Development of the Nursing Practice Guidelines for Prevention of Multidrug-Resistant Tuberculosis among Hospitalized Adult Patients in Bangladesh

Mohammad Nurul Anowar

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Thesis Title	Development of the Nursing Practice Guidelines for Prevention of Multidrug-Resistant Tuberculosis among Hospitalized Adult Patients in Bangladesh
Author	Mr. Mohammad Nurul Anowar
Major Program	Nursing (International Program)

Major Advisor:

……..
(Assist. Prof. Dr. Wongchan Petpichetchian)

Co-advisor:

…….....
(Assist. Prof. Dr. Sang-arun Isaramalai)

Examining Committee:

…….....Chairperson
(Assoc. Prof. Dr. Aranya Chaowalit)

…….....
(Assist. Prof. Dr. Wongchan Petpichetchian)

…….....
(Assist. Prof. Dr. Sang-arun Isaramalai)

…….....
(Assoc. Prof. Dr. Praneed Songwathana)

…….....
(Dr. Petchawan Pungrassami)

The Graduate School, Prince of Songkla University, has approved this thesis as partial fulfillment of the requirements for the Doctor of Philosophy Degree in Nursing (International Program)

……
(Prof. Dr. Amornrat Phongdara)
Dean of Graduate School

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ABSTRACT

This study aims to develop the nursing practice guidelines for the prevention of MDR-TB (NPG: MDR-TB) among hospitalized adult patients and to evaluate its efficiency. The research and development type of design was applied in this study. The study was conducted in two phases. In the first phase, a comprehensive literature review, observations, and interviews with eleven local stakeholders were conducted to gather evidence included in the initial guidelines. Then, the content validity of the guidelines was examined by applying two-round Delphi technique with 25 medical, pathological and nursing experts. In the second phase, the efficiency of the NPG: MDR-TB was evaluated by 64 nurses from the three levels of prevention: level 0 (non-TB ward), level 1 (TB ward), and level 2 (MDR-TB) in a national tertiary care setting in Bangladesh.

Initially, 227 recommendations were formulated for nurses working at level 0, level 1, and level 2. The guidelines provided recommendations for the identification, assessment and treatment of risk for the development of MDR-TB. Findings of the two-round Delphi were used for refining the final guidelines which

contained 47, 81, and 70 recommendations across the three levels, respectively. The findings of the second round revealed that each statement received > 75% experts' agreement regarding the relevancy, clarity, and applicability with a median > 5 and IQR ≤ 1.00 on a 7-point Likert scale (0 to 6). The efficiency of the guidelines was assessed by comparing the nursing practices for the prevention of MDR-TB between the pre and post implementation of the NPG: MDR-TB. Comparing the mean scores of pretest and posttest, it was found that posttest scores at all levels were significantly higher than pre test scores ($p < .001$).

The findings indicate that the NPG: MDR-TB is applicable and efficient to prevent the development of MDR-TB among hospitalized patients. However, the guidelines have only been primarily studied, therefore, further improvement and evaluation is needed.

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Mohammad Nurul Anowar

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CHAPTER 1

INTRODUCTION

Background and Significance of the Study

Multidrug-resistant tuberculosis (MDR-TB) is a scourge and a devastating form of tuberculosis (TB), caused by the strains of mycobacterium tuberculosis (M. tuberculosis). It is resistant to both isoniazid and rifampicin with or without other drugs. In many countries, it has become a significant clinical and public health problem, causing an impediment in providing effective treatment and is a serious threat to the global TB control efforts (Sharma & Mohan, 2006).

MDR-TB is not a new phenomenon but the actual magnitude of MDR-TB is still unknown. In 2008, only less than 7% of the total estimated MDR-TB cases were reported throughout the world from 127 countries (World Health Organization [WHO], 2010b). According to the WHO estimation, there were 440,000 MDR-TB patients globally in 2008. Among them 86% was in the 27 high MDR-TB burdened countries including Bangladesh, where the estimated number of cases is high (WHO).

In Bangladesh, the exact number of MDR-TB sufferers is also unknown. However, as a high burdened TB country the absolute number of MDR-TB may be high in Bangladesh (National Tuberculosis Control Programme [NTP], 2009b). According to the WHO estimation, Bangladesh is the seventh TB and MDR-TB burdened country in the world with an estimated 360,000 incident cases of TB in 2009 and 9,800 MDR-TB cases in 2008. In addition, a recent study reported that the percentage of MDR-TB strains was about 19.7% (221/1123) among the suspected TB

cases in the outpatient department of a tertiary chest disease hospital in Bangladesh (Rahman, Kamal, Mohammed, Alam, & Ahasan, 2009).

MDR-TB is more likely to be an adult disease. Many studies have revealed that the majority of MDR-TB sufferers are adult (Baghaei et al., 2009; CDC, 1999; Cobo et al., 2001; Franke et al., 2008). In these studies, the mean ages of MDR-TB patients were in a range of 31.17 to 49.6 years. Similarly, in some other studies the median age of MDR-TB patients were in a range of 28 to 44 years (Flament-Saillour, Robert, Jarlier, & Grosset, 1999; Hutchison, Drobniewski, & Milburn, 2003; Lockman et al., 2001). Moreover, from a systematic review of 29 MDR-TB studies, it was found that MDR-TB patients were likely to be younger than 65 years (Faustini, Hall, & Perucci, 2006).

Several factors are responsible for a person to develop MDR-TB and this is essentially a ‘man-made’ tragedy (Sharma & Mohan, 2006). However, the prior treatment for TB was found to be the major risk factor in the occurrence of MDR-TB. Some other significant risk factors are: alcohol abuse/dependence, being young adults, lack of directly observed treatment (DOT), having lung cavities due to lesions, being prisoners or ex-prisoners, having sputum smear positive, getting irregular treatments, being treated in the hospital setting or previous hospitalization, foreign-born, and poor socio-economic conditions such as lack of home water sewer system, and patients with high labor intensive occupations (Amin, Rahman, Flora, & Azad, 2009; Barroso et al., 2003; CDC, 1999; Choi et al., 2007; Moniruzzaman, Elwood, Schulzer, & FitzGerald, 2006; Ruddy et al., 2005).

MDR-TB affects social, economical, and psychological well being along with the physical health of patients. The patients with all kinds of TB have to

face multiple physical problems from both the disease and side effects of treatment drugs. In the beginning, the disease is expressed by a patient experiencing weakness, weight loss, fever, and night sweats (NTP, 2009a) but gradually patients become very thin and weak. Furthermore, many studies have reported various adverse drug reactions of MDR-TB treatment including nausea/vomiting, diarrhoea, arthralgia, dizziness, hearing disorders, gastritis, depression, peripheral neuropathy, headache, abdominal pain, psychosis, and renal failure/nephrotoxicity (Nathanson et al., 2004; Pinon et al., 2010; Sharma & Mohan; Tupasi et al., 2006). Some of these adverse effects may be irreversible like a hearing disorder and peripheral neuropathy (Pinon et al.; Tupasi et al.).

Patients social well being is impaired by the social stigma related to TB. People's knowledge about TB is often a tangle of superstitions and misconceptions. Social stigma is high since people believe that TB is a hereditary disease. Rajeswari, Muniyandi, Balasubramanian, & Narayanan (2005) stated that the stigma related to the TB disease interferes with patients' social activities such as visiting friends even after the completion of treatment. Thus, the patients feel inhibited in revealing the diagnosis to their friends even to their spouse.

TB and MDR-TB have considerable socio-economical impacts on the patient's family in terms of income, health, nutrition, and education if the patient is the main wage earner. In a study conducted in India, it was found that 34% of patients' families could not sustain an adequate diet, or purchase clothing, books for their children due to a loss of income and the burden of treatment costs (Rajeswari et al., 1999). Many patients have to borrow money and sell their property to seek treatment and diagnosis (Kamolratanakul et al., 1999; Rajeswari et al.). At the

national level, the government needs a large amount of money to prevent, identify, diagnose and treat TB (WHO, 2007).

Psychological problems are a common issue for MDR-TB patients and pose a challenge in their treatment (Vega et al., 2004). A study found that a psychological disorder is one of the predictors of death in the patients who defaulted on MDR-TB treatment (Franke et al., 2008). Generally, many patients are shocked when they are told they have TB (ICN, 2008). Moreover, psychiatric complications due to the intake of anti-TB drugs such as drowsiness, irritability, dizziness, depression, mood swings, and hostility, have been reported immediately since the invention and administration of anti-TB drugs (Lewis, Calden, Thurston, & Gilson, 1957). However, the incidence rate of anxiety, depression and psychosis are high in MDR-TB patients during course of their therapy (Vega et al.).

Appropriate treatment of TB and MDR-TB using effective multidrug-regimens is essential to control the emergence of drug resistant TB or MDR-TB. But the MDR-TB treatment is prolonged (Loddenkemper, Sagebiel, & Brendel, 2002), expensive and toxic, and less effective than the treatment of drug-susceptible TB (Long, 2000). The cure rate of MDR-TB is also not satisfactory (Espinal et al., 2000). There is no effective treatment and cure for some MDR-TB patients (Puri & John, 1997). Therefore, the prevention of the disease (MDR-TB) is the priority rather than the treatment or cure of the disease (Bastian & Colebunders, 1999).

The prevention of drug-resistant TB or MDR-TB emergence in the first place is an ideal means of its control (Prasad, 2005). For the prevention of TB and MDR-TB, several preventive strategies have been frequently used and suggested such as: DOTS strategies (WHO, 2008), infection control strategies (Centers for Disease

Control and Prevention [CDC], 1994, 2005; Dooley et al., 1990), action plan to combat MDR-TB (CDC, 1992), standard care of TB and MDR-TB (International Council of Nurses [ICN], 2008 ; Williams et al., 2007). Of these, a hierarchy of control measures includes three priority strategies; administrative measure, engineering measure, and personal respiratory protective measure has been frequently used and recommended for preventing and controlling TB and MDR-TB (Blumberg et al., 1995; Maloney et al., 1995; Wenger et al., 1995). However, there is no single prescription or way which is enough alone for the control or prevention of MDR-TB. Thus, the combination of several strategies is needed for the prevention of MDR-TB.

Since MDR-TB was reported, several initiatives have been taken at national and international levels to overcome this problem. Many guidelines had been developed and revised by different national and international organizations as an effort to control TB and MDR-TB (CDC, 1994; ICN, 2008 ; NTP, 2009a, 2009b; WHO, 2008). Still there is a lack of appropriate and effective evidence-based guidelines for nurses in preventing MDR-TB. From the review of TB and MDR-TB related articles and guidelines, it may be concluded that most of these focus on the technical aspects of the control of TB. These existing guidelines have less emphasis on the nursing care of TB patients and only one guideline for nurses was found. It was developed by the ICN for the effective and appropriate management of TB and MDR-TB (ICN). However, it is unclear whether it is evidence-based guidelines and may or may not be effectively applicable to some health systems such as that of Bangladesh. In addition, in the national TB and MDR-TB guidelines developed for use in Bangladesh, there is very little information reflecting the nurses' role and responsibilities in preventing and controlling TB and MDR-TB.

Nurses are at the frontline in identifying and managing TB and MDR-TB. The nurse's role is crucial in caring and controlling the TB (Ghebrehiwet, 2006) and often undertake a great portion of work in TB control. The ICN estimated that nearly three million nurses work in 22 TB burdened countries (Brown, 2008). In addition, from a high burdened TB country, it was reported that nearly 90% of TB patients are managed by nurses at the primary care level (Dick, Lewin, Rose, Zwarenstein, & Walt, 2004). Moreover, most sophisticated medicines failed where there is lack of vital connection of nurses in providing care. On the other hand, only by strengthening the nursing role can the proper diagnosis and treatment of TB be ensured (Brown). For example, 90% treatment success rate was achieved from a "nurse-led rapid access TB clinic" in London (Cootauco, 2008).

Nurses in Bangladesh are readily available in the hospital/clinical settings for caring patients with TB and MDR-TB. In the clinical settings particularly in TB hospitals/clinics, nurses perform a lot of work in managing diagnostic tests, and carry out and provide prescribed medical treatments to patients with TB and MDR-TB. But these nurses are rarely used to implement some important activities that are very crucial to prevent the emergence of MDR-TB such as observing the patients taking their anti-TB drugs, monitoring the patients side effects of the drugs and checking the completion of anti-TB drugs, following up the patients to assess the patients' conditions, and providing health education to the patients and their relatives. It may be due to lack of support to guide, monitor and evaluate nurses' activities for the proper management and prevention of MDR-TB. Thus, the development of nursing practice guidelines on a basis of available resources and its implementation

becomes essential to improve the nursing activities for the prevention of MDR-TB in Bangladesh.

There is a public health demand for the prevention of MDR-TB. It is important to mobilize the nursing workforce. To ensure the effective nursing contributions in the prevention of MDR-TB, evidence-based guidelines are essential to support the nurses in making appropriate decisions. Although, there is a greater contribution of nursing in the control and prevention of TB and MDR-TB but there is still a lack of initiative to improve the nursing care for the prevention of MDR-TB. As the initiative of nursing effort, this study aims to develop nursing practice guidelines to prevent MDR-TB (NPG: MDR-TB) among hospitalized adult patients.

Objectives of the Study

1. To develop nursing practice guidelines to prevent MDR-TB among the hospitalized adult patients in Bangladesh.

2. To evaluate the efficiency of the newly developed nursing practice guidelines to prevent MDR-TB among the hospitalized adult patients in Bangladesh.

Research Questions of the Study

1. What are the compositions of nursing practice guidelines for the prevention of MDR-TB among the hospitalized adult patients in Bangladesh?

2. How efficient is the newly developed nursing practice guidelines for the prevention of MDR-TB among the hospitalized adult patients in Bangladesh?

Conceptual Framework of the Study

The nursing practice guidelines were developed based on knowledge regarding the prevention of TB and MDR-TB in integration with two major concepts: (a) level of prevention and (b) clinical risk management; and methodology of practice guidelines development. The concept of level of prevention proposed by Mensah et al. (2005) for preventing and controlling coronary heart disease and strokes was used to categorize the target populations in different levels. The clinical risk management framework, produced by the Department of Health, Government of Western Australia (2005) was used to generate the prevention strategies of MDR-TB among hospitalized adult patients in Bangladesh.

Level of Prevention

There are several levels of prevention strategies existing in the health system. The three, four, or five levels of prevention are often described in existing articles. However, the original classification of prevention: primary, secondary, and tertiary prevention was proposed by the US Commission on Chronic Illness in 1957 (Kutash, Duchnowski, & Lynn, 2006). Several authors have also described the same three levels of prevention. But in terms of target population, goals of prevention, and the definition of terms used for the prevention levels, and their usage in preventive medicine are not similar. According to Mensah et al. (2005), all of the existing definitions and classifications of prevention are useful, and can be adjusted to the target population and goals, but the same terms are used inconsistently and often lead to confusion. Therefore, Mensah et al. proposed three levels of prevention approaches: health promotion, primary prevention and secondary prevention on the

basis of the presence of risk factors for the development and recurrence of cardiovascular diseases (CVD). The purpose of this study is to prevent the risk and control the development of MDR-TB by preventing the transmission and development of MDR-TB and its risk factors at three levels: patients without TB and MDR-TB, patients with TB but without MDR-TB, and patients with MDR-TB. Therefore, Mensah et al.'s work on three levels of prevention is selected to guide this study.

In the prevention model of Mensah et al. (2005), prevention is simply defined as (a) health promotion (level 0), (b) primary prevention (level 1) and (c) secondary prevention (level 2). Health promotion is the first level of prevention. It includes the entire population regardless of disease or risk factors status and aims at reducing the average risk of the entire population. This level of prevention is widely known as primordial prevention; the prevention of risk factors at the beginning (Rajendran, 2001; Ursoniu, 2009). Primary prevention is the second level of prevention. It includes persons with no disease but who have one or more risk factors to prevent the development of disease. Secondary prevention is the third level of prevention. It includes persons with an established disease to prevent recurrent events of the disease.

Based on the conceptualization of the three levels of prevention, the researcher categorizes all hospitalized adult patients into three groups: (a) patients without any TB (level 0), (b) patients with TB and having treatment for TB but without MDR-TB, (level 1) and (c) patients with MDR-TB (level 2). There are three levels of prevention: primordial prevention, primary prevention and secondary prevention. These categories was used as a frame of reference in constructing the

guidelines to improve the nursing practice in preventing MDR-TB for all hospitalized adult patients in Bangladesh.

Primordial Prevention

Primordial prevention is the first level of prevention. The target population was hospitalized adult patients without TB and MDR-TB (level 0). In this level, the characteristics of target population of the study are not quite similar to Mensah et al.'s work (2005). For them, in the first level of prevention the target population is the entire population regardless of disease (CVD or stroke) or risk factors. Assigning the target population at this level can be varied according to the aims as the target population (Froom & Benbassat, 2000). In this study, patients who are admitted in the hospital with any diseases or conditions but without TB and MDR-TB such as patients with asthma, chronic obstructive pulmonary disease (COPD) or accidents are the target population for the primordial level (level 0) of prevention. The goal of this level is to reduce risk factors of MDR-TB and to prevent the development of primary MDR-TB (MDR-TB in a hospitalized patient who has no prior anti-TB treatment).

Primary Prevention

Primary prevention is the second level of prevention. The target population was hospitalized adult patients with TB who were currently receiving anti-TB treatment and did not have MDR-TB (level 1). In addition to the first level, the goal of this level is to prevent the development of acquired or secondary MDR-TB (the development of MDR-TB in a patient who has received anti-TB drugs for one

month or more) and to prevent the development of primary MDR-TB (MDR-TB primarily develops in a patient receiving anti-TB drugs less than one month).

Secondary Prevention

Secondary prevention is the third level of prevention. The target population was hospitalized adult patients with MDR-TB (level 2). In addition to the first and second levels, the goal of this level is to prevent transmission of MDR-TB to other hospitalized adult patients.

A systematic approach is needed to prevent MDR-TB in these three levels. Clinical risk management process is applicable to identify, assess, and treat the risk for the prevention of MDR-TB in all levels.

Clinical Risk Management

The concept of clinical risk management emphasizes that all health care activities carry risks by their nature. These risks arise from any causes, whether it may be an accident, a mishap, or a mistake (Sadars, 2005). This concept offers a systematic approach to minimize these risks. Articles discussing clinical risk management have defined clinical risk management approach as a series of steps, stages or components of a risk management system (Bould, Hunter, & Haxby, 2006; Department of Health, 2005; Standards Australia and Standards New Zealand, 2004). However, different authors and organizations described a different number of steps. Among these, a relatively simple clinical risk management process proposed by the Department of the Health, Government of Western Australia was used to guide the

elaborate process of the prevention of MDR-TB at all three levels of prevention: primordial, primary and secondary prevention.

The clinical risk management process (Department of Health, 2005) was originally introduced in 2004 to ensure the continuing improvement in all organizations and at all levels of an organization. As the part of a strategic plan for safety and quality in health care, the Department of Health designed a five-step clinical risk management process that includes: (a) establish the context, (b) identify risks, (c) analyze risks, (d) evaluate risks, and (e) treat risks. In addition, there are two additional processes: communication and consultation, and monitor and review flowing across the five steps. For simplicity, the steps of risk analysis (steps) and risk evaluation (steps) can be combined and called risk assessment (Department of Health; Standards Australia and Standards New Zealand, 2004; Westgard & Westgard, 2009). Therefore, in this study, the clinical risk management process will consist of four steps as follows (Figure 1).

Step1: Establish the context. This first step of clinical risk management process focuses on identifying and understanding the environment and strategy of the organization or setting to which the clinical risk management process is being applied. With this regard, before taking the initiative to develop the guidelines to prevent MDR-TB in this study, it was necessary to know in detail about the environment including treatment, and investigational facilities for TB, the different anti-TB activities, stakeholders, isolation facilities for all kinds of patients including TB and MDR-TB, existing infection control measures and others in all three levels in the context of the Bangladesh health care system. In addition, the objectives and target populations for risk management tasks in each level was determined.

Step 2: Risk identification. Risk identification for the prevention of MDR-TB is to seek the causes/factors of the development of MDR-TB and identify the antecedents and consequences of those causes or risks. The identification of the risk factors causing the development of MDR-TB requires researchers, healthcare planners' or health care providers to have a thorough understanding about the sources, event or incident, way of risks and contributing factors of the risks. An effective identification technique encompasses a number of methods, such as reviewing the related reports and studies, interviewing the TB experts, nurses and patients, and communicating with the different TB and MDR-TB programs and organizations. Some key questions are needed to use while identifying the risks of MDR-TB. These include: what, when, where, why and how the risks are likely to occur, who might be involved and how those risks can be prevented. These were carefully identified within the context of Bangladesh.

In the first level (level 0), a list of risks and sources of risks for the development of MDR-TB, and its risks among the hospitalized non-TB patients was made. In addition, the researcher identified the risk of exposure, the risk of infection, and the risk of the development of risk factors among the target population. To identify the risks the researcher observed the setting and discussed with the nurses, physicians and other staff who were responsible for caring the patients at this level, and reviewed related literature.

In the second level (level 1), in addition to the first level, the researcher sought the information about the risk factors for the development of MDR-TB among the patients who were receiving anti-TB drugs. The existing risks for the re-infection of TB and the risks of infection of MDR-TB were explored.

In the third level (level 2), in addition to all the risks of the first and second levels, risks of transmission of MDR-TB were found at this level. To find out the risks for the transmission of MDR-TB, the researcher observed when, where and how the patients with MDR-TB were exposed to other patients in the hospital. Additional information about the transmission of MDR-TB was collected by discussing with the staff and experts related to the management of MDR-TB. In addition, the researcher explored the existing infection control measures for the prevention of TB and MDR-TB, and how these functioned.

Step 3: Risk assessment. This was a systematic process to understand the nature of identified risks of the development of MDR-TB, categorize them in a systemic manner, evaluate existing controls (risk analysis), and make a decision for treatment such as what measure should be taken and prioritize the treatment (risk evaluation). The identified risks of MDR-TB were analyzed with special attention on risks reduced by nurses. All identified causative factors that may contribute to the development of MDR-TB were categorized into the risk domains. The potential sources of information, such as a literature review and a multi-disciplinary group of experts, would be needed in this step to make an appropriate decision.

In the first level (level 0), the existing management in overcoming the risks of becoming exposed, infected, and developing the risks factors of MDR-TB was evaluated. The researcher assessed what are the risks of developing MDR-TB that can be minimized by the nurses. The researcher also made a list of the causes of risks; observed the existing management in overcoming the risks, and prepared a list of appropriate interventions for minimizing risks.

In the second level (level 1), in addition to the assessment in the first level, the focus was mainly on the existing nursing management of patients with TB. The strengths and weaknesses of the existing management were explored. This was done through the observation of the management procedures, discussions and interviews of related individuals, and the literature review. The researcher took note of all related activities in the management of TB patients in every mentioned approach.

In the third level (level 2), in addition to the assessment procedures in the previous levels, the researcher focused on determining the types of administrative, environmental and respiratory infection controls needed for the setting.

Step 4: Risk treatment. The plan and strategies were developed to minimize the identified risks based on the existing national TB and MDR-TB guidelines of Bangladesh, DOTS strategies, expert opinions, and empirical evidence from the literature review, the researcher's experiences, and the availability of local resources in all three identified levels of this study. It involved identifying the range of options for treating the risks, assessing these options and the preparation and implementation of treatment plans.

Methodological Framework

The NPG: MDR-TB was developed and evaluated in this study. The two phases approach was conducted. For the first phase of the NPG: MDR-TB development, Browman et al.'s guidelines development cycle (1995) was modified. In this conceptual tool, Browman and his co-workers proposed a series of eight steps for the development and implementation of guidelines. According to the Browman et al.,

step 1 to step 4 were adapted in this study. These four steps are: 1) select and frame the practice guideline problem 2) generate preliminary evidence-based recommendation (EBR), 3) reconcile interpretations of evidence to ratify the final EBR, and 4) apply clinical modulating factors to formulate guideline. The rest of the 4 steps (5-8) are the steps for guiding the development policy and a review of the guidelines.

The researcher developed the NPG: MDR-TB using the following three steps: Step 1 was a literature review; step 2 was interview of stakeholders and observation; and step 3 and step 4 were combined as step 3, the validation of the NPG: MDR-TB.

For the second phase, the NPG: MDR-TB was evaluated for its efficiency. This effort was made to demonstrate if implementing the NPG: MDR-TB contributed to the change in nurses' preventive practice measures for the prevention of MDR-TB. According to Mason (1994), to ensure the quality of care all process and outcome standards should be assessed as to whether nurses can follow them. Although this study is not a development of nursing standards as described by Mason, her conception to evaluate each activity in a newly developed nursing standard before and after dissemination is comparable to an evaluation of the recommended statements of nursing guidelines.

