MDR-TB) guideline and online learning course: www.wma.net/en/70education/10onlinecourses/10mdr_tb/index.html
TB refresher course:
www.wma.net/en/70education/10onlinecourses/40tb_refresher/index.html

World Health Organization (WHO)
TB related publications: www.who.int/tb/publications/en/

References

Banavaliker J. (2008). Control of tuberculosis in high prevalence countries. In: Davies P, Barnes P and Gordon SB (2008),. Clinical Tuberculosis. London: Hodder Arnold.

Banerjee A, Sharma B, Ray A, Kannuri N, and Venkateswarlu T (2004). Acceptability of traditional healers as directly observed treatment providers in tuberculosis control in a tribal area of Andhra Pradesh, India. International Journal of Tuberculosis and Lung Disease, vol. 10, pp. 1260-5.

Bligh D (1980). Educational principles in interprofessional learning. Bethesda: National Center for Biotechnology Information. Royal College of General Practitioners, vol. 14, pp. 810.

Catterick K (2009). Feasible and effective infection control programme to limit nosocomial transmission of drug-resistant TB in Tugela Ferry. Fourth South African AIDS Conference, Durban, abstract 455.

College of Nurses of Ontario (2008). Collaboration among Health Colleges and Professions. Toronto.

Colvin M, Gumede L, Grimwade K, Maher D and Wilkinson D (2003). Contribution of traditional healers to a rural tuberculosis control programme in Hlabisa, South Africa, International Journal of Tuberculosis and Lung Disease, vol. 7, no.9, pp. 86-91.

Centers for Disease Control and Prevention. Infection Control and Prevention Fact Sheets and Guidelines. Available at: www.cdc.gov/tb/topic/infectioncontrol/default.htm.

Dick J and Schoeneman JH (1996). Tuberculosis in the community: perceptions of members of a tuberculosis health team towards a voluntary health worker programme. *Tubercle Lung Disease*, vol. 77, pp. 380-383.

Figueroa-Munoz J, Palmer K, Dal Poz MR, Blanc L, Bergström K and Raviglione M (2005). The health workforce crisis in TB control: a report from high-burden countries. BioMed Central Ltd.

International Council of Nurses (2008). TB Guidelines for Nurses in the Care and Control of Tuberculosis and Multi-drug Resistant Tuberculosis. ICN: Geneva.

International Council of Nurses (2009a). Tuberculosis exposure in the Healthcare Setting: Prevention of Occupational transmissions (Fact sheet). ICN: Geneva.

International Council of Nurses (2007, 2009b, 2010). Healthcare worker safety in the context of drug-resistant TB in low and middle income countries. ICN/IHF/WMA/IFRC Seminar Report. ICN: Geneva.

Joshi R, Reingold A, Menzies D and Pai M (2006). Tuberculosis among Health Care

Workers in Low- and Middle-Income Countries: A Systematic Review. PLoS Medicine , vol 3 (12), pp 2376 - 2391.

Kironde S and Kahirimbanyi M (2002). Community participation in primary health care programmes: Lessons from tuberculosis treatment delivery in South Africa. Afr Health Sci, vol. 2, no. 1, pp. 16-23.

McDonald C and McCallin A (2010). Interprofessional collaboration in palliative nursing: What is the patient-family role? International Journal of Palliative Nursing, vol. 16(6), pp. 286 - 289.

Menzies D, Joshi R and Pai M (2007). Risk of tuberculosis infection and disease associated with work in health care settings. International Journal of TB and Lung Disease 11(6), pp 593-605.

O'Donnell M (2010). High Incidence of Hospital Admissions with Multidrug- Resistant and Extensively Drug-Resistant Tuberculosis among South African Health Care Workers. In: Annals of Internal Medicine, vol. 153(8), pp. 516-23.

Reeves S, Zwarenstein M, Goldman J, Barr H, Freeth D, Hammick M and Koppel I (2009). Interprofessional education: effects on professional practice and health care outcomes (Review).

Rieder HL (1999). Epidemiologic Basis of Tuberculosis Control, first edition. Paris: International Union Against Tuberculosis and Lung Disease (The Union).

Ryan F (1992). The Greatest Story Never Told. Sheffield: Swift Publishers.

Skodric-Trifunovic V, Markovic-Denic L, Nagorni-Obradovic L, Vlajinac H, Woeltje KF (2009). The risk of occupational tuberculosis in Serbian health care workers. In: International Journal of TB and Lung Disease 13(5), pp 640–644.

Stop TB Partnership and WHO (2006). Global Plan to Stop TB 2006 - 2015. Geneva: WHO.

Stop TB Partnership and World Health Organization. Presentations of the TB Infection Control Subgroup. Available at: www.stoptb.org/wg/tb hiv/icstrainlist.asp, accessed February 2010.

Wilkinson D, Davies GR, Conolly C. (1996). Directly observed therapy for tuberculosis in rural South Africa, 1991 through 1994, American Journal of Public Health.

Williams G, Alarcon E, Jittimanee S, Walusimbi M, Sebek M, Evita Berga E and Scatena Villa T (2007). Best Practice for the Care of Patients with Tuberculosis: A Guide for Low Income Countries. Paris: Union.

World Health Organization (2001). Community TB care in Africa. A collaborative project coordinated by WHO. Geneva: WHO.

World Health Organization (2002). The world health report 2002: reducing risks, promoting healthy life. Geneva: WHO.

World Health Organization (2006a). The Global Plan to Stop TB 2006 - 2015. Geneva: WHO.

World Health Organization (2006b). Engaging all Health Care Providers in TB Control: Guidance on Implementing Public-Private Mix Approaches. Geneva: WHO.

World Health Organization (2008). Community involvement in tuberculosis care and prevention - Towards partnerships for health. Geneva: WHO.

World Health Organization (2009a). A Ministerial Meeting of High M/XDR-TB Burden Countries, Addressing the key bottlenecks hampering the prevention and scale-up of M/XDRTB. Geneva: WHO.

World Health Organization (2009b). Global tuberculosis control: epidemiology, strategy, financing. WHO report 2009. Geneva: WHO.

World Health Organization (2009c). WHO Policy on TB Infection Control in Health-Care Facilities, Congregate Settings and Households. Geneva: WHO.

World Health Organization (2010). Management of Tuberculosis Training for Health Facility Staff, TB Infection Control in your Health Facility. Geneva: WHO.

International Council of Nurses
3, place Jean-Marteau, 1201 Geneva Switzerland

Tel: +4122 908.01.00
Fax: +4122 908.01.01
E-mail: icn@icn.ch

www.icn.ch