This two-phase approach was divided into six steps. Each step was conceptualized and presented as follows:

Step 1. Literature review: The purposes of the study, target population and potential outcome were setup in this step. A comprehensive literature review was conducted to analyze the concept and find out the methodology appropriate to the

study, and to seek the information for the existing evidence and recommendations associated with risk factors, causes, and nursing care for the prevention of MDR-TB.

Step 2. Interview stakeholders and observation: The first draft of the guidelines was formulated. A semi-structured interview with eleven local experts, setting observations, and discussions with related individuals were conducted to add more empirical evidence associated with nursing care and the prevention of MDR-TB in the context of Bangladesh. The evidence from all sources were interpreted and evaluated using Horsburgh, Feldman, & Ridzons' (2000) standard grading scheme.

Step 3. Validation of the NPG: MDR-TB: The content validity of the draft NPG: MDR-TB was assessed by conducting two-round Delphi process with 25 local and national experts from various professional health care groups. Consensus was defined according to a predetermined level of agreement (Cantrill, Sibbald, & Buetow, 1998).

Step 4. Baseline assessment of the current practice of the prevention of MDR-TB: The baseline data was collected from the selected participants working at three levels using three sets of self-administered MDR-TB Preventive Practice Questionnaires (MDR-TB PPQ) before the dissemination of the NPG: MDR-TB.

Step 5. Dissemination of the NPG: MDR-TB final version: The NPG: MDR-TB was disseminated to the participants by conducting a workshop, individual and group discussions and providing a printed copy of the NPG: MDR-TB in English and Bengali versions to every participant.

Step 6. Evaluation of the efficiency of the NPG: MDR-TB implementation: The efficiency of the NPG: MDR-TB was assessed by examining the changes of the nurses' preventive practice for the prevention of MDR-TB.

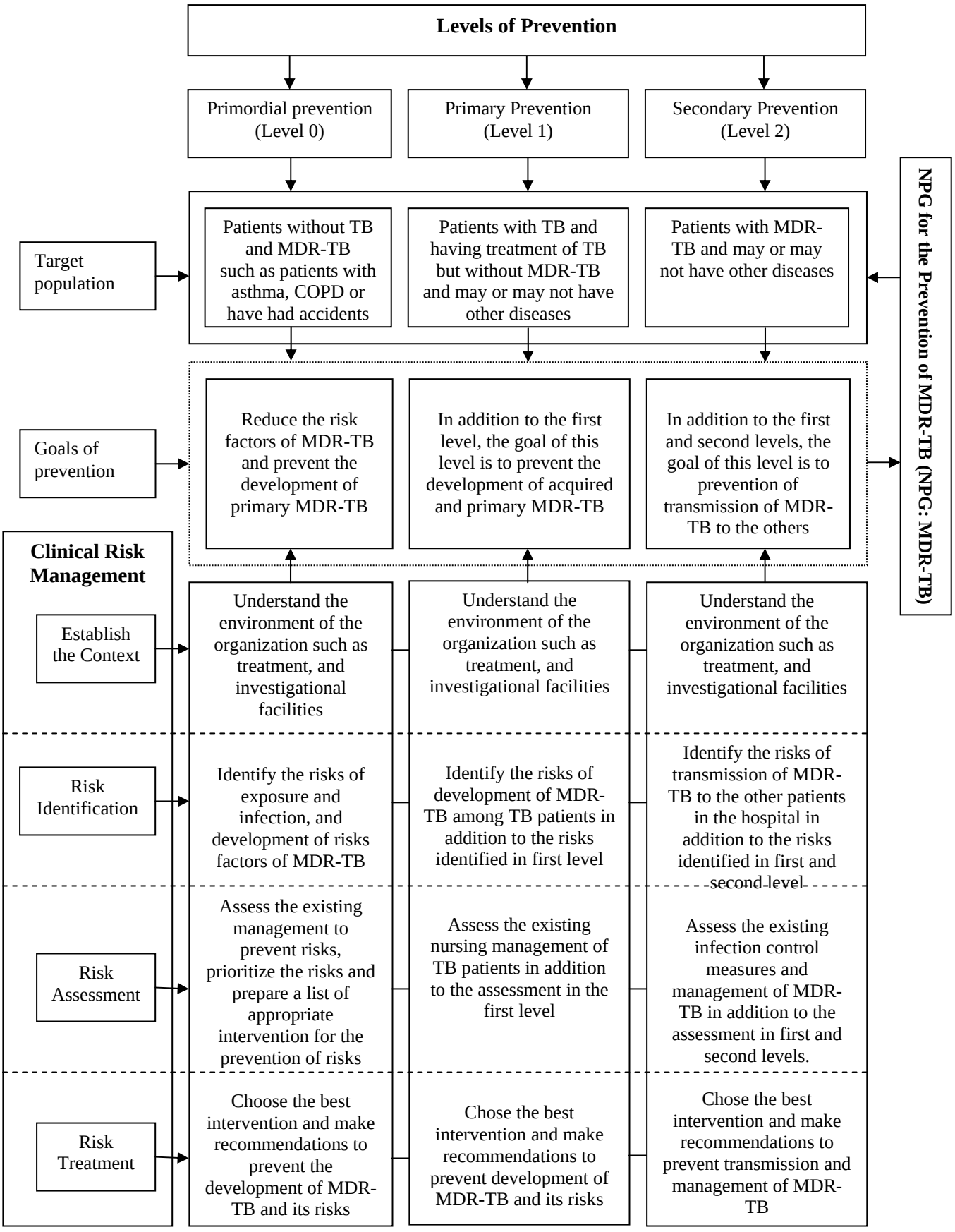

Figure 1 *Conceptual Model of the Prevention of MDR-TB in Bangladesh*

Definition of Terms

Nursing Practice Guidelines

Nursing practice guidelines refers to a set of statements of nursing measures for the prevention of MDR-TB among the hospitalized adult patients. The statements contain recommendations that are based on evidence from a review of research studies, existing guidelines, reports and experts' opinions, in-depth interviews of experienced persons on the prevention of MDR-TB and setting observation. The conceptual model of the prevention of MDR-TB in Bangladesh, as developed by the researcher, was applied as the blueprint to systematically develop the statements of the guidelines.

Efficiency of the NPG: MDR-TB

Efficiency of the NPG: MDR-TB refers to the changes in nurses' practices regarding the prevention of MDR-TB among the hospitalized adult patients. The nurses' practices are composed of case findings and case holding measures for the prevention of MDR-TB. Preventive practices of the NPG: MDR-TB was measured in all three levels using three sets of MDR-TB PPQ, developed by the researcher. The following two preventive practices are measured and compared at pre and post implementation of the guidelines.

Case Finding Measures for the Prevention of MDR-TB

Case finding measures for the prevention of MDR-TB refers to the nursing activities in the early identification and rapid assessment of MDR-TB and its

risk factors among hospitalized adult patients such as identifying vulnerable patients, identifying the non-compliant patients with TB and MDR-TB treatment, identifying delays and mistakes in the management of TB and MDR-TB patients in the hospital, identifying the lack of TB and MDR-TB infection control measures in the hospital, identifying risks induced by treatment & investigation procedures, and screening and monitoring the patients at risk for MDR-TB and its risk factors.

Case Holding Measures for the Prevention of MDR-TB

Case holding measures for the prevention of MDR-TB refers to the nursing activities in the effectively reducing the risk factors of MDR-TB among hospitalized adult patients such as maintaining the TB and MDR-TB infection control measures, maintaining respiratory hygiene and collecting sputum samples for investigation, ensuring the administration of anti-TB drugs, the management of the side effects of anti-TB drugs, and providing health education and support.

Scope of the Study

This study was aimed to the development and evaluation of the efficiency of the nursing practice guidelines to prevent the development of MDR-TB among hospitalized adult patients in Bangladesh. It was conducted in the National Institute of Diseases of the Chest and Hospital (NIDCH), Dhaka, Bangladesh. In the development phase, the participants of the semi-structured interview were the eleven key personnel of this hospital including physicians, nursing supervisors, nursing incharges and nurses who had at least three years experience in caring for TB and MDR-TB patients. In the evaluation phase, data were collected from 64 nurses who

worked in the selected wards (two non-TB wards, two TB wards, and two MDR-TB wards) of this hospital during the implementation period of the guidelines.

Significance of the Study

The guidelines developed this study are significant to the improvement of nursing practice, administration, and research. For nursing practice, the developed guidelines can be a source of evidence-based information for nurses in caring for patients susceptible to MDR-TB. It will help the nurses and their clients to make informed decisions that lead to quality of care, improve outcomes and patients safety. For nursing administration, the nursing administrators and practitioners who are responsible for leading, facilitating, improving and monitoring the activities or the program of the prevention and control of TB and MDR-TB will find the guidelines beneficial for assessing, monitoring and evaluating the performance of their sub-ordinate staff. It also offers baseline data for policy makers to further plan and develop a program for the prevention and control of TB/MDR-TB. For nursing research, researchers can further test the developed guidelines in other settings on evaluating the efficiency, particularly in patient outcomes in the long run. The researcher can make use of the guidelines in assessing the quality of nursing care in preventing TB and MDR-TB.

CHAPTER 2

LITERATURE REVIEW

This chapter presents a discussion on related literature and the search review under the major headings; MDR-TB, significant evidence related to MDR-TB prevention and the development of nursing practice guidelines.

MDR-TB

This main heading of the review consists of a discussion on the topics of definition and types of MDR-TB, the epidemiology of MDR-TB, MDR-TB in adults, the transmission of MDR-TB, clinical risk factors related to the development of MDR-TB in hospitalized adults, and the challenges in the risk management for MDR-TB prevention.

1. Definition and Types of MDR-TB

MDR-TB is defined as the bacteriologically confirmed cases of TB caused by the strain of M. tuberculosis that is concomitantly resistant to isoniazid and rifampicin with or without other drugs (Flament-Saillour et al., 1999). The definition of MDR-TB is more concerned about the resistance to isoniazid and rifampicin because they are the keystones of a short-course of chemotherapy (Iseman, 1999). Isoniazid; Isonicotinic Acid Hydrazide is a most powerful anti-TB drug. It is essential to early conversion of sputum smear AFB (Acid First Bacilli) from positive to negative and decreases the transmission of TB. Resistance to isoniazid is associated with a high rate of treatment failure, chronic illness and death (Iseman, 2007). The

other important agent, rifampicin, is the most potential first-line anti-TB drug. The drug's dual function, mycobactericidal and sterilizing activities, are crucial for curing TB and preventing relapses (Sharma & Mohan, 2004). Resistant to rifampicin is strongly associated with treatment failure among new cases (Espinal et al., 2000).

Based on the history of previous TB treatment, drug resistant TB including MDR-TB has been classified into two types: primary and acquired or secondary. Primary MDR-TB is defined as the development of isoniazid and rifampicin resistance TB of a patient without taking any anti-TB treatment (WHO, 1997) or has been treated for less than one month (Kim, 2002). It means that MDR-TB developed from out side and did not result from the treatment of the patient with the drug concerned. Acquired or secondary MDR-TB is when the MDR-TB emerges after receiving TB chemotherapy (for one month or more) (Kim; WHO, 1997). Primary and secondary MDR-TB are not clinically different except by history (Villarino, Geiter, & Simone, 1992). Moreover, XDR-TB is a complicated and rare type of MDR-TB. It is defined as a highly pathogenic strain of TB developing from MDR-TB, resistant to both isoniazid and rifampicin including any fluoroquonolone and at least to one of the three following anti-TB injectable drugs: capreomycin, kanamycin, and amikacin (WHO, 2010a).

2. Epidemiology of MDR-TB

The emergence of resistance to the anti-TB drugs is not a new event. It became apparent soon after the advent of the first anti-TB drug (Petrini & Hoffner, 1999). The emergence of MDR-TB followed the widespread use of rifampicin since the 1970s (WHO, 2008). However, MDR-TB became recognized as a global problem

after its dramatic outbreaks in the early 1990s in New York City, New York; Miami, Florida; Buenos Aires, Argentina; and elsewhere (Iseman, 2007). Now it threatens people worldwide, especially the inhabitants of countries in Europe, Asia, Africa, and the Americas (Nachega & Chaisson, 2003).

The actual magnitude of MDR-TB is still unknown. However, it was estimated that globally there was 440,000 MDR-TB cases in 2008. Among them 86% were in 27 high MDR-TB burdened countries. However, more than two third (298,800) of the MDR-TB cases were estimated in the eight high MDR-TB burdened countries including China, India, Russian Federation, Pakistan, South Africa, Philippines, Nigeria, and Bangladesh (WHO, 2010a).

The magnitude of MDR-TB in Bangladesh is also unknown because national survey or data on drug resistant tuberculosis is rare. But still now, Bangladesh has a large proportion of TB population and by inference must therefore, also have the largest proportion of MDR-TB (NTP, 2009b). In addition, WHO (2010a) estimated that Bangladesh is in the seventh position among the 27 high MDR-TB burdened countries in the world with 9,800 cases of MDR-TB. Moreover, to date, a few studies on the different aspects of drug resistant and MDR-TB have addressed that the proportions of MDR-TB in the rural areas of Bangladesh were 0 to 0.4% among new cases, 3 to 27.3 % among previously treated cases, and 0.7 to 5.3% among all TB cases. On the other hand, in the urban areas these were respectively 0 to 4.7%, 14.3 to 100% and 5.5 to 19.7% (International Centre for Diarrhoeal Disease Research, 2002; Rahman et al., 2009; Van Deun et al., 1999; Van Deun, Salim, Das, Bastian, & Portaels, 2004; Zaman et al., 2005).

3. MDR-TB in Adult

MDR-TB is more likely to be a disease of adulthood. In numerous studies and review articles, MDR-TB was found mostly in adults (Baghaei et al., 2009; CDC, 1999; Cobo et al., 2001; Faustini et al., 2006; Flament-Saillour et al., 1999; Franke et al., 2008; Hutchison et al., 2003; Lockman et al., 2001). Similar findings were revealed in a recent study in Korea on 211 MDR-TB patients (Kim et al., 2007). This study found that the range of age of MDR-TB patients was 13-91 years with the median age of 37 years. But there was no clear explanation from these studies for the reasons why TB or MDR-TB mostly occurs in this age group. However, it may be assumed that it is due to adults having frequent contact with suspected or confirmed contagious pulmonary TB and MDR-TB patients. The hospitals or health care centers are the main settings for this exposure to adults who are responsible for caring for the TB or MDR-TB patients; occasionally it can occur in a school or hostel.

4. Transmission of MDR-TB

MDR-TB outbreak in the hospital is evidence of an airborne transmission of the infection. Theoretically, all forms of TB can be transmitted through the air from one infected person to others. There are several means to spread the TB and MDR-TB germs from the patients to the environment or to others. Although, the bacillus of TB and MDR-TB may be found in the feces and urine of the infected individuals, the transmission of TB and MDR-TB can mainly be facilitated by the some common physical activities of the patients such as coughing, spitting, sneezing, breathing, speaking, shouting or singing (Contival, 1998). In addition,

during pregnancy the TB pathogen or strain can be transmitted from an infected mother to her fetus, when the fetus inhales bacilli in the amniotic fluid or direct hematogenous spread to the fetus (Nhan-Chang & Jones, 2010). Moreover, the transmission of the infection significantly increases during some diagnostic or treatment procedures that stimulate coughing, such as bronchoscopy, intubation and suction, sputum induction, and aerosol treatment (CDC, 1994).

5. Clinical Risk Factors Related to the Development of MDR-TB in Hospitalized Adults

Fundamentally, MDR-TB is a result of human error and thus essentially a man made tragedy (Sharma & Mohan, 2006). It did not exist before the introduction of anti-TB drugs (Petrini & Hoffner, 1999) and extremely rare arises if the management for drug susceptible TB patients is carried out appropriately (Frieden & Khatri, 2002). Several similar and different risk factors of MDR-TB were identified in the review of recent studies from both developed and developing countries. From the review, many factors were found to be significantly associated with, or predictors for the development of MDR-TB. However, prior treatment for TB was found to be the major risk factor in the occurrence of MDR-TB (Faustini et al., 2006). Some of other significant risk factors are: receiving irregular treatment, alcohol abuse/dependence, being young adults, having lung cavities due to lesions, being prisoners or ex-prisoners, smoking, having a sputum smear positive, having received TB treatment in a hospital setting, foreign-born and poor socio-economic conditions such as lack of home water sewer system were found as the major significant risk factors for the development of MDR-TB (Barroso et al., 2003; CDC, 1999; Choi et

al., 2007; Gelmanova et al., 2007; Moniruzzaman et al., 2006; Ruddy et al., 2005; Toungoussova, Caugant, Sandven, Mariandyshev, & Bjune, 2002). In addition to a lack of DOT, patients with high labor intensive occupations and living in rural areas had several similar risk factors that were also found in a case-control study in Bangladesh (Amin et al., 2009). However, there is scant study exploring the causes of the development and transmission of MDR-TB in hospital settings in Bangladesh.

Previous treatment for TB is the major cause for the occurrence of MDR-TB (Lomtadze et al., 2009). Although the main objective of the use of anti-TB drugs in the treatment of TB is to absolutely eradicate M. tuberculosis from the patients, it is not always attained even in cases of fully drug susceptible patients (Petrini & Hoffner, 1999). There is a consensus among the MDR-TB researchers about the association between a previous treatment of TB and MDR-TB (Baghaei et al., 2009; Toungoussova et al., 2002). In Europe, a systematic review (Faustini et al., 2006) on the risk factors of MDR-TB revealed that the prevalence of MDR-TB is 10.23 times higher among the patients who had undergone a previous treatment rather than never treated TB patients.

A delay in the diagnosis and treatment of TB is a major contributing factor to the transmission of TB and MDR-TB. Previous studies stated that delayed diagnosis of TB causes patients to have a more advanced stage of the disease, more complications, an increase in the likelihood of transmission, a decrease in the treatment's successfulness, and contributes to the direct and indirect costs and higher mortality (Cheng, Tolhurst, Li, Meng, & Tang, 2005; Lawn, Afful, & Acheampong, 1998).

Non-compliance or inadequate treatment adherence is one of the identified causes for the emergence of MDR-TB (Hutchison et al., 2003) and a major obstacle in the control of TB and prevention of DR-TB (Khalili, Dashti-khavidaki, Sajadi, & Hajiabolbaghi, 2008). Noncompliance means taking some, but not all medications. Patients stop taking their medicine as soon as they feel better. It is a crucial factor in the non-compliance of TB patients. Multiple medications, unpleasant side effects and the long duration of treatment may be considered as the causes of non-adherence to anti-TB drugs (Khalili et al.). In addition, inadequate or unsuccessful treatment of TB plays a dual function in the development of MDR-TB. It can be either a result of/or risk factors of MDR-TB (Faustini et al., 2006).

Poor management practice may have a significant effect on the development of drug resistant TB as well as MDR-TB. This may be due to a lack of care in the providers-patients' relationship, patients' lack of knowledge about TB and MDR-TB and its management, poor case management, frequent staff changes, low staff morale and poor record keeping (Department of Health, 1999). In addition, patients with a positive sputum smear are one of the significant indicators of MDR-TB. One study found that most (95.75%) of the MDR-TB patients had a positive sputum smear, whereas it was 81.2% among non-MDR-TB patients (Baghaei et al., 2009).

Both sexes; male and female were found to be at risk for the development of MDR-TB. In many studies, the male has been frequently reported as being vulnerable for the infection or development of MDR-TB because men are more likely than women to default from treatment (Aparna, Reddy, Gokhale, & Moorthy, 2009; Jimenez-Corona et al., 2006), and to be a retreated (Jimenez-Corona et al.,

2006). In addition, an Indian study found that the male gender is also negatively associated with favorable MDR-TB treatment outcomes (Aparna et al.). Females also were found at high risk for the development of MDR-TB. They are exposed to MDR-TB in caring for the patients in the home due to a lack of in-patients' service for MDR-TB in the health care settings (Lomtadze et al., 2009; Mdivani et al., 2008). In addition, females have less opportunity to assess the health care facilities due to housework, childcare and employment (Rajeswari et al., 1999). Moreover, females' delaying receiving treatment was found in previous studies (Cheng et al., 2005; Needham, Foster, Tomlinson, & Godfrey-Faussett, 2001).

In conclusion, the development of MDR-TB is multi-factorial. The transmission and development of MDR-TB is the result of many overlapping and inter-related factors. Almost all of the risk factors are man-made and preventable.

6. Challenges in the Risk Management for MDR-TB Prevention

Despite highly effective drugs and strategies available for the management and control of all kinds of TB, MDR-TB has posed a threat to both the public health and control of TB. Usually, MDR-TB is not easy to diagnose and treat as drug-susceptible TB (Jain & Dixit, 2008). Several issues are reported in the articles as complicating and challenging factors for the control of MDR-TB, which are: complexities in diagnosis (Suchindran, Brouwer, & Van Rie, 2009), high cost of second line drugs, extensive laboratory and monitoring requirements, adverse events associated with second-line drugs, low availability of quality-assured second-line drugs, difficulties in ensuring adequate patient support during long time treatment course, risk for resistance to second-line drugs (as cited in Nathanson et al., 2006),

difficult to treat due to side-effects, a long treatment duration (Jain & Dixit; Loddenkemper et al., 2002), and low effectiveness of second line anti-TB drugs (Jain & Dixit). In addition, the management of MDR-TB needs to be delivered by experienced and highly skilled persons (Sharma & Mohan, 2006), and involves frequent long time hospitalization for the infected patient (Nathanson et al.).

Significant Evidence Related to MDR-TB Prevention

This main heading of the review of this session consists of a discussion on the topics of the preventive measures of MDR-TB in hospitalized adult patients, factors affecting the infection control of MDR-TB in the hospital, nursing measures for the prevention of MDR-TB, the prevention of MDR-TB in Bangladesh**,** and the concepts related to the prevention of MDR-TB.

1. Preventive Measures of MDR-TB in Hospitalized Adult Patients

Several measures for the prevention of TB and MDR-TB have been proposed and numerous guidelines have been developed in both developed and developing countries for the prevention of TB and MDR-TB (CDC, 1992; 1994; and 2005; Department of Health, 1999; Dooley et al., 1990; Hong, 2001). In 1992, the US CDC proposed eight measures as the blue print of a national action plan to address MDR-TB. Among them all, the CDC (1994) developed guidelines for preventing the transmission of M. tuberculosis in health-care settings is as one of the authoritative protocols which followed the CDC guidelines of Dooley et al. and revised guidelines were issued in 2005. Much evidence has been found on the efficacy of Dooley et al. and the CDC (1994) guidelines from the wide implementation in different health-care

facilities of the USA (Blumberg et al., 1995; Maloney et al., 1995; Wenger et al., 1995). However, the overall strategic approach to prevent MDR-TB and its risk factors in the hospital setting may be described in two elements: the prevention of the development of MDR-TB in fully drug-sensitive TB cases, and the transmission control of TB and MDR-TB.

1.1 Prevention of the Development of MDR-TB in Fully Drug-sensitive TB Cases

Treatment is a central tenet of TB control. MDRTB is best prevented through the appropriate treatment of TB with first-line drugs that are of high quality. Properly applied short course chemotherapy is the recommended standard for the treatment of TB and is the best way to prevent MDR-TB (Department of Health, 1999). The standardized short course chemotherapy includes isoniazid, rifampicin, pyrazinamide, and streptomycin, or ethambutol or both and is the best way to prevent the MDR-TB. It is also effective in treating the patients with drug resistant to isoniazid and/or streptomycin (Department of Health). Four types of recommended regimens under short course chemotherapy are being used in the treatment of drug-susceptible TB. Among them, “an initial phase of daily isoniazid, rifampicin, pyrazinamide, and streptomycin, or ethambutol for 2 months followed by a continuation phase of either daily or three times a week isoniazid and rifampicin, all given by DOT, for 4 months or daily isoniazid and ethambutol for 6 months (self-administered)” is a most preferable, evidence-based and WHO recommended regimen for the treatment of drug-susceptible TB (American Thoracic Society, CDC, & Infectious Diseases Society of America, 2003, p. 73).

The DOTS, is the cornerstone of the standard short course chemotherapy. The administration of standard short course chemotherapy under the direct observation of TB patients by the health care providers is the main basic underpinning concept of the DOTS. The five key elements of its strategy includes (a) sustained political commitment, (b) assessment to quality assured sputum microscopy, (c) standardized short-course chemotherapy for all cases of TB under proper case management conditions including direct observation of treatment, (d) uninterrupted supply of quality-assured drugs, and (e) a recording and reporting system enabling outcomes assessment (WHO, 2008). The evidence for the effectiveness of short course chemotherapy and DOTS comes from many randomized controlled trials and basic research (Kamolratanakul, Sawert, Lertmaharit, et al., 1999; Mawer et al., 2001; Ruohonen et al., 2002; Salomon et al., 1997; Wright et al., 2004).

1.2 Transmission Control of TB and MDR-TB

There are three aspects in controlling the transmission of TB and MDR-TB. These are chemoprophylaxis of infected persons with TB and MDR-TB, management of the patients with MDR-TB, and mechanical control of the transmission of MDR-TB.

Chemoprophylaxis of infected persons with TB and MDR-TB. The chemoprophylaxis of TB includes the treatment of contacts with TB and MDR-TB, formally known as TB preventive therapy (Horsburgh et al., 2000). Preventive therapy for the latent infection of TB is effective in preventing TB disease in persons who have positive tuberculin skin tests (CDC, 2000). Several regimens are proposed

and clinically trialed for the treatment of latent TB infection (LTBI). These are 6, 9 or 12 months of isoniazid, 2 months of rifampicin plus pyrazinamide or 4 months of rifampicin regimen. Among them 6 or 9 months of isoniazid regimens are strongly recommended, however, 6 months isoniazid regimen is mostly preferred by the US CDC (CDC).

The concept in the prevention of drug resistant is the control of the disease before significant numbers of drug resistant bacilli develop. It depends on reducing the number of bacteria. Theoretically, uninterrupted treatment with two anti-TB drugs should prevent drug resistance (Moulding, Le, Rikleen, & Davidson, 2004). However, there is no evidence found from randomized control trials to support the effectiveness of chemoprophylaxis or treatments of latent TB infection in persons exposed to MDR-TB.

Management of the patients with MDR-TB. Appropriate treatment of MDR-TB by effective multidrug regimens is essential to prevent the transmission and emergence of MDR-TB. The treatment of patients with MDR-TB involves second-line anti-TB drugs. The short course chemotherapy TB drugs are not effective in the treatment of MDR-TB. The second-line anti-TB drugs are drugs other than the standard essential anti-TB drugs (WHO, 1997). There are two regimens in treating MDR-TB: the standard and individualized treatment regimen. The regimens for treating the drug resistant TB or MDR-TB consist of a mix of essential drugs and second-line snit-TB drugs.

The standard treatment regimen for MDR-TB patients consists of a four-months intensive phase with five drugs (kanamycin, ethionamide, pyrazinamide,

ofloxacin, and cycloserine or ethambutol), followed by a 12-18 month continuation phase with three drugs (ethionamide, ofloxacin and cycloserine or ethambutol) (Department of Health, 1999). In regards to the individualized treatment regimen, the approach to the treatment of MDR-TB is given on the basis of the result of the drug susceptibility tests. However, this causes a delay in treating MDR-TB until the drug susceptibility results are available. So, in the waiting period for the susceptibility test results, a treatment regimen may be applied which initially does not contain isoniazid and rifampicin (WHO, 1997).

Mechanical prevention. The mechanical aspects of prevention include administrative control measures, engineering or environmental control measures and personal protective control measures.

The administrative control measures reduce the exposure of patients and staff to TB and MDR-TB by preventing the generation of M. tuberculosis or strain containing droplet nuclei (Department of Health, 2007). Three aspects, patients, contacts and the staff of the hospital are the focus in this control. In regards to the patients' perspectives, minimizing the hospitalization of the patient with TB and MDR-TB, a rapid diagnosis, separating the infectious patients to isolation rooms are considered as the most important measures for the prevention of disease transmission (Hong, 2001).

The engineering or environmental control measure used to prevent the transmission of TB strain or organisms should be implemented when the institutional environment influences the transmission of the diseases. Engineering controls are implemented to remove or inactivate the mycobacterium organisms or strains. It

consists of two types of measures. First, the primary measure is used to control the source of infection by using local exhaust ventilation such as hoods and tents, and to dilute and remove the contaminated air by using general ventilation. Secondly, the secondary ventilation is used to prevent the contaminated air contaminating surrounding areas. The process of filtration and ultraviolet germicidal processes are used for these measures (CDC, 2006).

Personal respiratory protective measure is very useful and essential when there is the absence or insufficient administrative or environmental control. It is also most appropriate in a specific setting and situations within correctional facilities (CDC, 2006). In the prevention of TB and MDR-TB, the personal protective measure means the use of facemasks. An epidemiological modeling study (Basu et al., 2007), suggested that the use of N95 respirators for staff and surgical masks for patients with other preventive measures could prevent nearly a one third of XDR-TB cases. Contival (1998), argued that a correctly worn mask with minimum NIOSH (National Institute for Occupational Safety and Health) designation of N, P, or R-95 reduces the risk of exposure to TB by filtering at least 95% of particles smaller than 1 micron. On the other hand, the use of a normal surgical mask provides little or no protection against the transmission of TB (Contival).

In conclusion, it seems clear that MDR-TB can not be prevented by any single approach. The prevention of MDR-TB depends on the proper application of all kinds of TB and MDR-TB control activities including proper diagnosis and management of TB and MDR-TB¸ following the DOTS strategies, and the implementation of infection control measures. It needs the co-operation of many agencies and groups including the government, physicians, nurses and patients.

2. Factors Affecting the Infection Control of MDR-TB in the Hospital

There has been little study conducted exploring the factors affecting the TB and MDR-TB infection control measures in the hospital setting. However, a phenomenological study in South Africa explored several factors influencing TB infection control in hospital settings related to the healthcare system, wider contextual conditions and patient behavior. These are a lack of isolation facilities and personal protective equipment, the lack of a TB infection prevention and control (IPC) policy, inadequate TB training for staff and patients, communication barriers owing to cultural and linguistic differences between staff and patients, the excessive workload of nurses, a sense of duty of care, TB concerns and stigma, the role of traditional healers, a late uptake of hospital care owing to poverty and the use of traditional medicine, and poor adherence to IPC measures by patients, family members and carers (Sissolak, Marais, & Mehtar, 2011).

In considering the general infection control in hospitals, in a review study of 34 observational studies identified several influencing risk factors related to the organizational and management factors affecting the infection control system in the hospitals of the UK. These are “weak or negative clinical leadership at and above ward level, the absence of clear lines of clinical management and responsibility from ward to board, excessive ‘span of control’ among clinical leaders, unclear roles and responsibilities for infection control, lack of clear policies and active support for infection control, an absence of an effective multidisciplinary infection control team perceived as exercising positive leadership at word level, high staff turnover, high use of agency staff, low staff morale, high patients throughput, workload not matched to available staffing, and high bed occupancy” (Griffiths, Renz, & Rafferty, 2008, p. 17).

In the context of Bangladesh, no study was found on this topic. However, based on the researcher's experiences, it may be assumed that the factors influencing the TB infection control in Bangladesh would be nearly identical to the factors identified from the reviewed studies including: lack of nurses' knowledge, shortage of resources, a lack of appropriate infection control policy, overcrowding of patients, and nurses' shortage and heavy work loads.

3. Nursing Measures for the Prevention of MDR-TB

A substantial number of articles (Ghebrehiwet, 2006; Gleissberg, Maximova, Golubchikova, Wares, & Banatvala, 1999; Palacios, Guerra, Llaro, Chalco, & Sapag, 2003; Taylor, Redfern, & Hardy, 1996; Toth, Fackelmann, Pigott, & Tolomeo, 2004; Zvavamwa & Ehlers, 2008) have discussed the nurses' role in different aspects of TB including MDR-TB. Nevertheless, there is a lack of studies that fully discuss the nurses' role in the prevention of MDR-TB.

The objectives of nursing care of patients with TB are to meet the patients needs within their own social context and to prevent the transmission of the disease (Taylor et al., 1996). According to Puri & John (1997), and Taylor et al. there are a number of aspects to the nurse's role when working with TB patients to meet these objectives. These are health promotion, encouraging and ensuring compliance to treatment, providing care for infectious patients in the hospital or in the community, screening and contact tracing. The ICN argues that as the ICN code of ethics, nurses carry out four fundamental responsibilities in caring for the patients with TB and MDR-TB including promote health, prevent illness, restore health and alleviate suffering. They prevent people in the first place from becoming vulnerable to TB

diseases to promote health; reduce the transmission of TB by finding and treating active diseases to prevent illness; ensure patients receive the treatment they needed to restore health, and support the patients according to their needs to alleviate suffering (ICN, 2008). However, nurses are responsible and perform many activities in the both hospital and community level in caring and controlling the TB.

Nurses in the hospital are responsible for a number of typical activities including the management of patients, administration of the wards and providing health education to the patients. In addition, they have an important role in carrying out routine investigations, treatment management, and the discharge of patients from wards (Singla, Sharma, & Jain, 1998), observe administering anti-TB therapy (Gleissberg et al., 1999), and instituting and practicing recommended infection control measures (Toth et al., 2004).

Nurses in the TB hospital undertake many activities in caring for TB patients. In a study of Tomsk, from observational visits, semi-structured interviews, and discussions, researchers identified a bulk of activities that the nurses performed in different TB institutes of Tomsk. These include TB screening, communication with other health workers, giving assistance to the doctors during clinical sessions, monitoring the patients on treatment and chemoprophylaxis, providing health education, doing DOT, patients' referral and follow-up. In addition, nurses in Tomsk had many roles in the administration of adjunct therapies such as the intramuscular and intravenous administration of anti-TB drugs and galvanization, and complimentary therapies such as vibro-massage, ultrasound and ultra violet treatments (Gleissberg et al., 1999).

In the period of 1920-1940, before the discovery of anti-TB drugs, in the nursing homes or hospitals, nursing care was provided based on three things diet, rest, and activities or exercise. Increased body weight was the indicator of successful nursing so that, the nurses had to gave high priority to the activities in the kitchen and at the table, and weighed the patients weekly. Moreover, nurses made great contributions to scientific research such as acting as the research participants in testing the BCG vaccination (Mathisen, 2005).

In the community, nurses have the most demanding workloads and perform a great variety of activities (Gleissberg et al., 1999). Dick et al. (2004), reported that at the primary level of health care, the nurses in South Africa managed about 90% of TB cases. Even though, before the discovery of anti-TB drugs, visiting the TB patients in their home was the responsibility of nurses. Their responsibilities in home visits were to train the family about hygiene, clean the home, investigate the social situation and create a file to fill in a report on the family members after their home visit. This report was instrumental for the physicians in treating the patients with TB (Mathisen, 2005).

From a qualitative study, Palacios et al (2003) made a brief description on actual activities carried out by the nurses in the community based treatment of MDR-TB in Lima, Peru. Based on the collected ethnographic data from seven TB nurses of Peru, they explored that nurses were not only contributed to the treatment of MDR-TB but also in providing psychological and economical support to the patients. In this study, the researchers explored a wide range of nurses' activities, including the identification of patients with MDR-TB, the evaluation of patients prior to the treatment, the collection of necessary information such as information regarding the

length of suffering, existing symptoms and the treatment of the disease, and the patients' family economic conditions, weekly visits with each patient, checking the body weight, following-up smear and culture data monthly to assess the patients' prognosis and adverse effects of the drugs. Moreover, nurses were responsible for many other activities including following the patient through out the treatment course, laboratory analysis, prescribing certain medicines, educating the patients and family members about the various aspects of TB and MDR-TB, conducting a workshop for nurses and health technicians, supervising daily patient medication, communicating with other health care workers, and recording and reporting all information in regards to the patients.

In a similar study in Peru, the researchers identified that the nurses provide various types of emotional support to the MDR-TB patients. In providing emotional support they focused on the problems related to the different stages of treatment, the social stigma of the illness, treatment adherence, side effects, socio-economic difficulties, death and concurrent illnesses/special situations (Chalco et al., 2006).

Nurses' measures are essential in ensuring the administration of anti-TB drugs, particularly in the implementation of DOTS strategies. In DOTS strategies, nurses play a key role by providing flexible TB services and by providing individualized patient-centered care. The DOTS or TB program mainly focuses on completing the treatment mostly achieved by the nurses working in different health care settings such as the hospital. For the control and management of TB and MDR-TB, the nurses' roles in the five strategies of DOTS are: advocacy and lobbying, communicating and working closely with the patients, the identification of suspected

patients, giving advice to produce a good sputum sample, access for the delivery of a sputum sample, ensuring equitable access to DOTS, individualized care planning, education and supporting the patient, family and treatment observer, clear, accurate and prompt record keeping in the laboratory register, treatment cards and TB register, ensuring a sufficient drug supply for patients, and the documentation of investigation and treatment (ICN, 2008).

Nurses can promote the health of patients with TB by health education through imparting the relevant, appropriate, accurate, and most important and current information. According to Karim's suggestions (as cited in Taylor et al., 1996), to promote good health nurses should offer health education to patients and their carers on the nature of diseases, the importance of the completion of the full course of treatment, possible reactions to the treatment, how to obtain further supplies of drugs and the importance of attending follow-up sessions, and contact tracing of possible sources of the infection.

In a famous Australian article by Boland and Enright (1974), the authors summarized the educational functions of the TB nurses into ten categories as the commandants to TB nursing. These are: (a) teach the patients about the disease, and principles upon which treatment and prevention are based, (b) help the patient and family to accept disease and to complete the full treatment, (c) interpret and support the therapy, and continue supervision, (d) identify the problem for non-compliance of treatment and help to remove the difficulties, (e) improve the family's general health, (f) increase the patient's understanding about the medical responsibilities for the control of the disease, (g) carry out the epidemiological responsibilities for gathering data of familial and causal contacts, and contact tracing by necessary treatment and

supervision, (h) make clear to the patient and the family about the concept of TB disease that a TB cases, once discovered, can not be forgotten and never be overlooked, (i) maintain continuous and close contact with the doctor, and (j) keep factual records.

Nurses have a vital role to play in encouraging and monitoring compliance to treatment. Nurses should provide sufficient time to assess the patients and additional attention to those identified as having low compliance levels. It was suggested that nurses should check patient compliance regularly. In some situations it may be once a week depending on the patient's conditions, and the risk of non-compliance (Puri & John, 1998).

There is a lack of evidence to support the effectiveness of nursing's contributions in controlling and preventing TB and MDR-TB. Fortunately, from a study of a nurse-led follow-up interventional program, Ogedengbe et al (2008) reported that nurse-led follow-ups can reduce the patient load in the adult TB clinic without a deterioration of outcomes. The result of this study shows that even though the treatment success rate was not significantly changed after the implementation of the program than before, it had relatively increased to 96% (170/170) from 94% (278/297) in before.

Similarly, the effectiveness of another 'nurses-led rapid assessment clinic' in London was reported by Cootauco (2008). The important contributions of the nurses in this clinic were to identify the patients by taking their medical history at the first appointment and assess the patient's symptoms of TB such as cough, fever, night sweats, loss of appetite and weight. To assess the potential problems, nurses used the risk assessment tool. For the diagnosed patients as latent or active TB some

investigations were carried out like the tuberculin test, sputum test, and chest X-ray. The evolution report from the two years audit of this clinic show that the waiting rate was reduced, nobody relapsed, and the treatment success rate was increased. Moreover, from a case study of this clinic by the same author it was shown that through the nurse-led intervention, TB was rapidly diagnosed, immediate treatment and screening were carried out, and the potential transmission of the disease was prevented.

The obstacles related to the development of appropriate nursing practice in caring for TB patients were found in several studies. These included an enormous workload, poor remuneration, (Dick et al., 2004; Gleissberg et al., 1999), resistant to change, shortage of staff (Gleissberg et al.), poor rapport between health care providers or nurses and patients (van der Walt & Swartz, 2002), inadequate health care infrastructure (Dick et al.), and lack of nurses' knowledge, practice and attitudes in caring for the patients with TB (Singla et al., 1998; Zvavamwa & Ehlers, 2008).

A lack of nurses' knowledge was found in many studies. (Gleissberg et al., 1999; Singla et al., 1998; Souza & Bertolozzi, 2007; Wahyuni et al., 2007). In these studies, the gaps of nurses' knowledge was identified regarding the various aspects of TB such as the causes of TB, early symptoms of TB, the requirement to diagnose a patient as having TB, complications of TB, infectiousness after starting treatment, mode of transmission of TB, the information from WHO or other international approaches, the importance of a sputum examination, correct doses of routinely used short-course chemotherapy drugs, the minimum duration of a short-course of chemotherapy, instructions on discharge of a patient, and health education

for patients and family members. In addition, the results of the study of Souza & Bertolozzi, shows that nursing professionals still share the old belief that TB contamination can occur by using the patient's personal objects such as cups, plates, cutlery etc.

Lower practice and attitudes of the health care providers were revealed in some studies (Hashim, Kubaisy, & Dulayme, 2003; Wahyuni et al., 2007). The study of Hashim et al. in Iraq, found that the practice and attitude of health care workers were very poor in terms of asking for three direct smear tests, referring the patients, and the daily supervision of the patients. The study of Wahyuni et al. in Indonesia identified that the nurses and other health care workers did not provide complete information to the patients about TB and the technique of producing a good sputum sample.

In conclusion, the nurses have performed a major role in the prevention and control of TB and MDR-TB. They have been involved with all of the anti-TB activities everywhere and every time. Their role includes managing services for a patient with TB and MDR-TB from the initiation to the completion of treatment, including monitoring and following up the patients for the side effects of treatment drugs and the prevention of the transmission of TB and MDR-TB. However, it can be concluded that still now nurses play a share in the development of MDR-TB by their inappropriate and inadequate nursing practice in caring for the patients with TB, particularly in preventing the development of MDR-TB. Therefore, it is essentially important to improve nursing practice in the prevention of MDR-TB.

4. Prevention of MDR-TB in Bangladesh

Bangladesh has a successful history of TB services. With a mission of eliminating TB from the country, the NTP of Bangladesh has been working in both health care settings and at community levels in collaborating with different government sectors and non-governmental organizations (NGOs). As the effort of good collaborative partnership between the government and NGOs, at the end of the 2007, Bangladesh NTP achieved 72% of new smear-positive cases detection and 92% of treatment success rate compared to the global targets of at least 70% and 85%, respectively (NTP, 2009a). To control TB in Bangladesh the free-of-charge diagnosis and treatment services for the kinds of TB have been offered to all of the public TB and non-TB healthcare facilities, medical universities, all sorts of defense hospitals, public medical colleges, prisons and work places (NTP, 2009a).

DOT is recommended by the Bangladesh NTP for all TB patients everywhere. However, it is more strongly recommended for MDR-TB as its treatment is the last therapeutic option for many patients (NTP, 2009a, 2009b). The Bangladesh NTP has been following the DOTS strategies since 1993, and in 2007 its geo-administrative coverage became 100% (NTP, 2009b). In addition, the Green Light Committee supported the DOTS-Plus project and has been working in the NIDCH to screen all category II failures for possible MDR-TB cases. The DOTS-Plus Clinical Management and Social Support Committee are responsible for the overall supervision of admitted MDR-TB patients including maintaining a patient's records, monitoring a patient's progress and drug effects, suggesting appropriate treatment, patient's follow up, etc (NTP, 2009b).

In Bangladesh, TB patients are usually treated as ambulatory cases. However, a number of complicated TB patients such as patients who have become drug resistant, developed complications, are infectious, have a severe illness, or comorbidities are treated in hospital for a long time which can be up to many months. After the patient's condition has improved, the respective physician prepares a discharge plan and refers the patient to the nearest DOTS or health center to the patient's houses. In the case of MDR-TB, patients are mainly treated in hospital settings. Previously, MDR-TB patients had been treated in hospital for more than two years. Recently, MDR-TB patients are hospitalized in the NIDCH and other chest disease hospitals up to the end of the standardized intensive phase of treatment (at least for 6 months or more in the case of a late culture or sputum conversion) or until the DST result has shown the treatment can be changed to an individualized regimen. After four consecutive negative sputum cultures and smear results over four months and the individualized regimen has started, the patient is discharged from hospital and referred to an ambulatory phase under strict supervision giving DOT (NTP, 2009b).

Physical separation of known and suspected TB and MDR-TB has been considered the most important administrative control measures in Bangladesh. There are 57 TB hospitals and clinics in Bangladesh with more than 1000 beds to provide separate and specialized care to the patients with TB (Chowdhury, Chowdhury, Islam, Islam, & Vaughan, 1997). However, according to Zafar Ullah et al. (2006) the estimated patients (TB) : bed (in the TB hospitals and clinics) ratio is 500 : 1. In the NIDCH, there are separate male and female TB and MDR-TB wards to provide care separately from other patients. In terms of environmental control, natural

ventilation (i.e. open windows in an opposite wall) is the only way to prevent the transmission of TB and MDR-TB in a hospital.

Even though there is an existing comprehensive approach and strong TB and MDR-TB control in Bangladesh, there seems to be a lack of appropriate measures for the prevention of MDR-TB in Bangladesh, particularly in the NIDCH. For instance, even though DOT is strongly recommended, the 'real DOT' still seems to be absent particularly in hospital settings. In hospital, even though every day nurses deliver TB drugs directly to the patients, drugs are self-administered by the patients.

Bangladesh NTP has proposed an infection control strategy for the prevention of drug resistance and MDR-TB with the combination of administrative control measures, environmental control measures, and personal protective control measures (NTP, 2009b). However, there seems to be less or a lack of the appropriate application of these strategies in the practical setting. There is no negative pressure rooms for infectious TB and MDR-TB patients and a large number of patients are nursed together in a naturally ventilated room. In addition, infectious MDR-TB patients often stay together with TB patients, and TB patients often stay together with non-TB patients in the same room due to shortages of beds (Morol, 2011, March 6). Moreover, still now there is a lack of activities or facilities to prevent the development of drug resistance and to prevent the transmission of MDR-TB such as there is no extra room in the wards for collecting sputum and performing cough inducing procedures and no regular appropriate health education for patients and their relatives.

While staying in the hospital for long time, the patients are not restricted to stay in an isolated room and to use personal protective measures when they are exposed to other patients. Moreover, they can move and walk anywhere in

the hospital at any time without any restriction (Morol, 2011, March 6). This situation facilitates a higher risk of the transmission of MDR-TB and its risk factors among other patients in the hospital. Furthermore, the environmental control measures are not always maintained in the wards. Some patients do not want to open windows due to the air from outside is quite cool in winter and some patients block the windows by putting their belongings in front of them.

Nursing care for TB and MDR-TB patients in Bangladesh is only available in the hospital/clinical settings which may be due to the shortage of nurses and a lack of health care infrastructure in Bangladesh. However, from the researcher's working experience in one of the medical college hospitals and two TB hospitals in Bangladesh, nurses in TB and non-TB hospitals have been performing many roles in the management of TB and MDR-TB patients. These are medicating patients, isolating patients, investigating patients, referring the patients, and maintaining patient records. Unfortunately, many of the nurse's activities that have been observed seem to be inadequate and inappropriate for the prevention of the development and transmission of MDR-TB and its risk factors control. This is probably due to heavy workloads, lack of resources, facilities and support, and lack of nurses' training, guidelines, and knowledge on the prevention of TB and MDR-TB.

In conclusion, the present TB and MDR-TB services in Bangladesh are mainly curative services. There seems to be less attention paid to prevent the development or transmission of MDR-TB. Although, the nurses are available to provide all kinds of care to the patients in the hospitals, there is a lack of support and systems for nurses to provide appropriate preventive services to the patients with TB

and MDR-TB to prevent the development and transmission of MDR-TB and its risk factors.

5. The Concepts Related to the Prevention of MDR-TB

MDR-TB is a hundred percent preventable disease. However, to prevent MDR-TB, the researcher has to understand what theory or concept is appropriate to describe the phenomena of the study. Generally, in public health there are many different theoretical/conceptual models or frameworks that attempt to describe the prevention of diseases, events (such as accidents and violence), or risks including the social-ecological model (CDC, 2009), levels of prevention (Mensah et al., 2005), clinical risk management (Department of Health, 2005), DOTS framework (WHO, 2008). Each of these models or frameworks contribute to a better understanding of the related concept and helps the researchers to conduct the study. Here, the researcher offers a brief description of the two most related concepts: the concepts of levels of prevention and clinical risk management, those were used to guide this study and the development of the NPG: MDR-TB.

5.1 Levels of Prevention

The scope of prevention has changed over time. According to the World Health Organization (WHO), diseases prevention “covers measures to not only prevent the occurrence of disease, such as risk factor reduction, but also to arrest its progress and reduce its consequences once established” (as cited in Starfield, Hyde, Gervas, & Heath, 2008, p. 580). To understand how the preventive services can be assessed and described, public health specialists offer many valuable frameworks in

terms of levels of prevention. The original levels of prevention: primary, secondary, and tertiary prevention was proposed by the US Commission on Chronic Illness in 1957 (Kutash et al., 2006). However, in the review by Mensah et al., (2005) focusing on the levels of prevention, five levels of prevention from the review of recent studies of public health on prevention were identified. These are:

Primordial prevention. It is defined as the prevention activities to stop the emergence or development of risk factors in target populations, groups, units or countries in which they have not yet appeared (Giampaoli & Mean, 2007; Starfield et al., 2008). So, the target population of this is a population "without risk factors yet" (Mensah et al., 2005, p. 152). Primordial prevention involves the activities and measures that inhibit the emergence and establishment of conditions, which are known to increase the risk of disease. These conditions may be related to the socioeconomic conditions, behaviors and so on. Therefore, this type of prevention depends on mainly public education, the media, legislation and government policy. The difference between primordial and primary prevention is that primordial prevention targets the general population through lifestyle messages as a part of an awareness campaigning, whereas, the primary prevention focuses on the modification of risk at both the population and the clinical level (as cited in Ursoniu, 2009).

Primary prevention. Primary prevention is the second level of prevention. It includes persons with no disease but who have one or more risk factors to prevent the development of disease (Mensah et al., 2005). This prevention may be defined as an action to promote health prior to the onset of diseases (Starfield et al.,

2008). So, the ultimate purpose of this prevention is limited to the reduction of the incidence of a particular disease (Mensah et al.). It involves two strategies: (a) reduce the average risks of the whole population (the population strategy) and (b) reduce the risk of people at high risk as a result of specific exposure (the high-risk individual strategy) (Ursoniu, 2009).

Secondary prevention. Secondary prevention is the third level of prevention. It is the action in identifying and treating people with an established disease which halts the progress of the disease (Rahman, 2007). Similarly, Starfield et al. also stated that secondary prevention refers to the interventions that halt or slow the progression of a disease or its sequelae at any point after its inception (Starfield et al., 2008). The aim of this prevention is to reduce the prevalence of the disease, by curing and reducing the more serious consequences through early diagnosis and treatment (Ursoniu, 2009).

Tertiary prevention. Tertiary prevention is defined as the measures for the prevention of the disease progression after it is clinically noticeable and the diagnosis has been established and possible disabilities of the disease (Rahman, 2007). Therefore, the target population of this level is the persons with the disease.

Quaternary prevention. It involves the target population with severe disease conditions for rehabilitation or restoration of function (as cited in Mensah et al., 2005). According to the World Organization of Family Physicians, it can be defined as “an action taken to identify a patient at risk of over-medicalization, to

protect him (sic) from new medical invasions and to suggest to him (sic) interventions which are ethically acceptable" (as cited in Starfield et al., 2008, p. 580).

5.2 Clinical Risk Management

This concept has been established in the industry for many years. In healthcare development, it was first established in the mid-1970's (East, 1999) in the USA and recently in the UK in 1995 (McIlwain, 1999). Nowadays, it is a key business process within both the private and public sectors around the world.

The concept clinical risk management acknowledges that by nature all healthcare processes carry risks (De Smet, 2007). The assumption of clinical risk management is that a systematic approach is needed to minimize the untoward consequences of these risks (De Smet). According to this concept, risk is inherent in everything we do (AusAID, 2006) and clinical risk management is an interactive holistic process for minimizing risks. It is applicable in all kinds of organizations at all levels and to individuals but it needs to be applied in a systematic approach.

Many articles (Bould et al., 2006; De Smet, 2007; Department of Health, 2005; Westgard & Westgard, 2009), discuss clinical risk management and propose a number of steps, stages or components of risk management approach including risk awareness, risk identification, risk analysis, risk estimation, risk assessment, development and execution risk reduction strategies, evaluation of risk reduction strategies, risk evaluation, risk monitoring, risk control, risk reduction or risk elimination, risk management or treatment and risk re-evaluation. In these processes, the same step is used, however different terminology is used by different authors, and some steps are overlapped. For instance, according to many authors and

organizations (Department of Health; Standards Australia and Standards New Zealand, 2004; Westgard & Westgard), risk assessment is the overall process of risk analysis and risk evaluation. Similarly, the terminology control, management and treatment is interchangeably used as a step of clinical risk management with the same meaning (Standards Australia and Standards New Zealand). However, the clinical risk management concept of the Department of Health, Government of Western Australia was used as the strategy to prevent MDR-TB among hospitalized adult patients in Bangladesh.

Basically, the concept of clinical risk management of the Department of Health Government of Western Australia was derived from the concept of risk management of Standards Australia and Standards New Zealand (2004). Although, the clinical risk management approach of the Department of Health Government of Western Australia has two additional processes: 'communication and consultation' and 'monitor and review' which flow across the steps, originally it had five main steps including establishes the context, identify, analyze, evaluate and treat risks (Department of Health, 2005).

Establishes the context. It is the first step of the clinical risk management process. The purpose of this step is mainly to identify and understand the organization's external and internal environment and the risk management context in order for a clinical risk management program to be effective. It involves identifying the stockholders and their relationship with the organization. It is also important to identify the organization's strengths, weaknesses, opportunities and threats. When establishing the external environment it is important to take into account the

perceptions and values of the external stockholders and to establish policies for communication with these parties. The internal environment is understanding the key areas of the organization including structure, financial and human resource capabilities, culture, internal stakeholders, as well as the organization's goals and objectives and the strategies that are in place to achieve them. It is important because the clinical risk management takes place on the basis resources, and goals and objectives of the organizations (Department of Health, 2005; Standards Australia and Standards New Zealand, 2004).

Identify risks. This step is concerned with seeking all internal and external risks that seem to be a threat to the patients, healthcare providers, or the health system, whether or not they are under the control of the organization. In identifying the clinical risks the managers or researcher should thoroughly understand the source, event or accident, consequences or outcomes or impacts, contributing factors, and hazards of clinical risk. To do this the managers should ask what (risk) can happen, where (source of risk) it can happen, when (event) it can happen, why (causes) it happens, how (ways) it can happen (Department of Health, 2005). Good sources of information and approach are essential in identifying the risks. Some important sources of information are local and overseas experience, expert judgment, structured interviews, focus group discussions, SWOT analysis, personal and past organizational experience, reports, surveys and questionnaires, checklists and records. When identifying clinical risks other important approaches to consider include brainstorming, systems analysis, scenario analysis and systems engineering techniques (Standards Australia and Standards New Zealand, 2004).

Analyze risks. It is the step for understanding the level and nature of risk by a systematic approach (Department of Health, 2005; Standards Australia and Standards New Zealand, 2004). Risk analysis involves the consideration of the sources of risk, their positive and negative consequences, existing control over the risk, the probable severity of the consequences, and the degree of likelihood that those consequences may occur. Several sources and techniques may be used in analyzing the consequences and likelihood of risk. Sources of information may include past records, practice and relevant experience, published literature, public consultations, and specialist and expert judgments. The technique of analysis includes a structured interview of experts, the use of multi-disciplinary group experts, individual evaluations, and the use of module and simulation (Standards Australia and Standards New Zealand).

Evaluate risks. The risk need is evaluated for making decisions, based on the outcomes of the risk analysis. The decision may include: whether a risk needs treatment or not; whether an activity should be undertaken or not; and the priorities for treatment (Standards Australia and Standards New Zealand, 2004).

Treat risks. Is the development and implementation of strategies to minimize the risk. It involves, identifying the range of options for treating the risks, assessing these options and the preparation and implementation of treatment plans. A treatment plan should be integrated with the management and available resources of the organization. It should include the proposed action; resource requirements;

responsibilities; timings; performance measures; and reporting and monitoring requirements (Standards Australia and Standards New Zealand, 2004).

Development of Nursing Practice Guidelines

This main heading of the review consists of a discussion on the topics of nursing practice guidelines development process, evidence-based nursing practice guidelines, the characteristics of a highly qualified guidelines, the Delphi technique, and the efficiency of the guidelines.

1. Nursing Practice Guidelines Development Process

The increasing demand for guidelines has contributed to the development of improved methodologies for base guidelines. Many authors have suggested several methodology for developing guidelines (Browman et al., 1995; Kish, 2001; Royal College of Paediatrics and Child Health, 2006; Scottish Intercollegiate Guidelines Network, 2008). In these articles, the authors propose the different types of elements used for the development of practice guidelines. However, the key elements for developing practice guidelines: the identification of the topic, the synthesis of evidence, the formulation of recommendations and review guidelines have been proposed in all these articles. All of these key components were systematically arranged and described in the study of Browman and colleagues (Browman et al.). In their study, they proposed eight discrete steps as the methodology in developing guidelines defined as a conceptual tool for practicing guidelines development. The eight discrete steps of Bowman's practice guidelines development cycle are:

1.1 Select and Frame the Practice Guideline Problem

The selection of a topic is the first decision making step for a researcher in conducting a study for the development of practice guidelines. According to Kish (2001), the topic for developing guidelines should be chosen for the impact that will be created on the practice. However, there is a large number of potential areas, some priority setting or criteria is needed to select an area of guidelines development. A priority may emerge from an assessment of the major causes of morbidity and mortality in a given population (Shekelle, Woolf, Eccles, & Grimshaw, 1999). In the healthcare context, important criteria that are used in selecting the topic for guidelines development includes the prevalence of conditions, their associated burden of illness, concerns about large variations in the practice, high costs, issues related to risk management, potential to improve health outcomes for patients and the availability of evidence-based and supporting data (Browman et al., 1995; Kish; Royal College of Paediatrics and Child Health, 2006). In addition, in this step Browman et al. has suggested the prior specification of the outcomes of interest and the use of scenarios in framing the problem which would be helpful in avoiding subsequent confusion in developing guidelines. Moreover, it was also suggested to consider the availability of high-quality evidence to select the topic, indications to conduct a comprehensive literature review to identify the existing available evidence for the development of new guidelines.

1.2 Generate Preliminary Evidence-Based Recommendation (EBR)

After discussing the practice guidelines' topic, in this step there arise some questions that can be answered from the literature review. The questions are: Is

there any practice guideline existing to address the clinical problem that has been selected? If there is a guideline that already exists, then the guidelines need to be updated by reviewing the relevant literature, and then the remaining steps of the guidelines development process are followed. On the other hand, if any guideline does not exist or the existing guideline does not meet the certain methodological standard, the guidelines are not up to date, or do not addresses the problem of interest, then an explicit and systemic literature review is needed to extract the evidence and relevant information. Kish (2001) stated that a rigorous method of review or comprehensive review of literature is needed for guidelines development because it establishes the scientific validity and credibility of the guidelines. Then, the extracted evidence is used to generate the preliminary evidence-based recommendation in the form of a summary statement of the guidelines.

1.3 Reconcile Interpretations of Evidence to Ratify the Final EBR

This step is concerned with the interpretation and description of the evidence that is summarized in the previous step. The evidence, once gathered from the existing knowledge needs to be interpreted for grading (Shekelle et al., 1999). Grading may be defined as a systematic approach for making judgments about the quality of the evidence and the strength of the recommendations (GRADE Working Group, 2004). Using the detail and explicit criteria in rating the quality of evidence and grading of strength of recommendations makes the judgment more transparent to both those who read and use the guidelines. There are many “quality of evidence and grading of strength of recommendations” classification schemes existing that apply in research such as one proposed by the Quality Standards Sub-committee of the Clinical

Affairs Committee of the Infectious Diseases Society of America (IDSA) (Horsburgh et al., 2000) (Table 1).

1.4 Apply Clinical Modeling Factors to Formulate Guideline

In this step, the clinical flexibility and credibility of the guidelines are examined through a formal method of consensus evidence. In this method, the experts are invited to participate to give their opinions on the recommendations and its applicability to clinical practice. There are several formal methods that can be used to gain expert consensus and each has its own merits. The Delphi is one of them, in which members of a panel score their level of agreement with a draft recommendation. Consensus is defined according to a predetermined level of agreement. Other methods of formal consensus include the nominal group technique and consensus development conference. In this process, the produced guidelines may either coincide with the EBR or are different from it because sufficient weight was placed on the modulating factors to modify the recommendation. If any disagreement is found between the guidelines and EBR, it should be documented and explicitly reported, together with the reasons for the disagreement (Browman et al., 1995). However, according to Browman et al. as the consensus building is an important part of step 3 and 4, these can be intergraded into one step as “ratification and formulation of practice guidelines (consensus-building)”.

1.5 Independent Review of Guideline and EBR

In this step, an independent review session should be conducted by the experts of discipline-specific content and methodology familiar with the healthcare

system, but outside the formal guidelines development process. The purpose of this session is to enhance the credibility and legitimacy of the guidelines including the appropriateness of integrating particular modulating factors. If any change occurs to the guidelines from the external review, it should be documented. The evidence and modulating factors used in formulating the guidelines should be stated in the report of the practice guidelines. In this step, the final guidelines are developed and after that can be submitted to the committee for approval (Browman et al., 1995).

1.6 Negotiate Practice Policies

Once, the guidelines are approved and expected to be adopted as practice policies, the circumstances related to clinical, practical, and administrative constrains are to be considered that make an approved guideline difficult to implement. Many systematic constrains may include limited access to certain equipment or technologies. This step tries to explain the differences between guidelines and policies. The clinicians are prepared to accept responsibility the recommendations (guidelines) but they will not accept responsibility for the recommendations (policies) that may be shaped by non-clinical circumstances such as feasibility and affordability, but with which the clinicians will coorporate. This separation of responsibilities is important to “place the burden for effecting the change on the appropriate party so that the policies may, over time, become more congruent with the guidelines and the guidelines may become more congruent with evidence” (Browman et al., 1995, p. 508). In addition, this step is intended to address a clinician’s concerns about the motivations for guidelines development, and the issues of guidelines credibility.

1.7 Adoption of Guideline(s) and Policies

This is an administrative step. Before giving an official status, the sponsoring organization or centre must adopt formally the developed guidelines and negotiated policies. This administrative step "provides the centre its final opportunity to be considered as administrative modeling variables, and ensures mutual accountability on the part of clinicians and the centre for their contributions to the development of the practice policies" (Browman et al., 1995, p. 508).

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1.8 Schedule Guideline Review and Update

It is the final steps of Browman's practice guidelines development cycle (Browman et al., 1995). The researchers or guidelines developers need to specify when and how often the guidelines are to be reviewed, so that they may be up dated in the light of advancement in knowledge, new technological developments, change in the financial situation of the organization, and/or other changes in the modulating factors. On average, guidelines should be reviewed for updating in the field after every 2 years (Kish, 2001). Occasionally, the clinical problem may be a need to reframe, which feed backs into step 1.

*2. Evidence-based Nursing Practice Guideline*s

The evidence-based practice refers to "conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996, p. 71). The improvement of the value of health care by recommending interventions is the goal of an evidence-based guideline and it requires the use of evidence-grading systems that

explicitly address the strength of evidence (Hahn, 2009). The presentation of good evidence to the practitioners in a structured way ultimately leads to better performance.

Evidence should be gathered in a systematic way to avoid bias. WHO recommend following the Cochrane method of systematic review to the possible extent in gathering evidence (Global Programme on Evidence for Health Policy, 2003). According to the Grades of Recommendation Assessment, Development and Evaluation (GRADE) Working Group (GRADE Working Group, 2004), the reviewer of research should consider four key elements in gathering evidence. These are: (a) study design, which refers to the basic study design; (b) study quality, which refers to the detailed study methods and execution; (c) consistency, which refers to the similarity of estimate of effect across studies; and (d) directness, which refers to the extent to which the people, interventions and outcome measures are similar to those of interest.

The quality of evidence may be defined as “the extent to which all the aspects of study design and conduct can be shown to protect against systematic bias, non-systematic bias and error” (as cited in American Academy of Pediatrics, 2004, p. 875). Usually, grading the strength of evidence depends on the study design (Uhlig et al., 2006). So that the strength of the evidence provided by the study depends on the ability of the study design to minimize the possibility of bias and to maximize attribution. According to the Agency for Health Care Policy and Research, in grading the evidence the hierarchy of study type is: (a) systematic review and meta-analysis of randomized control trials, (b) randomized control trials, (c) non-randomized

intervention studies, (d) observational studies, (e) non-experimental studies, and (f) expert opinion (as cited inHarbour & Miller, 2001).

The strength of recommendation refers to the extent of the grader's confidence that adhere to the recommendation and it will do more good than harm (Uhlig et al., 2006). It is the key part in the development of any guidelines. The strength of recommendation is not only to build on the basis of the levels of the evidence but also on other factors such as anticipated benefit, harms, risk, and cost (American Academy of Pediatrics, 2004).

A variety of grading schemes exist to grade the quality of evidence and the strength of recommendations (American Academy of Pediatrics, 2004; Eccles et al., 1996; National Institute for Health and Clinical Excellence, 2006; Scottish Intercollegiate Guidelines Network, 2008). Different organizations use different systems to grade the quality of evidence and the strength of recommendation but there is no agreement as to which is best, however, it should be a standard method.

A standard grading system facilitates communication and allows for the comparison of recommendations made by different groups of experts (Uhlig et al., 2006). In this study, the Infectious Diseases Society of America-US Public Health Service Grading System for ranking recommendations in clinical guidelines was modified and used to grade the quality of evidence and the strength of recommendations (Horsburgh et al., 2000). In this grading system, meta analysis and systematic review are not included. Since meta analysis and systematic review are rich sources of reliable evidence, many authors and organizations (Eccles et al., 1996; National Institute for Health and Clinical Excellence, 2009; Scottish Intercollegiate Guidelines Network, 2008) have been using evidence from these sources as high level

of evidence (level I). Therefore, this grading system was modified to add meta analysis and systematic review as the sources of level I evidence (Table 1).

Table 1

The Grade of Recommendation and the Quality of Evidence (Adapted from Horsburgh et al., 2000)

Category	Definition
Grade of recommendation	
A	Good evidence to support a recommendation for use
B	Moderate evidence to support a recommendation for use
C	Poor evidence to support a recommendation for or against use
D	Moderate evidence to support a recommendation against use
E	Good evidence to support a recommendation against use
Quality of evidence	
l	Evidence from at least one properly randomized, controlled trial, meta analysis, and systematic review.
ll	Evidence from at least one well-designed clinical trial without randomization, from cohort or case-controlled analytic studies (preferably from more than one centre), from multiple time-series, or from dramatic result in uncontrolled experiments
lll	Evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees

Note. Meta analysis and systematic review were added as the sources of level I evidence.

3. The Characteristics of Highly Qualified Guidelines

The guidelines are expected to be more consistent, effective and efficient to improve quality of care (as cited in The Appraisal of Guidelines, Research, and Evaluation in Europe [AGREE] Collaboration, 2003b). The AGREE defined quality of clinical practice guidelines as “the confidence that the potential biases inherent of guidelines development have been addressed adequately and that

the recommendations are both internally and externally valid and are feasible for practice" (The AGREE Collaboration, 2001, p. 2).

A large number of characteristics of the quality of guidelines were determined in several studies as an attempt to develop an instrument for the measurement of lack of the quality of clinical practice guidelines (Cluzeau, Littlejohns, Grimshaw, Feder, & Moran, 1999; The AGREE Collaboration, 2003a). In addition, in a review of Vlayen, Aertgeerts, Hannes, Sermeus, & Ramaekers (2005), 269 similar and dissimilar statements or characteristics of guidelines were identified from 24 critical appraisal tools of guidelines and categorized into 50 different item characteristics. Moreover, the AGREE Collaboration (2003b) generated 23 criteria in the 6 different aspects of the guidelines development procedure that have been considered as the characteristics of high-quality clinical practice guidelines (Burgers, Cluzeau, Hanna, Hunt, & Grol, 2003; Fervers et al., 2005; Vitry & Zhang, 2008). The AGREE Collaboration, proposed characteristics are internationally developed and accepted in measuring the quality of clinical practice guidelines (Vlayen et al.). However, all of the criteria of high quality guidelines may be categorized and described under the heading of the following characteristics (Basinski, 1995; Thomas, 1999; Vlayen et al.).

3.1 Validity

Validity refers to the achievement of the expected results by following the recommendations (Saturno et al., 2003). According to Thomas (1999), the validity of guidelines means that the use of guidelines should lead to the health gains and costs predicted. Thus, the validity of guidelines requires the guidelines be rigorously

developed and consistent with available scientific evidence (Thomas). Rigorous development of guidelines is related to the process used to gather and synthesis the evidence, and the methods used to formulate the recommendation (Grol, Cluzeau, & Burgers, 2003). In addition, the validity of guidelines is related to a large number of guidelines development dimensions such as decision making (methods related to reach a consensus and to formulate recommendations), sources of evidence, references cited, literature search and selection, and evidence of collection and evaluation (Vlayen et al., 2005).

3.2 Cost Effectiveness

It is one of the most important characteristics of the clinical practice guidelines to develop on the basis of the economic status (resources) of the organization or the country and cost effectiveness of the application of the recommendations. According to Thomas, “if the guidelines ignore the costs and concentrate only on benefits, practices might be recommended with major implications for resource use, which are not accompanied by correspondingly large improvements in patient outcomes” (Thomas, 1999, p. 38).

3.3 Reproducibility and Reliability

According to the Thomas (1999) the reproducibility of guidelines “means that given the same evidence, another guidelines development group would produce similar recommendations” (Thomas, p. 38). Clinical practice guidelines are seem to be reproducible when two groups of experts, presented with the same evidence and methods, derive similar recommendations (Winn, Brown, & Botnick,

1999). On the other hand, the reliability means that “given the same clinical circumstances, another health professional would apply the recommendations in a similar fashion; both are more likely to occur if the guideline is developed in a systematic and rigorous manner” (Thomas, p. 38). It involves with the independent review, pilot/pre-testing, and documentation of the guidelines (Vlayen et al., 2005).

3.4 Representative Development

In developing the guidelines, the participants or development team needs to include the individuals from all relevant professional groups. It will ensure that the representation of all the professional groups that are likely to use the guidelines (Thomas, 1999). Even the patient’s view and preferences need to be sought because the chief purpose of clinical guidelines is to improve the quality of patient care.

3.5 Clinical Applicability

This refers to the extent to which guidelines can be used in clinical practice by the target users (The AGREE Collaboration, 2003a). The purposes, rationale, guidelines topic, patient population and provider population are included in this characteristic (Vlayen et al., 2005). The first characteristics of qualified clinical practice guidelines are that the scope of the guidelines and for whom the guidelines are meant to be described in the process of guidelines development. The overall objectives and the prudential benefit should be described in the guidelines. The target population and users should be clearly defined in the process of guidelines development (Scottish Intercollegiate Guidelines Network, 2008).

3.6 Clinical Flexibility

The guidelines should be flexible. The clinical flexibility of the guidelines includes two factors: 1) the guidelines should identify exceptions to applying the guidelines, and 2) the guidelines should discuss how patient preferences are to be taken into account in the decision making process (Thomas, 1999).

3.7 Clarity

Precise definitions and 'friendly' formats should be used in the guidelines, so that the user can easily follow them (Thomas, 1999). The AGREE Collaboration (2003a) also recommend that since the main role of guidelines are to help clinicians and patients make better decisions, busy clinicians need simple and user-friendly guidelines that are easy to understand.

3.8 Meticulous Documentation

The documentation of the guidelines refers to the background information about the developmental process and details plan for implementation and evaluation of the guidelines (The AGREE Collaboration, 2003a). The meticulous documentation of the guidelines includes the details of who took part, methods used, and assumptions made, and should link recommendations to the available evidence, which should be graded according to its method (Thomas, 1999).

3.9 Scheduled Review, and Unscheduled Review

Guidelines should be reviewed periodically and modified to incorporate new knowledge (Thomas, 1999). Therefore, the guidelines should present

the key review criteria for monitoring and/or audit purposes (The AGREE Collaboration, 2003a).

In conclusion, if guidelines are to be considered as qualified guidelines, they need to have most, if not all, of the mentioned characteristics.

4. Delphi Technique

The Delphi technique is well known as a means and method to gain consensus by using a series of questionnaires to collect data from a panel of selected subjects (as cited in Hsu & Sandford, 2007). It has been used in a variety of disciplines including social science research and has been increasingly used in nursing research (Keeney, Hasson, & McKenna, 2001). The Delphi technique is used when: (a) it is essential to get a judgment (Andranovicn, 1995), (b) it is not practicable or desirable to bring experts together (Critcher & Gladstone, 1998), (c) lack of agreement, and (d) there is an incomplete state of knowledge (as cited in Stitt-Gohdes & Crews, 2004)

Delphi technique is a series of data collection rounds. Although, there are no strict roles or guidelines on the number of Delphi rounds, the provision for feedback and opportunity to revise the previous responses obviously requires at least two rounds. In addition, more numbers of Delphi techniques may result in a reduction in information and response rates due to respondent fatigue. Usually, the number of Delphi methods depends on several issues such as time available, and consensus development (Keeney et al., 2001). It has both strengths and weakness which are as follows:

4.1 Strengths of the Delphi Technique

Previous studies (Andranovicn, 1995; Macmollian, 1971), have identified the four important strengths of the Delphi technique which includes: anonymous response, iteration, controlled feedback and statistical group response. However, development of valuable consensus is one of the most important strengths of this method.

Development of consensus. The Delphi technique, is most commonly called the method of consensus (van Teijlingen, Pitchforth, Bishop, & Russell, 2006). This method is mostly concerned in developing and measuring the consensus by providing a means of collecting an expert's opinion where little evidence exists. It is the systemic way of synthesizing information from conflicting evidence (van Teijlingen et al.).

Anonymous response. It is an individual response of an expert in a confidential process. In this way, the Delphi technique reduces the effect of dominating individuals. It gives an opportunity to the experts to share responsibilities and it is considered as the tonic for developing consensus and promotes satisfaction by participating and ownership of the resulting decision. Anonymous responses protect the participants from unduly influencing the others in the panel and thus prevents the bias in the outcomes (Andranovicn, 1995). If the panel anonymity is appropriately maintained, the panel members can give their opinions freely.

Iteration. The Delphi technique is an interactive process. In the Delphi process, the experts generate their ideas and comments, and the researcher distills those responses and presents them to the experts in the subsequent rounds for their input (as cited in Geist, 2010). A series of Delphi rounds provides an opportunity to share ideas among all the members of the panel. This process allowing the individual to change their opinion (van Teijlingen et al., 2006).

Controlled feedback. Throughout the several rounds of the technique, the controlled feedback reduces the direct confrontation and the disadvantages that usually occur in the interacting group. The examples of disadvantages that can be reduced by the Delphi technique are: quickly accepting or dismissing other opinions, focusing on personalities rather than the issue, and closing off discussion of novel or different ideas (Andranovicn, 1995). Controlled feedback occurs between interactions when the researcher uses qualitative data such as comments and reasons for ratings (as cited in Geist, 2010).

The statistical group response. It consists of quantitative feedback such as means, medians, modes, and interquartile ranges based on the numerical ratings of every statement or item (as cited in Geist, 2010). The Delphi technique has been considered as a great tool that helps to get the consensus quickly. The term group response refers to the appropriate combining or aggregating of the individual response in the result of the final round to ensure that the opinion from every panel member is represented in the final response (Macmollian, 1971).

In addition, saving costs is one of the strengths of this method. It is a relatively cost-effective method, compared with alternatives such as consensus development coference (as cited in Critcher & Gladstone, 1998). Moreover, it supports the involvement of participants from disparate geographical areas (van Teijlingen et al., 2006). There is no need to have the participants in the same place or location, hence the researchers and participants can avoid the cost and hassles of traveling to and from a meeting (Andranovicn, 1995). Furthermore, the Delphi method is one of the most flexible methods. The participants can change their statements, and suggestions or withdraw some altogether as a period of 'considered thought' is allowed (van Teijlingen et al.).

4.2 Weaknesses or Limitations of the Delphi Technique

No study is perfect, there are always some weakness (Stitt-Gohdes & Crews, 2004). Even though, Delphi is a powerful method to develop consensus, answer difficult questions, compile a body of knowledge from experts, for solving problems, or establishing validity, it has also some weaknesses. Andranovicn (1995), mentioned the three main weaknesses of the Delphi technique are: participant's must have written commutation skills, the Delphi is labor intensive and time consuming, and need for highly motivated participants.

Anonymity is one of the core components of the Delphi technique. Anonymity may be the cause of the lack of participant's accountability in viewing their expression and it may encourage hasty decisions (as cited in Powell, 2003). Powell argued that this is not a weakness to a Delphi study as it could apply to any

anonymous postal questionnaire. It was also argued that this weakness might be minimized by using the expert and sequential process.

In conducting Delphi, some problems are often created and the researcher may not be able to conceptualize the ways to solve the problems (Stitt-Gohdes & Crews, 2004). To minimize this weakness, the same author suggested that the research should be creative in perceiving the different kinds of problems from different individuals.

The main strength of Delphi is to report the achievement of consensus in the given area which lacks empirical evidence (Powell, 2003). But there is an objection that this consensus method should not be treated as a scientific method for the development of new knowledge due to very little information about the inclusion criteria, sampling or method of analysis (as cited in van Teijlingen et al., 2006). Another weakness related to consensus is a wrong recommendation due to hasty decisions by busy or weary panel members.

The validity of this method has also been criticized. Goodman stated that “the researcher can have no influences in any of the development stages of survey, which could have implications for face validity” (as cited in Keeney et al., 2001, p. 198). In addition, the non-representative panel is another weakness of the Delphi technique (van Teijlingen et al., 2006).

Moreover, the dropout rate of the participants seems to be one of the greatest weaknesses of the Delphi technique. There is a large amount of work over a long time related with the Delphi technique, which seems to reduce the acceptability of the method. As the rounds of method progresses, response rates gradually decrease.

In conclusion, although, the Delphi technique has been criticized heavily for the absence of its reliability and validity, other criteria including transferability, credibility, applicability, or conformability of results may be more appropriate (Keeney et al., 2001).

5. Efficiency of the Nursing Practice Guidelines for the Prevention of MDR-TB

Efficiency is the way of judging the activities of an organization or enterprise (Encyclopedia of Management, 2009). This study focuses on the efficiency to evaluate the guidelines. To measure the efficiency of the guidelines, it is essential to understand the term evaluations of the guidelines and its efficiency.

The guidelines should be evaluated or pilot tested before use (Grol, 2001). Evaluation mainly occurs after the dissemination and implementation of guidelines among the target population (Basinski, 1995). From many previous studies (Edwards, Davies, Ploeg, Virani, & Skelly, 2007; Kett et al., 2011; Meerwijk et al., 2010) and literature reviews (Grimshaw et al., 1995; Grimshaw & Russell, 1993; Thomas et al., 1998), it was identified that the clinical practice guidelines were evaluated by focusing on either process of care (such as consisting of empirical anti-biotic use and compliance with the guidelines) or patients' outcomes (such as severity of illness, improved patient compliance with treatment, and reduction in early complications) or both.

Efficiency is a measure of performance but it is very much confused with effectiveness and these are often considered as synonyms (Encyclopedia of Management, 2009). However, efficiency and effectiveness have different meanings. "Efficiency is defined as an internal standard of performance and effectiveness as an

external standard of fit to various demands" (Borgstrom, 2005, p. 1). In another way, efficiency measures the relationship between outputs; products or services of an intervention and inputs; the resources that it uses. Whereas effectiveness measures the extent to which are the intervention's intended outcomes (Ministry of Foreign Affairs of Denmark, 2006). Although, the meaning or definition of efficiency is widely varying in different disciplines, in general, it is defined as the relationship between health care outputs and resource inputs. However, in addition to this relationship, efficiency might also be considered with the relationship between health care services and final health outcomes (Kautter, 2011). The health service outcomes can be measured in many ways such as by measuring the individual units of service including procedures and prescriptions (McGlynn, April 2008). Moreover, Frei and Harker (1996) claimed that in the traditional efficiency measure, the actual way in which the inputs are transmitted to outputs is often overlooked. They argued that the actual design of the transformation process is crucial in the performance of a firm. Thus, they suggested that the process design must be studied and integrated into the performance analysis. Therefore, in this study, the efficiency of NPG: MDR-TB was measured in terms of the changes in nurses' practices regarding the prevention of MDR-TB among the hospitalized adult patients.

Case findings and case holdings or treatment measures are the principal measures for controlling transmission and reducing the incidence of TB including MDR-TB (Golub, Mohan, Comstock, & Chaisson, 2005). Generally, TB case finding measures refers to an organized systematic attempt to discover (diagnose) nearly all the real patients of tuberculosis (Arora, 1976). It has an important role in the development of appropriate control measures by defining the

population at risk for TB and MDR-TB. There are two types of case finding activities in controlling TB. These are passive case finding, which occurs when people present themselves with symptoms, and active case finding, which refers to screening an exposed population with a diagnostic test (ICN, 2008). However, in the control and care for patients with TB and MDR-TB by nurses, the standard case finding involves the nursing activities related to assessing patients who may have TB and MDR-TB and sputum collection for diagnosis (ICN).

Case holding and treatment are interchangeably used in TB literature (Department of Health, 2003). It refers to the activities to treat the patients with TB including registering the patients (Hershfield, 1999), ensuring the patients' medication (Department of Health, 2003; Hershfield), and providing health education (Department of Health). According to the ICN, the standard case holding measures include the nurses activities related to communicating with the TB and MDR-TB patients, organizing DOTS in the intensive phase, translation phase assessment from intensive treatment to continuation phase, case management during the continuous phase, and managing patient transfer. Therefore, the efficiency of the guidelines for the prevention of MDR-TB refers to the ability of the guidelines in changing the nursing activities or practice regarding the case finding and case holding measures.

Summary

MDR-TB is becoming an increasingly important clinical and public health problem, particularly in the developing countries and is a threat to human life and the control of TB. It is a man made phenomena and the consequence of several completely preventable mistakes; mostly related to the prior treatment of TB. It has a

devastating impact on almost all of aspects of human wellbeing. MDR-TB is very difficult and costly to treat. Prevention is the ultimately the only way to solve the problem of MDR-TB. Several studies indicated that the implementation of multiple preventive measures is needed for the effective prevention of MDR-TB. Nurses are in the frontline among the health care providers to halt the alarming emergence of MDR-TB. They perform the bulk of activities in identification, assessment and treatment of the causes and diseases of TB and MDR-TB. However, nurses' contribution is often fraught with mistakes that occur in the management of TB by providing inappropriate and ineffective care. Since MDR-TB was reported immediately after the development of anti-TB drugs, several initiatives have been taken at national and international levels to overcome this problem. But still there a gap in taking initiative to support the nurses in providing quality nursing care for the prevention of MDR-TB. Therefore, a guideline is urgently needed to be developed for nurses to improve nursing care for the prevention of MDR-TB.

CHAPTER 3

RESEARCH METHODOLOGY

Prior to presenting the research methodology, the study setting is described to delineate the organizational context where this developed NPG: MDR-TB would be implemented. The methodology of this study is discussed according to research design, the phases of development of the NPG: MDR-TB, and ethical considerations.

Study Setting

Six wards: two non-TB medical wards, two TB wards, and two MDR-TB wards of the NIDCH, Dhaka were purposively selected as the setting of this study. It is the only chest diseases institute and referral hospital in Bangladesh. The patients from all over the country with chest diseases and disorders such as a destroyed lungs or collapsed lungs, haemoptysis, chest injury and complicated forms of TB and MDR-TB, are referred to this hospital. It has 693 beds for inpatients and 275 nursing staff. This hospital has several wings including nine medical and four surgical units and separate male and female wards for non-TB, TB and MDR-TB patients. TB and MDR-TB patients are admitted under all medical units according to their admission schedule and stay in hospital for a long time. There are several rooms in a ward and in each room four to seventeen patients stay together. Sometimes, TB and MDR-TB and TB and non-TB patients stay together in the same room due to a shortage of sanction beds for TB and MDR-TB. Natural ventilation (i.e. open windows on the opposite wall) is the only way to prevent the transmission of TB and MDR-TB. The Green

Light Committee supported DOTS-Plus project has been working in the hospital to screen and provide proper management of MDR-TB cases (NTP, 2009b). However, TB drugs are self-administered by patients.

Like other hospitals in Bangladesh, most nurses working in this hospital are registered as diploma nurses from the Bangladesh Nursing Council (BNC) and are permanent government employees. A very few number of nurses are working as project employees. In each of the selected wards, approximately 11-14 nurses are working for three shifts: morning, evening and night. In the Bangladesh context including the NIDCH, nurses perform their duty in rotation. Every year they should rotate from one ward to another ward. In addition, the nursing authority often exchange or shift the nurses from one ward to another ward in any emergency situation.

Research Design

The research and development type of design is used in this study and is conducted in two phases. The first phase is the development of the NPG: MDR-TB and the second phase is the test of the efficiency of the newly developed NPG: MDR-TB.

Phase 1: Development of the NPG: MDR-TB

The purpose of this phase was to develop the nursing practice guidelines for the prevention of MDR-TB in hospitalized adult patients in Bangladesh. This phase was conducted in the three following steps.

Step 1: Literature Review

This step was to gain an insight of the existing state of knowledge in the area. A comprehensive review of existing TB guidelines and current relevant literature of TB and MDR-TB was conducted. The following key words and combinations were used: 'prevention of' 'control of' and 'management of, TB and MDR-TB combined with guidelines, nursing practice guidelines, clinical practice guidelines, and nurses' role to search relative papers from electronic databases including PubMed, Science Direct, CINAHL, ProQuest, and OVID published during 1992-2010. Some other terms were also used such as 'MDR-TB and nurse', 'causes of MDR-TB', 'risk factors for MDR-TB' and 'transmission of MDR-TB'. Research or reviewed papers, guidelines, and articles containing the information about the nursing approach in caring and preventing TB and MDR-TB were also included in the review.

Step 2: Interview Stakeholders and Observation

This step aimed to formulate the first draft of the guidelines. It was prepared by the researcher using the data from Step 1. A semi-structured interview was conducted to add more relevant and implicit evidence in the context of Bangladesh. Also the researcher observed the study settings and discussed with related individuals of the settings in caring for the patients to assess the existing risk factors and how they prevented MDR-TB. Then the first draft of NPG: MDR-TB, NPG: MDR-TB version-1 (NPG: MDR-TB $V_{1)}$ was developed by synthesizing the findings from the literature review, semi-structured interviews, and observations of the setting and discussions with different health care providers.

Instruments. In this step, the interview guidelines, tape recorder, and field notes, were used to collect data during participant interviews and setting observations.

Participants. A semi-structured interview was conducted with 11 purposively recruited experts consisting of 5 senior nurses, (2 from MDR-TB ward, 1 from TB ward, 1 from non-TB and 1 from the DOTS centre), 2 nursing in-charge (1 from MDR-TB ward and 1 from TB ward), 1 nursing supervisor of MDR-TB ward, and 3 TB and MDR-TB specialist physicians. They had been working in the TB hospital for a minimum of three years (Appendix D 3, Table 13).

Procedures. The researcher informed the participants in detail about the purposes, the plan for gathering data and possible benefits of the study prior to conducting the interview. The interview was conducted at a convenient time and place for each participant. They also were informed about their freedom to participate or not participate in this study and that the interview was tape recorded. Verbal or written agreement was obtained. Participants were interviewed for 25 minutes to two hours.

Data analysis. Data was transcribed by the researcher and checked by the eight conveniently selected participants from the same group. Then the transcribed data was analyzed by using simple content analysis. The main ideas were categorized into themes. The identified themes were added to developing the NPG: MDR-TB V_1.

Step3: Validation of the NPG: MDR-TB

The purpose of this step was to determine the content validity of the NPG: MDR-TB. A modified two-round Delphi technique was used to secure consensus from the MDR-TB experts in Bangladesh.

Participants. Twenty eight experts were initially selected but only 25 participated. They were various health care professionals: 11 senior staff nurses, 3 nursing administrators (2 nursing supervisors and 1 deputy nursing superintendent), 3 nursing educators, 4 TB/MDR-TB physicians, 1 laboratory specialist, 1 director of the national TB control program; and 2 DOTS-Plus coordinators. Willingness to participate in the study and having experiences of working, teaching, or researching in the area of TB/MDR-TB for at least three years were the criteria used to select the experts (Table 2).

Table 2

Frequency and Percentage of the Experts in Each Round of Delphi

Experts	Round 1 (n = 25)	Round 2 (n = 24)
Senior Staff Nurse	11 (44%)	11 (45.8%)
Nursing Administrator	3 (12%)	3 (12.5%)
Nursing Educator	3 (12%)	3 (12.5%)
TB/MDR-TB Physician	4 (16%)	3 (12.5%)
Director (Ex)of NTP	1 (4%)	1 (4.2%)
DOTS-Plus Coordinators (current and ex)	2 (8%)	2 (8.3%)
Laboratory Specialist	1 (4%)	1 (4.2%)

There were more females (56%) than males (44%) comprising this group. The average age was 44.6 years (SD = 7.16) with the range of 31 to 56 years. Professionally, all of the participants were highly educated; of them, two-thirds (68%) had post-graduate degrees and one (4%) had a PhD degree in medical science. The length of working and teaching experience of the experts on TB and MDR-TB varied from 3 to 28 years. On average, the expert's experience was 12.32 years (SD = 7.40) (Appendix D 4. Table 14).

Instruments. The researcher developed the questionnaires consisting of a set of the guideline statements. A 7-point Likert scale, ranging from 0 = strongly disagree to 6 = strongly agree, was used. For the content validation of the guidelines, the researcher asked the 25 experts in round one and 24 in round two to rate whether each statement was relevant, clear and applicable. In addition, the experts were asked to provide suggestions or comments for further revision.

Data collection and analysis. Two rounds of Delphi were conducted to reach consensus. Data was collected from the same group of experts to assess the content validity of the NPG: MDR-TB V_1. The process and findings of each round were as follows:

1. The first round

The NPG: MDR-TB V_1 was sent to the experts with clear instruction as mentioned above. The researcher also requested them to return the completed

questionnaires within one week. The returned questionnaires were examined carefully in the following manner.

Each statement of the NPG: MDR-TB V_1 was examined in terms of the relevancy, clarity, and applicability. The percentage of agreement from the experts was calculated for each statement to develop the consensus. It was then used for decision making whether the statement should be retained, revised, or discarded. The mean, median, standard deviation (SD), and inter-quartile range (IQR) of the agreement score for each statement were calculated. The following modified criteria of Cantrill et al., (1998) were used.

1. Retained: if $\geq$ 75% of experts scored the statement $\geq$ 4 in terms of relevancy, clarity and applicability.

2. Revised: if $\geq$ 75% of experts scored the statement between 2-3 in terms of relevancy, clarity and applicability.

3. Discarded: if the statement failed to meet either one of the above criteria.

In addition, a median of 5 or more and IQR $\leq$ 1.00 were also used to guide the decision (Crutzen et al., 2008). Finally, a summary of the findings from the first round was prepared, and the NPG: MDR-TB Version-2 (NPG: MDR-TB V_2) was developed and then used for the second round.

2. The second round

The NPG: MDR-TB V_2 was sent to the same group of experts with a summary of the findings from the first round. In this round, the experts were asked to reconsider each of the retained and modified statement for confirmation or re-rating

their agreement. The general format of the questionnaires of this second round was identical to the one used in the first round. In addition, they were asked to prioritize each statement by ranking each statement using a 5-point rating scale ranging from 0 = unimportant to 4 = very important. The rank priority was calculated by using the mean, median, mode, SD, and IQR. The procedure of rating and interpreting the findings were identical to the first round. The output of this round was the NPG: MDR-TB Version-3 (NPG: MDR-TB V_3), the final version.

Phase 2: Evaluation of the Efficiency of the NPG: MDR-TB

The purpose of this phase was to test the efficiency of the NPG: MDR-TB V_3. Firstly, the developed NPG: MDR-TB final version was disseminated and implemented. Subsequently, the efficiency of the guidelines implementation was evaluated. The procedures of this phase are as follows:

Participants

The participants were all registered nurses who were either government or project employees, working in the selected wards, and were willing to participate in the study. The baseline data was collected from 72 registered nurses who met the inclusion criteria: 24 from level 0, 26 from level 1 and 22 from level 2. There were 65 nurses attending the workshops. Among them only 64 nurses completed the post implementation questionnaires. The baseline data of seven nurses (four from level 0, two from level 1, and one from level 2) who did not attend the workshop and one nurse from level 1 who did not complete the post implementation questionnaire, were dropped from the analysis. The reasons that they were not able to

participate were that they were on leave during the workshop and were in the process of transferring to another hospital.

Instruments

Three sets of self-administered questionnaires (MDR-TB PPQ) developed by the researcher for the three groups of respondents in the three units of the study were used. Each instrument consisted of two parts: demographic and preventive practice questionnaire (Appendix C 4).

The first part collected data regarding age, gender, religion, and professional education, duration of total service and working experience in respective wards, and training on TB, MDR-TB and/or chest diseases and disorders. The second part, the MDR-TB PPQ was designed separately for use in the three settings or units: non-TB medical ward, TB ward, and MDR-TB ward to evaluate whenever the implementation of the developed NPG: MDR-TB would contribute to changes in the nurses' practice for the prevention of MDR-TB.

Each preventive practice assessed two major elements of TB control and standard nursing care to control TB: case finding and case holding. That means, in every setting, the MDR-TB PPQ included two categories of nursing measures: case finding measures and case holding measures for the prevention of MDR-TB. The recommendations of the three parts of the NPG; MDR-TB were summarized and modified to form statements (items) in three levels. A 5-point numerical rating scale; reflecting the frequency of the nursing measures in preventing MDR-TB (rating from 0 = almost never perform, to 4 = almost always perform) was used.

Three sets of MDR-TB PPQ are:

1. The MDR-TB PPQ of the Nursing Practice Guidelines for Prevention of MDR-TB among Hospitalized Adult Patients without TB and MDR-TB (Level 0) consisted of 2 components and 8 sub-components with 33 items (Appendix, C 4).

2. The MDR-TB PPQ of the Nursing Practice Guidelines for Prevention of MDR-TB among Hospitalized Adult TB Patients but without MDR-TB (Level1) consisted of 2 components and 11 sub-components with 51 items (Appendix, C 4).

3. The MDR-TB PPQ of the Nursing Practice Guidelines for Prevention of Transmission of MDR-TB in Hospitalized Adult Patients (Level 2) consisted of 2 components and 9 sub-components with 41 items (Appendix, C 4).

Validity and Reliability of the Instruments

The MDR-TB PPQ was content validated by three experts including one Bangladeshi physician who is an expert in the management of TB and MDR-TB, one Thai and one Bangladeshi nursing expert in medical nursing and research methodology. The experts were asked to assess the degree of relevance and appropriateness of the instruments within the Bangladesh cultural context. In addition, the experts were asked to indicate the conciseness and clarity of each statement as yes (concise, clear) or no (not concise, not clear).

The redundant and overlapping items were deleted from the MDR-TB PPQ. The Content Validity Indices (CVIs) were computed. The CVIs of the instruments is determined by the proportion of items rated as either 3 or 4 by all

experts (Polit & Beck, 2008). A CVI of .91 for the questionnaire of 'level 0', .86 of 'level 1', and .90 of 'level 2' were satisfactory.

The test-retest reliability of the three sets of the MDR-TB PPQ was tested by calculating the Intraclass Correlation Coefficients (ICCs) for the entire questionnaires. The reliability of the questionnaires was tested using the actual study participants of the study due to a limited number of participants. To assess test-retest reliability, the researcher collected the baseline data twice at an interval of 2 weeks. Of the 24 participants of 'level 0', 26 participants of 'level 1', 22 participants of 'level 2' who completed the baseline questionnaires, 23, 26 and 22 completed the re-test, respectively. The test-retest reliability coefficient of the MDR-TB PPQ was estimated from 71 pairs using the single average measure of ICCs with 95% confidence interval. The ICCs coefficients of three sets of the MDR-TB PPQ were .92 (Level 0), .94 (Level 1) and .98 (Level 2).

Translation of the Instruments

All three sets of the MDR-TB PPQ were developed in the English language (English version-1). After validation by the expert panel, the instruments were translated in to Bengali by following the classical back translation process of Sperber and Devellis (as cited in Sperber, 2004). This process has three steps. The first step, the original English version-1 of the three instruments were translated into Bengali by a bilingual expert; a medical physician. In the second step, the Bengali version was back translated into English (English version-2) by a professional translator (English/Bengali). In the final step, the English version-1 and the English version-2 were compared to check for the equivalence of the two versions by a

professional English teacher. After ensuring the equivalence of these two of instruments, the researcher then used the Bengali version for data collection.

Data Collection and Analysis

The assessment of the efficiency of the NPG: MDR-TB was conducted in three steps: baseline assessment of the current practice of the prevention of MDR-TB, dissemination of the NPG: MDR-TB V_3, and evaluation of the efficiency of the NPG: MDR-TB implementation.

Baseline assessment of the current practice of the prevention of MDR-TB. This step will be presented in two parts: preparation for data collection and assessment of baseline information.

1. Preparation for data collection

Before data collection the researcher has taken the following preparation:

1.1. The researcher submitted a letter from the Dean, Faculty of Nursing, Prince of Songkla University, Thailand asking for permission from the authority of the NIDCH, Dhaka, Bangladesh to collect data.

1.2 The researcher contacted all authorities of the hospital including the Director, DOTS-Plus Coordinator, Medical Superintendent, Residential Physician and Surgeon, Nursing Superintendent, and Hospital Secretary to explain the purpose of the study and seek collaboration of all researcher activities.

1.3 The researcher trained three senior staff nurses as the research assistants to help in collecting the data, implementing guidelines and following up the guidelines implementation.

1.4 Participants from all three levels were divided into two groups. The researcher arranged a half-day workshop for each group by discussing with medical and nursing authorities of the hospital to disseminate the guidelines. The researcher prepared all necessary documents including handouts and teaching materials.

1.5 The researcher asked the DOTS-Plus Coordinator to take a part in the dissemination of the guidelines to the participants. The DOTS-plus project is a program for directly observed treatment that adds components of MDR-TB management including diagnosis, management and treatment of MDR-TB cases. The researcher provided a copy of the guidelines to the coordinator and discussed in detail about the guidelines.

2. Assessment of Baseline Information

The baseline assessment was conducted to assess the current practice of the prevention of MDR-TB in the selected wards. The nurse participants received and responded to the questionnaire in their available time. The questionnaires were distributed after explaining the purposes, benefits and the process of the study, and getting verbal agreement or written consent. The researcher explained how to fill in the questionnaires clearly. The questionnaires were collected and checked for completeness by the researcher and the research assistants.

Dissemination of the NPG: MDR-TB final version. The researcher arranged a half-day workshop to disseminate the guidelines to the participants of the selected wards. During the first part of this workshop the researcher gave a brief lecture on MDR-TB including the definition and causes of MDR-TB, and the nurses' contribution in its prevention. The researcher then explained all three parts of the guidelines to them by arranging the recommendations from all parts in three categories: risk identification, risk assessment and risk treatment. In the second part, the DOTS-Plus Coordinator discussed the details of the guidelines. The emphasis was given on the importance of the recommendations of the NPG: MDR-TB and how these can be implemented with the available resources of the setting.

In addition to this workshop, the researcher held several group and individual discussions with participants to ensure that the recommendations of the guidelines were clearly understood. Moreover, a copy of the NPG: MDR-TB in English and Bengali was given to every participant to facilitate them in using the guidelines. In absence of the researcher, he appointed three research assistants to make frequent visits to the wards to facilitate, observe, and ensure the application of the guidelines. This was carried out over one and a half months. This duration was considered short but provided, at least, a minimum period to produce an effective implementation, considering the nature of the setting as nurses may be transferred to work in other places as mentioned earlier.

Evaluation of the efficiency of the NPG: MDR-TB implementation. The purpose of this step is to evaluate the efficiency of the NPG: MDR-TB final version.

After a time lapse of one and a half months, the research assistants collected the data in the same way as the assessment of the baseline information.

Data from the MDR-TB PPQ was analyzed. Descriptive and inferential statistics were used. Demographic data was analyzed using descriptive statistics including frequency, percentage, mean, standard deviation, and range. Data related to the preventive practice was analyzed by using descriptive statistics (means and standard deviations). The significant improvement of the preventive practice scores between before implementation of the NPG: MDR-TB (pretest) and after implementation of the NPG: MDR-TB (posttest) indicated the efficiency of the NPG: MDR-TB implementation. The paired sample t-test for normally distributed data and Wilcoxon matched paired signed rank test for not normally distributed data were used for within group comparison.

Ethical Consideration

The researcher protected the human rights of the participants throughout the study. Approval from the Institutional Review Board of Faculty of Nursing, PSU, Thailand and hospital authorities were obtained. Then the researcher informed the participants in detail about the study. They were also informed about their freedom to participate or not participate without any consequences on their current work position. Verbal or written agreement was taken from the participants. The participants were assured about confidentially and anonymity. They had the right to ask any questions or to refuse to respond to any questions or to stop participation at any time without any explanation (Appendix A 1-2).

In summary, the study protocols of the two phases including steps, activities, persons involved, and outputs/outcomes in each step are presented (Figure 2).

Phase 1
Development of the NPG: MDR-TB

Steps	Activities	Persons Involved	Out puts/Outcomes
1	Literature review	PI	
2	Interview stakeholders and observation	Eleven local experts & PI	NPG: MDR-TB V_1
3	Validation of the NPG: MDR-TB V_1		
3.1	First round	25 local and national experts	NPG: MDR-TB V_2
3.2	Second round	24 local and national experts	NPG: MDR-TB V_3. (Final version)

Note. PI = Primary Investigator; NPG: MDR-TB = Nursing Practice Guidelines for Prevention of MDR-TB; V_1, V_2, and V_3 stand for three versions of the NPG: MDR-TB Version-1, 2, and 3 respectively; MDR-TB PPQ = Multidrug-Résistant Tuberculoses Preventive Practice Questionnaire ; CVIs = Content Validity Indices ; ICCs = Intraclass Correlation Coefficients.

Phase 2
Evaluation of the Efficiency of the NPG: MDR-TB

Steps	Activities	Persons Involvement	Out put/Outcome
4	Baseline assessment of the current practice of prevention of MDR-TB	72 nurses, researcher, and research assistants	Pretest
4.1	Obtaining permission	Hospital authorities	Approval
4.2	Development of the MDR-TB PPQ (3 sets for Level 0, Level 1, and Level 2) and assessment of validity and reliability	Three experts and actual sample (71 nurses)	CVIs .86 to .91 ICCs .92 to .98
4.3	Back translation of the MDR-TB PPQ	Three bilingual translators	Bengali version of the MDR-TB PPQ
5	Dissemination of the NPG: MDR-TB final version	65 nurses, DOTS- Plus Coordinator and Researcher	Participants' knowledge gained
6	Evaluation of the efficiency of the NPG: MDR-TB implementation	64 nurses, researcher and research assistants	Posttest determination of change of pretest and posttest score

Figure 2 *Study Protocol: Phases and Steps*

CHAPTER 4

RESULTS AND DISCUSSION

This chapter presents the results and discussion of the study following the two phases of the study protocol. These are: (1) development of the NPG: MDR-TB and (2) evaluation of the efficiency of the NPG: MDR-TB.

Results

Phase 1: Development of the NPG: MDR-TB

The procedure for the development of the nursing practice guidelines was performed in three steps: literature review, interview the stakeholders and observation, and the validation of the NPG: MDR-TB.

Step 1: Literature Review

In this step, a comprehensive literature review was conducted by the researcher to identify the best evidence from the existing literature on nursing practice related to the prevention of MDR-TB among hospitalized patients. A total of 46 out of 503 papers met the inclusion criteria: research or reviewed papers, guidelines, and articles containing the information about the nursing approach in caring for and preventing TB and MDR-TB. Out of this number no randomized controlled trials or evidence-based guidelines specific to nurses' contribution for the prevention of TB and MDR-TB were identified. The decision was made to include the relevant papers

including prospective, retrospective, or qualitative studies, investigation reports, related articles and guidelines.

The included articles were graded as level one (I), two (II), and three (III) by using a modified standard grading scheme of the Infectious Diseases Society of America-US Public Health Service (Horsburgh et al., 2000). The reason for using this grading scheme was because it has been used in developing the guidelines for TB (American Thoracic Society, CDC, & Infectious Diseases Society of America, 2005; Horsburgh et al.) and for other infectious diseases (Guerrant et al., 2001).

On the basis of three major elements of the clinical risk management strategy: risk identification, risk assessment and risk treatment, the evidence from the reviewed articles were identified by using three clinical questions: what are the existing risks, how the nurses can assess the existing risks, what are the nursing related practices to treat the risks for the development of MDR-TB among hospitalized adult patients? A total of 132 recommendation statements were identified and derived for all three levels: level 0 (non-TB ward), level 1 (TB ward), and level 2 (MDR-TB ward). They were categorized into risk identification (42 statements), risk assessment (29 statements), and risk treatment (61 statements) for all levels.

For 42 statements of the risk identification category, they were clustered under six subcategories: (a) treatment and investigation induced risk factors, (b) patients vulnerable for the development of MDR-TB and its risk factors, (c) non-compliance of TB treatment in patients, (d) delays in the management of TB and MDR-TB, (e) inappropriate care provided to the TB and MDR-TB patients, and (f) lack of TB and MDR-TB infection control measures in hospital. Similarly, in the risk assessment category, 29 statements were grouped into three subcategories: (a)

screening the patients for MDR-TB and its risk factors, (b) monitoring the patients for having MDR-TB and its risk factors, and (c) investigating the patients for TB, and MDR-TB. In the risk treatment category 61 statements were grouped into five subcategories: (a) maintaining TB and MDR-TB infection control measures in hospital, (b) providing health education and support for the patients, (c) ensuring the administration of anti-TB drugs, (d) maintaining records, and (e) collection of sputum specimens for investigation (Appendix D 1, Table 9-11).

Step 2: Interview Stakeholders and Observation

A semi-structured interview with key stakeholders and a non-participatory observation by the researcher were conducted to incorporate more empirical evidence in the context of Bangladesh and to develop the NPG:-MDR-TB V1. The researcher also conducted many informal discussions with the nurses, patients and DOTS-staff, and attended a meeting and a seminar on TB and MDR-TB. Moreover, the researcher had read the patients documents including patients' treatment files and nurses' records to gather information about the management of TB and MDR-TB in the hospital.

A non-participatory observation was conducted to observe the real situations in the study setting. This observation mainly focused on the TB and MDR-TB infection control in the hospital and nursing practices in the prevention of MDR-TB. The researcher took field notes.

Semi-structured interviews were conducted with eleven local stakeholders including three respiratory physicians, one nursing supervisor, two nursing in-charges (head nurses), and five senior staff nurses. They were more than 30

years old and had experience in working with and in TB and MDR-TB hospitals ranging from 3 to 24 years with an average of 9.64 (7.7) years (Appendix D 3, Table 13).

The interviews were conducted by the researcher in convenient places within the hospital. Audio tapes from the interviews were transcribed verbatim and checked by the participants to establish the trustworthiness of the data. The findings were analyzed for themes and content by using line-by-line qualitative content and thematic analysis then grouped in the three categories of preventive measures: identification, assessment, and treatment of risk for the development of MDR-TB among hospitalized adult patients in Bangladesh.

There was concordance between the results of these two sources, observations and interviews. Then they were incorporated with those from the literature review.

Risk identification. The participants expressed their concern about the risks for the development of MDR-TB and identified a large number of risks that should be taken into consideration for the prevention of MDR-TB and risk factors in the health care settings of Bangladesh. The existing potential risks both for the transmission and development of MDR-TB and its risk factors among hospitalized patients in Bangladesh emerged as follows:

1. Vulnerable patients

Patient's vulnerability is of the crucial risk factors for the development of TB and MDR-TB. From the experts' interviews, vulnerability emerged as a central

theme consisting of two risk factors including: patients with medical risk factors and patients in high risk groups for having TB and MDR-TB infection and diseases. The participants mentioned that

> *"Diabetes is a high risk factor for the development of MDR-TB. Patients' age is another factor, particularly the adult; age range from 30-50". [EX (Expert) 5-Nurse]*
>
> *"Some patients who are repeatedly admitted in the hospital such as COPD patients are in the risk for development of TB and MDR-TB". (EX8-Nurse)*

2. Non-compliance with TB treatment

It is a serious problem in TB control. The following descriptions were mentioned as risks for the development of MDR-TB in the Bangladesh context: self discontinuation of anti-TB treatment, irrespective of the rules and regimens of anti-TB treatment, irregular intake of anti-TB drugs, and inadequate doses of anti-TB drugs. The following statements from the experts exemplify these comments:

> *"Patients do not continue treatment. They do not complete the total duration of course of treatment. They stop medication when they feel healthy after one to two months. (EX6-Nurse)*
>
> *"Admitted TB patients are also irregular in taking their anti-TB drugs. The patients stop their medication when they developed jaundice. Therefore they developed MDR-TB". (EX5-Nurse)*
>
> *"Sometimes they (patients) do not take medicine and put it under the pillow and tell a lie that they had taken the drugs". (EX10-Physician)*
>
> *It is seen that patients took excess or less amount of drugs. Patients do not follow the rules and regimens of anti-TB treatment.……Sometimes they take drugs after meal instead of before meal. Sometimes they take two drugs when they need to take four combined drugs". (EX1-Nurse)*

3. Inappropriate care provided to the TB and MDR-TB patients

The participants mentioned some most common inappropriate care of the patients with TB and MDR-TB which may cause inadequate treatment leading to

the resistance to anti-TB drugs. These are: the lack of ensuring the adequate amount of anti-TB drugs for patients for the next doses, the lack of ensuring the regular intake or adequate dosages of anti-TB drugs, the inability to convince patients when they refuse to take medication, prescribing inappropriate dosages of anti-TB drugs, the lack of maintaining directly observed therapy, and missing patient's investigation requisitions or laboratory reports. The respondents indicated that:

> *"Nurses are not attentive to check whether the patients have medicines or not, or how much medicine they have… We do not also ensure that the patients have all types of (anti-TB) drugs or not, particularly for holidays". (EX1-Nurse)*
>
> *"In our MDR-TB ward, the patents bed no: 49, initially refused to take injection 'streptomycin' for five days, we prepared the injection and had to through it away every day." (EX6-Nurse)*
>
> *"Some doctors may prescribe the dosage of drug inappropriately i.e., inadequate dosage". (EX11-Physician)*
>
> *"I would like to say that DOTS is not maintained when nurses administered medication to the patient in our hospital. Here is and our practice, patients are used to stand up in a line and nurses ask them to collect their medicines individually. After that, it is not made sure whether they take their medicines, throw away, or keep them. (EX11-Physician)*
>
> *Sometimes the laboratory report was sent to the wrong place. For example, I used to be asked from nurses working at wards whether the report was sent here". (EX3-Nurse)*

4. Lack of health education for patients about MDR-TB and its factors

There is a lack of formal and appropriate health education for the patients about TB and MDR-TB. Some participants mentioned the following lacking in health education for the patients as the influencing risks for the transmission and the development of MDR-TB and its risk factors. Some participants stated that:

> *"Health education is not provided in our country and this is the reason why patients do not want to collect medicine, sometimes they do not take medicine and throw the medicine because they do not……". (EX11-Physician)*
>
> *"Nurses do not explain things accurately including some side effects of anti-TB drugs due to the busy schedule".(EX1-Nurse)*

5. Delay in the management of TB and MDR-TB patients

Several types of delays related to nursing practice in caring for the patients with TB and MDR-TB were disclosed. These were delays in receiving and treating the patients with TB and MDR-TB, getting the results of investigations, performing the prescribed investigation for the patients, giving the anti-TB drugs to the patients, and transferring the TB and MDR-TB patients to a respective ward.

> *"You know that in our hospital sometimes there is delay in receiving the patients by physicians. Sometimes, the patient is admitted in the morning but doctors received them in the evening". (EX3-Nurse)*
>
> *"….. Sometimes we sent the secretion taken from the mouth or saliva as sputum sample for investigation. Therefore, the pathologist cannot investigate the sputum for C/S. They do not have enough time for further collection of the sample. In this way, there is also some delay in investigating patients. It means that we did not collect the appropriate sputum sample. I usually received the sputum C/S report after 1 to 1.5 months. We actually need it within one month". (EX6-Nurse)*
>
> *"Sometimes, we see that patients do not get drugs on the day the doctor makes the order but they get drugs after two days". (EX1-Nurse)*
>
> *"….. Yesterday, there was a chance for transfer of a patient to the MDR ward. We were trying to transfer this patient since one and a half months. There was a vacant seat. It was that the nurses would like to have a transferred order. Previously we already gave the order. ….. Thus this patient was not transferred". (EX10-Physician)*

6. Lack of support for the patients with TB and MDR-TB

Lack of support and negligence of the patients who have the diseases were identified as the risks for the transmission and the development of TB and MDR-TB. Two experts stated that:

> *"……. For example, I can say about our TB hospital, TB patients are always kept in away from all and used to ask the patients why they come here (come in close). ……. Another example, nurses do not provide beds to the patients; normally Ward boys and Ayahs (subordinate staff) keep them in bed. ……. For myself, I may also do the same things. Even though, sometimes we do not see the face of the patients. It is a risk … In this way; the patients can transmit disease to others". (EX2-Nurse)*

7. Insufficient TB and MDR-TB infection control measure

The lack or absence of essential TB and MDR-TB infection control measures including the inappropriate isolation of TB and MDR-TB patients, inadequate isolation facilities and policies, inadequate ventilation of isolation rooms, lack of use of personal respiratory protectors and lack of sufficient support to maintain isolation for TB and MDR-TB patients were observed to be the major risks for the transmission of MDR-TB and its risk factors in the study setting. Most of the participants were concerned about these risks. For instance:

> *"Sometimes the patient is so seriously sick and needs to be admitted but we have limited beds in the MDR-TB wards. In this case, the doctor has to admit this patient in (other) ward even though the doctors are not willing to do this". (EX11-Physician)*
>
> *"Admitted MDR-TB patients can go to every where in the hospital. There is no restriction for them". (EX5-Nurse)*
>
> *"Sometimes we have male and female patients who fall in love with each other. They go to a public place together, like shopping mall (Farmgate, one of the busiest and most crowded areas and famous shopping centers of Dhaka city). They …" (EX9-Physician)*
>
> *"Patients do not open the windows when they feel cool. No body follows it and windows remain closed". (EX10-Physician)*
>
> *"TB and MDR-TB patients do not want to use masks because the mask is an indicator of TB and MDR-TB". (EX3-Nurse)*
>
> *"We do not get sufficient support from our supporting staff when we ask them to help us to clean the beds and to transfer the patients from one bed to another particularly at night and on evening shift". (EX1-Nurse)*

8. Lack of maintaining cough etiquette

Inappropriate cough etiquette or respiratory hygiene was reported by some participants as a risk for the transmission of MDR-TB in the hospital. These included indiscriminate spitting of sputum by the patients, lack of facilities for collecting sputum and disposing of coughed up fluids, and unprotected coughing of the TB and MDR-TB patients. Some participants indicated that:

"Patients collect sputum at the bedside instead of in a safe place". (EX1-Nurse)

"To spit the sputum in a bowl is a risk factor for the transmission of MDR-TB. Previously, I saw that patients spat in a sputum cup with a lid but now patients spit in the open bowl". (EX4-Nurse)

"Patients dispose of sputum in the bathroom. The system is not good". (EX6-Nurse)

"The practice of respiratory hygiene such as use of handkerchief during coughing and sneezing is not there. They spit indiscriminately on the floor and wall side". (EX11-Physician)

9. Treatment and investigation induced risks

The treatment and investigation related risks identified by the participants were: use of the same devices (micro-mist and O_2 mask) for many patients, inappropriate sputum collection procedures, high risk places in the hospital and the side effects of anti-TB drugs. The participants mentioned that:

"One of the major risk factors for the transmission of MDR-TB is the use of same devices (micro-mist and O_2 mask) for many patients in providing nebulization and oxygen therapy. …. Normally, nurses ask the supporting staff to give containers to the patients to collect sputum and patients collect sputum whether the sputum is produced by his/her cough or not. Nobody checks how and when the patients collect sputum. Patients collect sputum in the ward; it is one of the risk factors for the transmission of MDR-TB". (EX2-Nurse)

"There are many risk factors for the development of MDR-TB for patient in non-TB wards such as investigations facilities including pathology, spirometry and bronchoscopy where all patients including TB, smear sputum positive TB patients, MDR-TB and non-TB patients wait for a long time in the same place." (EX4-Nurse)

"Side effect is one of the major causes of irregularity in taking the anti-drugs. TB patients take four or five types of anti-TB drugs. These drugs have different side effects. Some develop jaundice. If so, they stop TB drugs for 10 days or one month and start again. Some of them develop eye problems, psychosis, or pain in hands and legs. They always stop or postpone the drugs". (EX6-Nurse)

10. Lack of nurses' knowledge and training

Like other contributing factors, lack of nurses' knowledge and training on the management of TB and MDR-TB was identified by the participants as the influencing risk for the development of MDR-TB and its risk factors. Some participants mentioned that:

> *"There is no training facility for nurses' to develop their skill. We do not have any basic knowledge to provide care or manage the MDR-TB patients. We manage patients based on our idea and working experience. Some of us have only one-day orientation program on DOTS. But we do not have any specific training on TB and MDR-TB". (EX7-Nurse)*
>
> *"……..This knowledge is necessary for nurses? Here the nurses learn by facing the obstacle or problem or they learn from their colleagues. There is no formal training for nurses before placement in the ward. We know that there is a need for training nurses before placing them in the ward". (EX11-Physician)*

11. Perceived secondary gain

Some participants addressed strongly that some patients received secondary gains if they had MDR-TB in which they received some benefit from it. This can be serious risk factors for the transmission and development of complicated form of TB and MDR-TB. In the interview, the participants highlight this problem as a risk for the development of MDR-TB:

> *"MDR-TB patients thought that it does not matter whether the disease (MDR-TB) is transmitted to others or not. Some patients feel proud as an MDR-TB patient. They thought that some thing important is happening. They said that I am not a TB patient but I am now an MDR-TB patient. Sometimes they proudly said that my contact number is necessary for you but your phone number is not necessary for me". (EX6-Nurse)*
>
> *"We always provide health education to the MDR-TB patients and ask them not go out to walk around the hospital, not to go to the market, not to bring the visitors with them and to be alert. This may make them think they receive more attention from us more than other patients". (EX7-Nurse)*

Risk assessment. All health personnel should assess the patient's health status in relation to TB (Queensland Government, 2010). Risk assessment refers to the nursing measures to evaluate or assess the hospitalized patients for having MDT-TB or its risk factors. In the context of the situation, following three sub-categories of nursing practices gained through the participants' experiences for the assessment of MDR-TB and its risks among the admitted patients in hospital.

1. Screening the patients for MDR-TB and its risk factors

For screening the patients for MDR-TB and its risk factors, the experts recommend the following nursing practices as the preventive nursing measures for the prevention of MDR-TB: checking the patient's records and medicine during admission, and taking the patient's history about drugs, family and cough. Some participant stated that:

> *"The main responsibilities of the nurses is that during admission nurses need to confirm about the diagnosis of the patients from admission ticket (admission note of the physician) whether the patient is TB, MDR-TB, or non-TB". ……. Nurses can take the drug and family history of the patients. They can ask the patients whether he/she takes the anti-TB drugs. They can check the patient's medicine". (EX2-Nurse)*
>
> *"Attention should be given to those who are coughing, to decide actually what kind of patient is this? They can check the diagnosis from their medical record. If the patient is not diagnosed as TB then the nurse can take the patient's history and ask the patient whether he/she has taken any anti-TB drugs? They should enquire about coughing whether he/she has coughed for more than three weeks or not?" (EX10-Physician)*

2. Assessing the patients for non-compliance to TB treatment

To assess the non-compliance to TB treatment among the admitted TB and MDR-TB patients in hospital, participants suggested to perform two nursing

practice regularly: check the patients' drugs to ensure the intake of correct dosages of anti-TB drugs and ask the patients every day about medication to ensure the regular intake of anti-TB drugs. Two participants stated that:

> *"To ensure the regular intake of (anti-TB) drugs, every day at least one time we can ask the patients whether they take their anti-TB drugs or not". (EX8-Nurse)*
>
> *"Checking medicine is essential for nurses to ensure the proper medication of the patients". (EX1-Nurse)*

3. Investigating and monitoring the patients for MDR-TB and its risk factors

Performing sputum examinations for suspected TB or MDR-TB patients, and monitoring TB and MDR-TB patients for the side effects of anti-TB drugs were two important measures for investigating and monitoring patients for MDR-TB and its risk factors. Some participants mentioned during the interview:

> *"Here, there is a system that nurses can send the sputum for examination without any doctor's order when the patient is suspected for TB. Nurses can send three samples of sputum'. (EX9-Physician)*
>
> *"Every day we can ask some specific questions when we go to them such as, "do you get itching? Is your urine color changed? Do you have drowsiness? Do you have hearing loss?" (EX9-Physician)*

Risk treatment. Risk treatments were categorized into six sub-categories. They are: maintain TB and MDR-TB infection control measures, maintain cough etiquette, provide health education, collect sputum and ensure patients' investigation, ensure the intake of anti-TB drugs, and the management of the side effects of anti-TB drugs.

1. Maintain TB and MDR-TB infection control measures

Three components of TB and MDR-TB infection control were addressed by the participants. These included (a) administrative control measures; which includes isolating the TB and MDR-TB patients from other patients of the ward as well as from each other, transferring the TB and MDR-TB patients to the respective wards, and maintaining isolation procedures for TB and MDR-TB patients; (b) environmental control measures which includes maintaining the ventilation of the ward; and (c) use of personal respiratory protector and devices which includes ensuring the use of a mask for infectious TB and MDR-TB patients, and using separate respiratory devices for the treatment and investigational procedures. The following were reported:

> *"If the nurses suspect any patients with TB and MDR-TB (in a non-TB ward)… they can provide a corner bed to the patient near the window where the ventilation is better. They can put suspected cases on same side or in a corner of the room". (EX9-Pysician)*
>
> *"It is important to shift these (MDR-TB) patients with their (nurses) own responsibilities. If they (nurses) insist to the doctor that the patient is MDR-TB and refer to the MDR ward, and the nurses look for vacant beds in the MDR ward and by this way transmission of MDR-TB may be slightly reduced". (EX10-Physician)*
>
> *"If this is an ideal TB hospital, isolation techniques would be properly maintained and visitors would be restricted, the transmission of MDR-TB would be reduced". (EX7-Nurse)*
>
> *"To maintain the ventilation, the cloth should not be hung in the ward and windows should not be remained close. They (nurses) should motivate the patients that it is good for them to keep the open the windows so that the sun light may enter insight that helps to destroy the germs and the transmission became less". (EX10-Physician)*
>
> *"For me, I have never allowed a (TB or MDR-TB) patient not wearing a mask if he or she has sputum smear positive. Even though, patients use masks in the ward, nurses need to be more aware to ensure the use of mask. If nurses observe that the patients do not conform to the instructions, they can consult the professor (because patients always listen to the professor)". (EX3-Nurse)*
>
> "*Nurses can use the separate micro-mist and O_2 mask for individual patients". (EX2-Nurse)*

2. Maintain respiratory hygiene

Nursing practices in maintaining respiratory hygiene or cough etiquette were highlighted by half of the participants to treat the risk of the transmission of MDR-TB. The expert participants repeatedly recommended for two types of nursing tasks in ensuring the cough hygiene in hospital: protecting indiscriminate spitting and providing disinfectant for the sputum pot. The following comments were made by the participants regarding maintaining cough etiquette in the ward:

> *"It can be prevented if we can stop spitting the sputum everywhere". (EX3-Nurse)*
>
> *"Some nurses ask the sweeper/cleaner to put Savlon (antiseptic) to prevent the transmission of TB and MDR-TB. However, to put the sputum in sputum cup with lid is the best way to prevent the spread of MDR-TB Germ". (EX4-Nurse)*
>
> *"It is better to put the disinfectant with the sand and water in the basket for the prevention of direct transmission". (EX11- physician)*

3. Provide health education and counseling

Nearly all participants focused on the importance of providing health education and counseling for the prevention of MDR-TB and its risk factors in the hospital. In providing the TB and MDR-TB preventive health education to the patients, the participants suggested for nurses to inform the patients about the risks of the hospital settings for the transmission of the diseases and to teach patients about the different aspects of their diseases. Participants expressed their experience and opinions as:

> *"Since our hospital is a TB hospital nurses can give information to non-TB patients about the MDR-TB wards and the infectiousness of MDR-TB. …….. it can prevent occurrence of MDR-TB to both TB and non-TB patients. Providing health education is a nurse's responsibility and they can do it easily". (EX1-Nurse)*

"We can make patients understand that 'you got TB drugs. You need to continue the anti-TB treatment for 6 months. Although, you would face many problems during this treatment, but you must continue it, otherwise, it will be transmitted to your wife, children and others'. …… To cure the MDR-TB patients, we need to counsel the patient to continue the drug". ***(EX6-Nurse)***

4. Collect sputum and ensure patient's investigation

Patient's investigation is an integral part of TB and MDR-TB prevention and control. It is the nurse's responsibility to perform investigations for all suspected and diagnosed TB patients in the hospital (Singla et al., 1998). Any risks identified earlier contributed by incorrect or improper management for collecting sputum or other investigational measures should be treated. The participants recognized the following nursing care activities that should be undertaken during a patient's investigation and collecting their sputum: collecting the sputum in a proper place, maintaining the records of investigations with necessary information, communicating with the laboratory, taking precautions and maintaining procedures during collecting sputum, helping the patient to collect sputum when they do not produce sputum, and informing the doctors about the investigation reports. The nurses and doctors, participating in the interview made statements that:

"…… in DOTS we used to ask the patients how to collect sputum …… Nurses can ask the patients to collect sputum at a specific and distinct place. In the wards, there is open space (Veranda) in front of each ward. Nurses can arrange a separate space of that place of the ward by providing a screen……". (EX3-Nurse)

"Nurses can record the investigation in a record book by using the patients name and LAB number, so we can easily communicate with laboratory for delayed or missing reports……". (EX6-Nurse)

"It is important to take precautions when the patients collect sputum. No person should be allowed in at that time. We need to have a room for collecting sputum. This room should have the facility for cross ventilation. We can also arrange a separate place by bed side screen to collect sputum". (EX4-Nurse)

"If the patient does not have sputum with cough nurses can nebulize the patient. Most of the time sputum comes out after nebulization …..…". (EX6-Nurse)

"Nurses should inform the doctors about the investigation report. Another thing is that they need to ensure why the report has not come. If the nurses can take initiative they can collect the advance result sheet from pathology before preparation of the final result". (EX11-Physician)

5. Ensure taking of anti-TB drugs

This sub-category includes the following activities: observing the patients' medication every day, giving anti-TB drugs to patients every day, ensuring the correct dosages of anti-TB drugs, asking the patient every day to take their anti-TB drugs, and ensuring the appropriate amount of drugs in hand for next dose. As expert participants commented in interviews:

We (nurses) can give the medicines daily and observe the patient's medication at every morning (directly observed treatment). (EX1-Nurse)

"They (nurses) can do the actual DOTS, particularly, in the intensive phase. They make the patient take the drugs in front of them every day to ensure that the patients are taking medicine". (EX9-Physician)

"Every nurse is alert about that (identify inappropriate doses of anti-TB drugs), they can easily identify inappropriate doses of anti-TB drugs and give the appropriate dose as standard TB doses. Then the nurses make correction of treatment ordered by the doctors. (EX7-Nurse)

"If we ask the patients only one time (in a day) to take their anti-TB drugs, it is possible to reduce irregular intake of drugs". (EX8)

"It is needed to check whether the patients do have or do not have the appropriate amount of drugs for next day". (X6-Nurse)

6. Management of side effects of anti-TB drugs

The two kinds of nursing practice highlighted by the participants were: taking note of the side effects of anti-TB drugs and reporting them to the physicians, and taking care of the patients who have complications from anti-TB drugs. The

following statements regarding the management of the side effects of anti-TB drugs for admitted patients were reported:

> *"Nurses should take note of the side effects of anti-TB drugs and report to the Physicians". (EX4-Nurse)*
>
> *"Nurses should look after the patients for the drug's side effects from the start. We need to observe the patients for complications, such as some patients develop vomiting. For this case, we can manage by giving anti-emetic drugs so that treatment can be continued….." (EX6-Nurse)*

In conclusion, the findings of the interviews and observations were categorized into three main categories; risks identification, risks assessment and risks treatment, and 20 sub-categories of empirical evidence to develop the nursing practice guidelines for the prevention of MDR-TB and its risk factors for the three levels: level 0, level 1, and level 2. The summarized evidence from the literature review, semi-structure interviews, and setting observations were used to formulate the preliminary evidence-based recommendations, NPG: MDR-TB V_1. A total number of 227 similar and dissimilar recommendations were formulated to form three parts for the three levels of target populations and settings. Each part of the guidelines is composed of three categories of recommendations: risk identification, risk assessment and risk treatment for the prevention of the development of MDR-TB. For all levels and in each category, the recommendations were sub-categorized under the various numbers of sub-headings (Appendix D 2, Table 12).

Step 3: Validation of the NPG: MDR-TB

The statements of the newly developed guidelines were subject to expert consensus to ensure content validity. A two-round modified Delphi technique was conducted in this phase to obtain consensus on the relevancy, clarity, and

applicability of the statements of the NPG: MDR-TB. The results of the Delphi method are presented in Table 3.

Table 3 shows that the number of statements after two-round Delphi reduction. The final version, NPG: MDR-TB V_3 is composed of 47, 81, and 70 statements, and is comprised of three categories: risk identification, risk assessment and risk treatment under 11 subcategories in level 0, 17 sub-categories in level 1, and 16 subcategories in level 2. There were no changes in the categories and subcategories of statements after two-rounds of Delphi. The final NPG: MDR-TB V_3 is displayed in Table 4. Only categories, subcategories and sample statements of each level are presented.

Table 3

The NPG: MDR-TB Statements of Each Level at Each Round of the Delphi

Level	Number of category/ subcategory	Number of statement		
		Round 1 (V_1)	Round 2 (V_2)	Final (V_3)
0	3/11	55	56	47
1	3/17	99	100	81
2	3/16	73	76	70

Note. V_1, V_2, and V_3 stand for three versions of the NPG: MDR-TB Version-1, 2, and 3. Level 0, 1, and 2 stand for non-TB ward, TB ward, and MDR-TB ward respectively.

The findings of the second round regarding the importance of each statement revealed that over 75% of experts rated all statements as important or very important (Appendix D 6, Table 16-24).

Table 4

The Categories, Subcategories and Sample Statements of Each Level

Level	Category/ Subcategory	Sample Statement	Ranking
Level 0	Risk Identification: Nurses should		
	1	Identify the patients who have previously come in contact with TB and MDR-TB patients.	A-III
	2	Identify the causes of delay in transferring the TB and MDR-TB patients to the respective ward or hospital.	A-III
	3	Identify TB and MDR-TB patients admitted in non-TB wards.	A-III
	4	Identify the devices that cause transmission of TB and MDR-TB.	A-III
Level 0	Risk Assessment: Nurses should		
	1	During admission, check thoroughly the admission ticket, all medical records and medicines of every patient to confirm whether the patient is non-TB, TB, or MDR-TB.	A-III
	2	The patients who have risk factors for development of TB or MDR-TB, assess if they have TB and MDR-TB.	A-III
	3	For the suspected TB patients, send the sputum for AFB to assess the infectiousness of the patients without delay.	A-III
Level 0	Risk Treatment: Nurses should		
	1	Take initiative to isolate the patients with TB and MDR-TB from non-TB patients.	A-III
	2	Ask and remind the patients to cover their mouth and nose with a protector during coughing, sneezing, and to wash hands frequently.	A-III
	3	Inform the patients about the different wards, settings, and places of hospital which are at risk for transmission of TB and MDR-TB.	B-III
	4	Maintain the appropriate methods and precautions in collecting sputum samples.	A-III
Level 1	Risk Identification: Nurses should		
	1	Identify the patients having a history of prior drug treatment for TB or MDR-TB.	I.A
	2	Identify the patients who discontinue or refuse to take TB medication.	A-III

Table 4 (Continued)

Level	Category/ Subcategory	Sample Statement	Ranking
Level 1	Risk Identification: Nurses should		
	3	Identify the patients who are prescribed TB treatment with inadequate dosages of anti-TB drugs.	A-III
	4	Identify causes of delay in doing investigations and getting the results of investigations for the recognition of infectious and drug resistant TB, and MDR-TB.	B-III
	5	Identify the infectious TB patients who do not always stay in the isolation room or ward.	A-III
	6	Identify inappropriate sputum collection procedures in the ward.	A-III
Level 1	Risk Assessment: Nurses should		
	1	Ask the patients whether he/she has ever come into contact with MDR-TB patients.	A-III
	2	Ask the patients, patients' relatives, other patients and health care providers to assess the time, dose, and regular intake of anti-TB drugs.	B-III
	3	All patients with TB assess for MDR-TB.	B-III
	4	Be knowledgeable about the common side effects of anti-TB drugs.	A-III
	5	For the suspected drug resistant TB or MDR-TB patients, send the sputum for AFB smear, sputum culture and drug sensitivity (DST) test without any delay.	A-III
Level 1	Risk Treatment: Nurses should		
	1	For infectious TB or MDR-TB patients, perform the aerosol-generating procedure in an engineered room or a well ventilated room or area.	A-III
	2	Ask the TB and MDR-TB patients to always spit and store their coughed up fluid in a pot with a lid and then dispose in a selected place, and to wash the pot properly.	A-III
	3	Reinforce education to patients when they encounter any problems regarding management of TB and MDR-TB.	A-III
	4	Collect the sputum in a separate well ventilated room or at least nurses can arrange an area or place of the ward by using screens.	A-III

Table 4 (Continued)

Level	Category/ Subcategory	Sample Statement	Ranking
Level 1	Risk Treatment: Nurses should		
	5	Directly observe patients administering anti-TB medications (directly observed treatment; DOT).	A-I
	6	Look after and take appropriate measures for the patients with side effects of anti-TB drugs.	A-III
Level 2	Risk Identification: Nurses should		
	1	Identify the patients who do not take anti-TB drugs or injections regularly.	A-III
	2	Identify the patients who were absent in the ward during dispensing anti-TB drugs and did not collect drugs.	B-III
	3	Identify the causes of delay in giving the anti-TB drugs to the patients.	B-III
	4	Identify the infectious MDR-TB patients who do not use masks when they are going out of the isolated room or ward.	A- III
	5	Identify the side effects of anti-TB drugs among patients.	A- III
Level 2	Risk Assessment: Nurses should		
	1	If there is no record, ask every patient whether he/she has ever been treated for TB or MDR-TB and/or exposed to MDR-TB.	A- III
	2	Check the anti-TB drugs of the patients that have been previously provided to them.	B-III
	3	Monitor the patients for infectious MDR-TB if a) cough is present, b) cough inducing procedures are performed, c) sputum smears are known to contain AFB, d) patients are not receiving anti-TB therapy or have not completed at least 3 to 4 weeks of therapy, and e) no change in their symptoms since starting therapy.	B-III
	4	Assess the common side effects of anti-TB drugs by asking, listening and observing patients, and performing the prescribed investigations.	A- III

Table 4 (Continued)

Level	Category/ Subcategory	Sample Statement	Ranking
Level 2	Risk Assessment: Nurses should		
	5	Nurses should assess the sputum conversion by testing the sputum AFB smear, sputum culture and DST.	A- III
Level 2	Risk Treatment: Nurses should		
	1	Strictly maintain isolation throughout the hospitalization period for suspected or diagnosed infectious MDR-TB patients.	A- III
	2	Provide disinfectant (if available) into the sputum storage pot to prevent the transmission of MDR-TB germs.	B-III
	3	Treat the patients with respect and establish a rapport.	B-III
	4	Send the sputum specimen to the laboratory as early as possible after collection and avoid direct sunlight.	A- III
	5	Ensure that patients are given the correct TB medication and inform the physician if the patient has started inadequate dosages of anti-TB drugs.	A-III
	6	Take a note of side effects from anti-TB drugs, and report them to the physicians immediately.	B-III

Note. Level 0, 1, and 2 stand for non-TB ward, TB ward, and MDR-TB ward respectively. A = good evidence to support a recommendation for use; B = moderate evidence to support a recommendation for use; I = evidence from at least one properly randomized, controlled trial, meta analysis, and systematic review; II = evidence from at least one well-designed clinical trial without randomization, from cohort or case-controlled analytic studies (preferably from more than one centre), from multiple time-series, or from dramatic result in uncontrolled experiments; III = evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees (Adapted from Horsburgh et al., 2000).

Phase 2: Evaluation of the Efficiency of the NPG: MDR-TB

This phase was conducted to evaluate the efficiency of the NPG: MDR-TB by having changes in the nurses' daily practice regarding the prevention of MDR-TB. The results of the evaluation of the NPG: MDR-TB is presented below.

The posttest scores were compared with the pretest scores. The findings of this phase will be presented as follows:

Demographic Information of the Participants

The participants were mostly female, > 90% in level 1 and 2, and 80% in level 0. The majority of nurses (56.5% to 80%) in all levels held only the first level of professional education; diploma in nursing, followed by 15% bachelor and 5% master in level 0, 34.8% bachelor and 8.7 % master in level 1, and 28.6% bachelor and 4.7% master in level 2. All of the nurses in level 2 were permanent government employees and a very few; 10% in level 0 and 8.7% in level 1 were project employees. A significant majority of nurses; respectively 80%, 56.5%, and 85.7% in the three levels, had no training on TB, MDR-TB or chest diseases. Very few nurses (5% in level 0 and 8.7 % in level 1) had 1 year Diploma training on Chest Diseases. Some nurses, 8 (34%) in level 1 had only 1-3 days training on TB, DOTS or DRS (Drug Resistant Survey) while that of the nurses among level 0 and level 2 was only 3 (15%) and 1 (4.8 %), respectively. Only 2 (9.5%) nurses of level 2 had 1 week training on TB. The mean ages of the nurses were 40.45 ± 6.13 in level 0, 43.48 ± 5.17 in level 1 and 40.05 ± 4.52 in level 2. The average length of their service age was 15.10 years with the range of 7-30 years among the nurses at level 0, and that was 19.35 years at level 1 and 13.88 years at level 2 with the range of 1-28 years. The work experience of the nurses in their respective wards was higher in level 0, (7.35 years, min = 1, max = 23) (Appendix D 5, Table 15).

Efficiency of the NPG: MDR-TB Implementation

In all levels, the efficiency of the NPG: MDR-TB was evaluated by comparing the nursing practices for the prevention of MDR-TB between pre and post implementation of the NPG: MDR-TB. In each level, the nursing practices for the prevention of MDR-TB were categorized into two categories, namely case finding and case holding measures for the prevention of MDR-TB. (Table 5).

The results indicated that there were significant differences between the mean scores of pretest and posttest scores at all levels: level 0 ($z = -3.92$, $p < .001$), level 1 ($z = -4.20$, $p < .001$) and level 2, ($t = -5.63$, $p < .001$).

Table 5

Comparison of the Preventive Practice Scores between Pre and Post Implementation of the NPG: MDR-TB (N = 64)

Level	n	Pretest		Posttest		Test statistics	*p*
		Mean	SD	Mean	SD		
0	20	2.37	0.50	3.43	0.17	-3.92 [z]	.00
1	23	2.60	0.51	3.45	0.16	-4.20 [z]	.00
2	21	2.88	0.60	3.61	0.09	-5.63 [t]	.00

Note. [t] Two-tailed paired t test. [z] Wilcoxon matched signed rank test. Level 0, 1, and 2 stand for non-TB ward, TB ward, and MDR-TB ward respectively.

Non-TB Wards (level 0)

The subgroup analysis was conducted to examine the change in the two categories of the preventive measures: case finding and case holding. As shown in Table 6, the total pretest mean (SD) scores of the subscales ‘case finding measures’ and ‘case holding measures’ were respectively, 2.19 (0.50) and 2.56 (0.59). There

were significant changes of practicing case finding and case holding measures of the participants working on the non-TB wards. The posttest scores in both categories were significantly higher than the pretest ($p < .001$).

Table 6

Comparison of Mean Differences of the Preventive Practice Scores in Each Sub-scale between Pre and Post Implementation of the NPG: MDR-TB at Level 0 (N = 20)

Preventive Practice	Pretest		Post test		Test statistics	*p*
	Mean	SD	Mean	SD		
Case finding measures	2.19	0.50	3.36	0.16	-10.44 [t]	.00
Case holding measures	2.56	0.59	3.51	0.21	-7.19 [t]	.00

Note. [t] Two-tailed paired t test.

TB Wards (Level 1)

The changes of the preventive practice of the participants on the TB ward were examined by comparing the total mean (SD) scores of the case finding and case holding preventive measures. The total pretest and posttest practice scores in the case finding category were respectively, 2.39 (0.54) and 3.37 (0.17), and in the case holding category were 2.78 (0.52) and 3.51 (0.17). It is apparent that there were significant increases in the mean scores from the pretest to posttest practice in both categories of the preventive practice: 'case finding measures' ($z = -4.17$, $p < .001$) and 'case holding measures' ($t = -6.76$, $p < .001$) (Table 7).

Table 7

Comparison of Mean Differences of the Preventive Practice Score in Each Sub-scale between Pre and Post Implementation of the NPG: MDR-TB at Level 1 (N = 23)

Preventive Practice	Pretest		Post test		Test statistics	*p*
	Mean	SD	Mean	SD		
Case finding measures	2.39	0.54	3.37	0.17	-4.17 [z]	.00
Case holding measures	2.78	0.52	3.51	0.17	-6.76 [t]	.00

Note. [t] Two-tailed paired *t* test. [z] Wilcoxon matched pair signed rank test.

MDR-TB wards (Level 2)

From Table 8, it is evident that in the MDR-TB ward, the participants' preventive practice for the prevention of MDR-TB improved after the posttest in both categories of the preventive measures from the pretest. The total posttest mean (SD) scores of the subscales 'case finding measures' and 'case holding measures' were much higher: respectively, 3.50 (0.15) and 3.67 (0.10) than from the pretest: 2.80 (0.54) and 2.93 (0.67). This illustrates the significance differences of the posttest scores in both categories compared to the pretest ($p < .001$).

Table 8

Comparison of Mean Differences of the Preventive Practice Scores in Each Sub-scale between Pre and Post Implementation of the NPG: MDR-TB at Level 2 (N = 21)

Preventive Practice	Pretest		Posttest		Test statistics	*p*
	Mean	SD	Mean	SD		
Case finding measures	2.80	0.54	3.50	0.15	-5.78 [t]	.00
Case holding measures	2.93	0.67	3.67	0.10	-5.28 [t]	.00

Note. [t] Two-tailed paired *t* test. [z] Wilcoxon matched pair signed rank test.

Discussion

The following sections discuss the findings and limitations of the study. The discussion is presented in three sections: the development of the NPG: MDR-TB, the evaluation of the efficiency of the NPG: MDR-TB and the limitations of the study.

Phase 1: Development of the NPG: MDR-TB

To prevent the development of MDR-TB among hospitalized patients, both well developed NPG: MDR-TB and appropriate methods of its implementation are needed. A modified development process, established by Browman et al. (1995), was followed to develop the NPG: MDR-TB. A three-step process, which included a literature review, stakeholder interviews and setting observations, and content validation, by using a multi-method approach that involved quantitative and qualitative analysis was conducted (Figure 2). Many authors and organizations have suggested several steps for the development of the guidelines (Browman et al.; National Health and Medical Research Council, 1999; National Institute for Health and Clinical Excellence, 2009; Scottish Intercollegiate Guidelines Network, 2008). However, the literature review demonstrated that a literature review, survey, expert interviews, expert reviews, consensus development (Delphi technique), have been frequently applied to the development of clinical practice guidelines (Colucci, Kelly, Minas, Jorm, & Suzuki, 2011; Landier et al., 2004; van der Linde, Hofstad, van Limbeek, Postema, & Geertzen, 2005). In addition, the majority of guidelines mostly used a combined approach of a literature review, experts' judgments or consensus,

and/or expert interviews (Colucci et al.; Hutt & Kramer, 2002; Park & Park, 2010; van der Linde et al.).

Step 1: Literature Review

The first step of this study consisted of a comprehensive literature review which was found to be the most commonly used starting point in developing clinical practice guidelines. This aimed at identifying existing research evidence and to develop the guidelines for the participants' interview.

The result of the literature review was that the randomized control trial and meta-analysis i.e., the best evidence of level 1 was very scanty in the prevention of MDR-TB particularly relating to the nursing practice. The reason is that there is little nursing literature available related to the prevention of TB or MDR-TB. TB is a communicable disease which has less prevalence in western countries than in developing countries, where there are only few nursing professionals and nursing researchers who are able to conduct study in this area. To overcome this limitation, the prospective, retrospective, or qualitative studies, investigation reports, related articles and guidelines related to the prevention of MDR-TB among hospitalized patients were used. However, initially the NPG: MDR-TB was developed by the evidence mainly from the international guidelines and other related articles. In addition, the quality of all selected studies was appraised by using the modified Infectious Diseases Society of America-US Public Health Service Grading System (Horsburgh et al., 2000).

From the review, a total of 132 statements were derived for all three levels to identify, assess and treat the risk for the development of MDR-TB among

hospitalized patients. Regarding the identification of risk factors for the transmission and development of MDR-TB in hospitalized patients, several common factors were identified. For instance: prior treatment of TB, substance abuse, and the presence of cavitations in lungs (Barroso et al., 2003; Choi et al., 2007). Some factors were found to be a risk mostly in some developed countries, such as foreign born people (Flament-Saillour et al., 1999; Moniruzzaman et al., 2006), female gender (Mdivani et al., 2008) and prisoners (CDC, 1999). On the other hand, there were some risk factors that were mostly found in developing countries such as poor socio-economic conditions, and irregular treatment (Amin et al., 2009; Barroso et al.). For the prevention of these risk factors 61 pieces of evidence were found in the literature. Of them a large amount of evidence was derived under the category of TB and MDR-TB infection control measures by reflecting on the three TB infection control measures of the US CDC namely administrative, environmental and personal protective measures (CDC, 1994, 2005),. The probable reason for this is that most of the guidelines and activities for the prevention of TB and MDR-TB are mostly developed following the CDC guidelines, as these guidelines are the main and important sources of information for the prevention of TB and MDR-TB in health facilities (Hong, 2001; Mehtar, 2008).

Step 2: Interview Stakeholders and Observation

The second step of this study consisted of both semi-structured interviews of the stakeholders and setting observation. Even though, the qualitative data seemed to be unscientific and anecdotal but these help to bridge the gap between scientific evidence and clinical practice (Green & Britten, 1998). Moreover, the

qualitative data is comparatively more powerful than scientific publications in changing clinical practice (as cited in Green & Britten). Therefore, two key qualitative data collection methods: semi-structured interviews and observation were used to integrate empirical evidence in the context of Bangladesh.

A semi-structured interview was conducted to acquire a local perspective (emic) on the various concepts related to the identification, assessment and treatment of risks for the development of MDR-TB. The emic, is a process in which the researchers aim to describe a phenomena from the viewpoint of specific cultural contexts (Sabbagh & Golden, 2007). In this study, data from semi-structured interviews or emic perspectives helped to collect the real information regarding the risk factors of MDR-TB and their treatment in the local setting by using the subjective experience as a source of knowledge. This approach also helped the researcher to find the existing nursing practice, resources, facilities, and barriers in the prevention of MDR-TB and its risk factors.

A setting observation was conducted by the researcher to understand the existing risk factors of MDR-TB and their treatment in the local setting by using the objective data (etic perspectives). The etic, is a process in which the researchers aim to find out commonalities (Sabbagh & Golden, 2007) and construct (Morris, Leung, Ames, & Lickel, 1999) of the phenomena that apply across cultures. This approach enables the researcher to learn about the real situation of the context regarding the risk factors and prevention of MDR-TB, and activities or practices of the nurses in the setting through observing and participating in those activities. It also helped the researcher to assess what are the risks of MDR-TB that can be minimized

by the nurses and to explore the strengths and weaknesses of the existing management for the prevention of MDR-TB and its risk factors.

Despite a large number of scientific evidence found in the literature related to the nursing practice for the prevention of MDR-TB, the integration of knowledge from research together with the practical experiences of clinical professionals was useful in forming a solid basis for the development of NPG: MDR-TB (van der Linde et al., 2005). In addition, in order to develop appropriate and applicable guidelines to be used in Bangladesh, it is very important to gain inputs from stakeholders at the national levels. Since this study was conducted at NIDCH, a national centre for TB and MDR-TB, the interview of key personnel, who work at this hospital, provided very fruitful information**.** Moreover, the reviewed articles and guidelines were mostly from other countries. Some identified risk factors of MDR-TB and nursing interventions for assessing and minimizing the risks for the development of MDR-TB would be somewhat different from the existing risk and preventive nursing measures in Bangladesh.

The findings emerged from the semi-structured interviews and setting observations were considerably similar to the literature review across the three categories: risk identification, risk assessment and risk treatment. However, regarding the subcategories of the statements in the risk identification category; lack of maintaining cough etiquette, perceived secondary gains, lack of health education for patients about MDR-TB and its factors, and the lack of nurse's knowledge and training were not found in the literature review as a risk or influencing factors of MDR-TB.

Since TB and MDR-TB are transmitted by airborne droplets from respiratory secretions, lack of cough etiquette or respiratory hygiene is thought to be the main cause of the transmission of MDR-TB. From the semi-structured interviews of the experts and from setting observations, it was found that there is a lack in maintaining cough hygiene in the wards. Patients often spit their cough secretions carelessly everywhere. There is no proper system or facilities to dispose of the patient's sputum. Patients with TB and MDR-TB in the ward do not always follow the practice of using a protector during coughing, sneezing or talking with others. According to the local policy and procedure, the patients should spit their cough secretions in a plastic pot with a lid. In addition, the patients should be instructed to cover their mouth and nose when coughing, with hands, or a cloth such as a handkerchief, clean rag, tissue or paper mask (NTP, 2009b). Thus, all of these risks factors were considered during the redevelopment of the guidelines and a recommendation was made to prevent these risks. Therefore, the nurses can realize the importance of the prevention of those risk factors and take appropriate measures that can help the patients to change their risk behaviors.

Perceived secondary gain by the patient particularly for MDR-TB was mentioned as a risk for the transmission of MDR-TB. The patients who perceived secondary gain, for instance, patients who felt that they were privileged were most likely to be non-cooperative in maintaining the rules and regulations of the hospital and MDR-TB preventive measures.

Lack of health education for patients about MDR-TB and its factors, and the lack of nurse's knowledge and training were found to be two subcategories of risk factors for the transmission and development of MDR-TB among hospitalized

patients in Bangladesh. One study also reported that the lack of health education of TB patients regarding their disease, such as the duration or the risk factors of discontinuing TB treatment was significantly associated with defaulting from TB treatment (Elbireer, Guwatudde, Mudiope, Nabbuye‐Sekandi, & Manabe, 2011). Consequently, the default from therapy is strongly associated with the development of MDR-TB (Kimerling et al., 2003).

Regarding the nurse's knowledge, the experts realized that the nurses have a lack of knowledge about the disease, management and transmission of TB and MDR-TB and this is due to the lack of a nurse's training on the management and transmission of TB and MDR-TB. Even though no study was found exploring the impact of the lack of nurses' knowledge on the development of MDR-TB, several studies of other countries also revealed that nurses have a lack of or poor knowledge in the various aspects of TB such as its causes, symptoms, diagnosis, infectiousness of TB, and correct doses and complications of anti-TB drugs (Gleissberg et al., 1999; Singla et al., 1998; Souza & Bertolozzi, 2007; Wahyuni et al., 2007). These knowledge gaps may contribute to a higher risk of nosocomial TB and MDR-TB (Woith, Volchenkov, & Larson, 2010).

Insufficient or lack of TB and MDR-TB infection control measures in the hospital was found to be the major risk factor for the nosocomial transmission of TB and MDR-TB. This risk factor is more complex in the study setting. From the interviews and observations, it was revealed that in most cases non-TB, TB, and/or MDR-TB patients are staying together. In Bangladesh, the TB hospitals seem to have inappropriate isolation facilities and policies. TB and MDR-TB patients do not use the appropriate protective measures to prevent the spread of infection to other patients,

families and staff. They were walking around and talking with others in the hospital without wearing any mask. Similar findings were also revealed from an observational visit to a HIV-dedicated ward in Spain (Rullan et al., 1996). In addition, a number of (four to seventeen) TB or MDR-TB patents were nursed together in a room due to the lack of an isolation room and/or negative pressure room for each patient and TB and MDR-TB patients were overloaded in the wards. Moreover, the natural ventilation of the wards is not always maintained particularly in the rainy and winter season and may also be due to some other causes.

In the risk assessment category, three subcategories of nursing measures emerged from the expert interviews. Among these, two subcategories namely, “screening the patients for having MDR-TB and its risk factors” and “investigating and monitoring the patients for MDR-TB and its risk factors” had emerged reflecting the three subcategories of nursing measures that were found in the literature review. In addition, one subcategory of a nursing measure “assessment of patients for non-compliance with TB treatment” emerged from the interview. Even though, it was not found from the literature review, it was found in literature as one statement under the subcategories of “monitoring the patients for MDR-TB and its risk factors”.

One statement under the subcategory of screening the patients for MDR-TB and its risk factors that was found in the literature review did not emerge from the interviews and observations. The statement is “nurses used to perform the physical examination of the patients with TB in the TB clinic”. The experts did not recommend this measure most probably because the nurses in the setting are not

mainly responsible for those tasks due to a severe shortage of nursing staff and patient overload in the ward or hospital.

In the risk treatment category, all subcategories of statements revealed from the interviews and observations are somewhat similar to those found in literature. Unfortunately, some recommendations derived from the internationally accepted guidelines, such as the US CDC guidelines (1994, 2005), would not be applicable in a resource limited country like Bangladesh because these guidelines were written mainly for developed countries and require a major infrastructure, expertise and funding for implementation (Hong, 2001; Mehtar, 2008). For instance, even though, the US CDC guidelines are the main source of information, the most authoritative, and evidence-based guidelines for the prevention of TB and MDR-TB, these are mostly applicable to the countries for which they are developed (Mehtar) but would not be applicable in resource-poor countries.

These guidelines recommend for negative pressure rooms or single-patient rooms with special ventilation characteristics for the prevention of MDR-TB. In Bangladesh, there are no negative pressure rooms in public hospitals to isolate the TB and MDR-TB patient. Recommendations for a single-patient room are also not possible to follow. With a high inpatient load of different forms of TB including MDR-TB in all health care settings, particularly in TB and MDR-TB settings, it is impossible to accommodate each patient in an isolation room. In addition, negative pressure rooms or other engineering controls need planning, maintenance and monitoring for proper functioning. Poor functioning exhaust ventilation would have more risk for the transmission of diseases than natural ventilation (Mehtar, 2008). Moreover, a study on eight hospitals in Peru, found that the risk of airborne contagion

including TB is much lower in opening windows and doors to maximize natural ventilation than with costly, maintenance-requiring mechanical ventilation systems (Escombe et al., 2007). Therefore, based on local facilities, it could be recommended to isolate the TB and MDR-TB patient in a natural ventilated room.

The CDC guidelines also recommended for local exhaust ventilation (e.g., enclosed, ventilated booth) or respiratory isolation conditions, if using this evidence is not feasible to perform aerosol-generating procedures such as bronchoscopy, nebulizer, and sputum induction on patients with TB. Similarly, there are no mechanical ventilators particularly for sputum induction or collection and nebulization. It is also impossible to provide a separate room in every ward for these cough inducing procedures due to a shortage of rooms and patient overload in the hospital. Therefore, the local expert participants recommended collecting the sputum in an open air (specific) space outside the wards.

Step3: Validation of the NPG: MDR-TB

Effective clinical practice guidelines should have certain characteristics which include validity, cost effectiveness, reproducibility, reliability, representative development, clinical applicability, clinical flexibility, clarity, meticulous documentation, scheduled review, and unscheduled review guidelines (Thomas, 1999; Vlayen et al., 2005). However, in previous studies, some common criteria including appropriate, essential or important, relevancy, accuracy, clarity, specificity, feasibility, measurability, commensurately, and likelihood were used to get experts' consensus or to evaluate the content validity of the guidelines (Colucci,

Kelly, Minas, Jorm, & Chatterjee, 2010; Hutt & Kramer, 2002; Landier et al., 2004; Park & Park, 2010; Van Stralen, Lechner, Mudde, De Vries, & Bolman, 2010).

In this consensus process of two-round Delphi, the selection of the participants received the highest importance because the quality of the generated results depends largely on the quality of the expert participants. The experts were selected based on their experiences in preventing the development of MDR-TB and their willingness to participate in the study. Keeney, Hasson, & McKenna (2001), also stated that in addition to the individual's knowledge of a particular topic, individual willingness to engage in discussion or in the process should be considered during selection of experts as the participants of the Delphi technique. In addition, the participation of experts from different professions involved in this process provide a solid foundation for the implementation of the NPG: MDR-TB (van der Linde et al., 2005).

The appropriate number of subjects is another important issue in the Delphi study. There was no definition or agreement found on the size of number of experts as well as no criteria against which a sample size choice could be fixed for validating the NPG: MDR-TB. However, the number of experts for Delphi may vary from study to study depending on the nature, scope and importance of the study (Kaynak, Bloom, & Leibold, 1994), and selected design and time frame for data collection (Keeney et al., 2001). In the previous studies, the number of experts is flexible, but the minimum number should be at least 15-20 (as cited in Kaynak et al.). Therefore, this study aimed to have a minimum of 25 experts.

The criteria used to define and determine the consensus in the Delphi process of this study is subject to interpretation. Basically, consensus is defined as "a

certain percentage of the votes falls within a prescribed range" (as cited in Hsu & Sandford, 2007, p. 4). In this study, consensus among experts has been quantified using the percentage of agreement, median scores and IQR for each statement. Consensus was defined as an expert agreement rating 4 or more (on a 7-point Likert scale, from 0 to 6) for more than 75% (Cantrill et al., 1998). Thus it was decided that in both rounds of this Delphi study ≥ 75% of the experts should score 4 or more for inclusion to be valid and consensual. In addition, for two other parameters, the median scores and IQR were calculated to support the interpretation of the consensus. On a seven-point Likert scale (0-6) the median scores of each statement ≥ 5 and IQR ≤ 1.00 can be considered as good consensus (Crutzen et al., 2008). Together with these parameters, the experts' suggestions and comments, and the researcher's rationales and experiences were supplemented to judge whether the statements should be retained, revised, combined, added and/or discarded.

The number of rounds used in a study depends on the achievement of consensus and on the starting point of the Delphi technique. For example, starting the first round by posing open questions or starting with the content from the literature review (as cited in Dempsey, Barry, & Battel-Kirk, 2011; Hsu & Sandford, 2007). In this study, this process started with the contents of the draft guidelines developed from the literature review, interviews and observations to obtain expert consensus. One round was not enough to develop NPG: MDR-TB, thus a second round was conducted to confirm the expert consensus and get consensus on the newly added statements in the NPG: MDR-TB V_2. The process was closed after two rounds, because after round two all statements reached consensus. There were no written comments from experts on the statements or no suggestions to add new statements.

The results of the Delphi process are a strong consensus against all statements of the NPG: MDR-TB V_1 and NPG: MDR TB V_2 in round one and round two, respectively. In addition, all statements in both rounds had a median score of 5 or more with IQR $\leq$ 1.00 on a 7-point (from 0 to 6) Likert scale, except one statement (IQR was >1.00) of the NPG: MDR-TB V_1 in the first round. The potential explanation for this is that the meaning of this statement was not clear to the experts. Thus, this statement was revised and retained for further consideration in the next round.

Despite very positive feedback, the experts provided many suggestions and comments that should be taken into account to design the final draft of the NPG: MDR-TB. The suggestions and comments were mainly related to the modification, addition, combination and deletion of the statements in each round due to several reasons such as overlapping, redundant, irrelevant, impractical and mistakes in writing the statements. Another important suggestion was given by the experts to consider some factors that would be barriers in the effective implementation of the NPG: MDR-TB in a practical situation. The important barriers that were mentioned by the experts are: the nurse's workload and limited knowledge about TB and MDR-TB, lack of support and resources. Miller & Kearney (2004), also stated that available resources and potential barriers such as a lack in a healthcare professional's knowledge should be taken into account during the dissemination and implementation of the guidelines. Thus, considering these factors, the researcher developed the guidelines that can be implemented under available resources including humans and materials, and introduced the guidelines to the nurses by conducting workshops and several group discussions.

In summary, in the first round, a total of 227 indentified statements pertaining to the three levels: level 0, level 1, and level 2 of the NPG: MDR-TB were evaluated by 25 experts. After analyzing the expert responses, the results showed that consensus was obtained on nearly all statements but upon the expert's comments and suggestions and the researcher's rationales and experiences 42 statements were revised and two statements were discarded from all three levels. In addition, seven new statements were added. Therefore, in all, 232 statements consisted of level 0 (56), level 1 (100), and level 2 (76) were sent to the experts in the second round for further evaluation (Appendix D 6, Table 16-24). In the second round, all of 232 evaluated statements received consensus from 24 experts. But 64 statements were revised, 19 discarded, 36 statements were combined into 18 after analyzing the expert responses. The explanation of doing this was similar to that as mentioned earlier. In addition, in this round, three statements that obtained consensus from the experts in level 0 and 1 were added in level 2 under the subcategories of the risk treatment category because these statements were found to be important in the prevention of MDR-TB in this level. Hence, by the end of this round 198 statements consisted of level 0 (47), level 1 (81), and level 2 (70) were retained and contained in the final version of the NPG: MDR-TB (Appendix D 6, Table 16-24).

This result indicates that the experts agreed with the content of the NPG: MDR-TB and it includes all necessary nursing measures for identifying, assessing, and treating the risks for the development of MDR-TB. Moreover, in the second round, each statement was prioritized by the experts using a 5-point rating scale ranging from 0 (unimportant) to 4 (very important). The result also revealed that over 75% of experts rated all statements as important or very important indicating

consensus on the priority for the prevention of the development of MDR-TB among hospitalized adult patients in Bangladesh (Witt & Almeida, 2008). This would be possibly because the initial guidelines were developed on the basis of available evidence from the literature review and then the recommendations were added and modified to reflect the current practice regarding the prevention of MDR-TB and its factors in the health care setting of Bangladesh. It can, therefore, be concluded that almost all statements of the NPG: MDR-TB are relevant, clear and applicable and can be used by the nurses to prevent MDR-TB and its risk factors among hospitalized patients in Bangladesh.

Phase 2: Evaluation of the Efficiency of the NPG: MDR-TB

In this phase, the efficiency of the NPG: MDR-TB implementation will be discussed.

The efficiency of the NPG: MDR-TB was evaluated in the real situation by 64 nurses from the three levels: non-TB, TB and MDR-TB wards. The result showed that overall there was a significant difference in the preventive practices of the participants across the three levels after the implementation of the NPG: MDR-TB. This shows that the participant nurses did improve in regards to their preventive nursing care for the patients for the prevention of the development of MDR-TB.

This positive impact would be due to various factors which were taken into account during the detailed planning of the development, dissemination and implementation of the NPG: MDR-TB. According to Rogers (1995), a number of factors interact to influence the translation of research into practice. The four major interrelated factors that influence the diffusion process are the innovation itself, how

information about the innovation is communicated, time, and the nature of the social system in which the innovation is being introduced. Since, the Rogers's Diffusion of Innovation Model has been used by numerous studies in investigating the translation of knowledge (Brown, 2009; Panagiari, 2008; Spiering & Erickson, 2006), it is used to implement and guide the discussion of the efficiency of the NPG: MDR-TB implementation.

Firstly, the innovation refers to something newly introduced including an idea, practice, guidelines or project to an individual or others (Rogers, 1995). The diffusion of innovation (the developed guidelines in this study) is influenced by its characteristics such as the complexity, relative advantage of the guidelines, and the compatibility with the values, cultural norms, and perceived needs of its users (Titler, 2007). The NPG: MDR-TB was developed based on scientific evidence, experiences and knowledge of the stakeholders; and validated by the local and national TB and MDT-TB experts from different medical professionals in Bangladesh. These efforts, concerning the local context did help make these guidelines contextual-based, resulting in them being well-accepted by participating nurses in this study.

Secondly, communication channels used to disseminate the guidelines were pivotal. Reviewed studies on the dissemination and implementation of the guidelines have identified numerous communication methods such as workshops, practice sessions, conferences, seminars, educational interventions, publications in journals, mailing to target individuals, distribution of teaching materials, small educational groups, and reminders (Miller & Kearney, 2004; Prior, Guerin, & Grimmer-Somers, 2008; Wensing, van der Weijden, & Grol, 1998). However, multifaceted dissemination and implementation strategies are more effective to

transfer the guidelines in practice than a single strategy (Feder, Eccles, Grol, Griffiths, & Grimshaw, 1999; Moulding, Silagy, & Weller, 1999). In this study, different communication strategies including a half-day workshop, distributing the hard copies of the NPG: MDR-TB to every participant, individual and group discussions, and frequent follow-up visits were used. Therefore, it can be believed that these strategies may have contributed to the success of the study.

Thirdly, time dimension refers to the duration for change. Rogers has addressed that a process of adopters, once they have knowledge about an innovation for their decision to adopt or not adopt takes time. The rate of adoption will increase over time. According to Titler (2008), implementing the change depends on the nature of the practice change and it takes time from several weeks to months. In this study, the efficiency of the NPG: MDR-TB was evaluated after one and a half months of its implementation. This duration was considered short but provided, at least, a minimum period to produce an effective implementation, considering the nature of the setting when nurses may be transferred to work in another place.

Fourthly, the social system refers to encompassing social structure, the system's norm and diffusion, opinion leaders and change agents, and types of leadership (Rogers, 1995). The social structure is the patterned arrangement of the units in the organization or system that can facilitate or impede the implementation of the guidelines (Rogers). Since, the guidelines received approval from the authority to be implemented in the hospital, it was more likely that nurses felt they should follow. In addition, during the implementation phase, the coordinator from DOTS-Plus project acted as the opinion leader in facilitating and supervising the participants, together with researcher. This informal leadership of an opinion leader contributes to

the successful change in the established practice behaviors (system's norm) of the nurse practitioners in the system such as the improvement of the nurse's preventive practice for the prevention of MDR-TB in the hospital. Moreover, using the three nurse research assistants as the peer opinion leaders was also helpful to change a nurse's practice by facilitating her to use the guidelines.

Furthermore, innovation-decisions regarding the adoption or rejection of the guidelines by the participants or authorities was another important influence on its implementation (Rogers, 1995). The involvement of the opinion leaders, expert consultant, (Titler, 2007) and end-users, (Moulding et al., 1999) and maintaining an interpersonal network (Rogers; Titler, 2007) in the guidelines development and implementation process, were suggested as the important strategies in the adoption of the guidelines in the context. Therefore, in this study, in addition to the submission of the guidelines and getting permission from the authorities, several reinforcing strategies were applied. These are the involvement of some authorities as the experts in the development and evaluation process of the guidelines, and having several informal discussions and personal contacts with the authorities and participants to help them understand about the purposes, development process, strength of evidence and potential consequences of the guidelines. To have these factors present it was possible to adopt the guidelines in the hospital resulting in positive changes in the nurse's practices for the prevention of MDR-TB.

In considering the overall items of the NPG: MDR-TB PPQ, all individual items included in case finding and case holding measures showed higher mean scores in the posttest than in the pretest implementation across the three levels. In the non-TB wards (Level 0), all of the individual preventive nursing practices in

the two categories of nursing measures: case finding and case holding measures were significantly improved after the implementation of the NPG: MDR-TB among the respondents than before (Appendix D 7, Table 25-26). However, there was no significant difference in the three items of the TB wards (level 1) between the pretest and posttest scores. These items are: “I find out the patients for whom DOT is needed”, “I explain to the patients about the test to be done and the reason for doing it”, and “I check the sputum register to see which results are outstanding/due each day” (Appendix D 7, Table 27-28).

Similarly, there were no significant difference in the six items of level 2 (MDR-TB wards) between the pretest and posttest scores. These items are: “I find out the patients, who do not collect and/or do not have anti-TB drugs for next day”, “I recognize the infectious MDR-TB patients who do not use a mask when they go out from the isolated rooms/wards/units/hospitals.”, “I use the separate devices such as oxygen canula/mask, micromist etc for every individual patient”, “I maintain the sputum register when I send a sputum for examination”, “I ensure the correct dosages of drugs during distributing the drugs and medicating the patient”, and “I teach the TB and MDR-TB patients admitted in the MDR-TB ward about the different aspects of their disease including diagnosis, treatment, prevention, adverse effects of anti-TB drugs etc” (Appendix D 7, Table 29-30).

In a previous study, several reasons were identified as barriers to demonstrate non-significant differences in the clinical practice guidelines (CPG) knowledge of family medicine residents between a pre and post intervention of a pilot study. These are: lack of CPG instruction, lack of critical appraisal ability, insufficient time, lack of CPG accessibility; and lack of faculty modeling (Echlin, Upshur, &

Markova, 2004). In this study, the reason of a non-significant study could be the high average pretest scores of these items. The same reason was explained in a nutrition and health educational intervention study for the non-significance of results between the pretest and posttest (Vijayapushpam, Antony, Subba Rao, & Raghunatha Rao, 2010). The reasons for high pretest scores would be the level of experience of some nurses who participated in the implementation of the NPG: MDR-TB which was quite high due to working for a long time in the TB and MDR-TB wards. The same reasons for high pretest scores was also reported by another pretest and posttest interventional study (Narayan, Mathai, Adhikari, Bhandari, & Bawa, 2004).

It can now be concluded that the implementation of NPG: MDR-TB contributed to the improvement of nursing care by increasing the frequency of preventive nursing practice. The improvement in preventive nursing practice illustrates the fact that the NPG: MDR-TB is applicable and efficient to be used in preventing the development of MDR-TB among hospitalized patients in Bangladesh.

Limitations of the Study

The findings of this evaluation should be viewed with caution. There are some limitations to this study. Firstly, this guidelines was developed in the context of a tertiary level hospital. This may limit this generalizability to smaller health care settings. Secondly, the efficiency parameter seems to be promising as evident by a significant change in nurses perceived preventive practices of MDR-TB, however sustainability is not warranted. Thirdly, the guideline is considered lengthy, although all statements are relevant. This may limit its use for some nurses.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

In this chapter, the study is summarized in three parts: conclusions, future research and recommendations, and the implications of the study.

Conclusions

The aim of this study was to develop evidence and practice-based nursing practice guidelines for the prevention of MDR-TB among hospitalized adult patients and to evaluate its efficiency. It was developed to help the nurses and their clients to make decisions that lead to quality of care, improve outcomes and patient's safety.

The research and development type of research design was used to develop the guidelines. It had two phases: the development of guidelines and the evaluation of the efficiency of the newly developed guidelines. In the first phase, a systematic approach combining a comprehensive literature review, interviews, and observations was conducted to gather evidence included in the initial guidelines. A total number of 227 similar and dissimilar recommendations emerged from the findings of these various sources which were used to develop the initial version, NPG: MDR-TB V_1 in three parts for the three levels of target populations and settings. The content validity of the NPG: MDR-TB was examined in terms of relevancy, clarity, and applicability of the statements by using 25 local and national experts including nurses, physicians and a laboratory specialist in a two-round Delphi process. Consensus was reached on nearly all of the statements in both rounds. On the basis of

the expert's suggestions, the final version of NPG: MDR-TB emerged with 47, 81, and 70 statements, comprising of three categories: risk identification, risk assessment and risk treatment under 11 subcategories in level 0 (non-TB ward), 17 sub-categories in level 1 (TB ward), and 16 subcategories in level 2 (MDR-TB ward).

In the second phase, the efficiency of the guidelines was evaluated by 64 nurses from the three levels using a multi-method interactive approach. This includes workshops, distribution of printed copies of the NPG: MDR-TB, individual discussions, and follow up visit. The changes in the nurse's preventive practice for the prevention of MDR-TB were compared between pre and post guidelines implementation scores. Significant differences of the preventive practice scores for the prevention of MDR-TB between the pre and post implementation of the guidelines were found in all levels ($p < .001$).

In conclusion, the findings of the NPG: MDR-TB implementation indicates that the guidelines can be utilized for the prevention of MDR-TB and its risk factors control in the hospital. However, it needs further investigation to elaborate whether the implementation of the guidelines can eventually decrease the incidence of MDR-TB among hospitalized adult patients.

Future research and Recommendations

For the fully effective implementation, the guidelines should be used further to measure for sustainability because one and a half months after the implementation of the guidelines is a very short time period. A short time period can not tell whether the guideline implementation will be sustained or not.

Although, the implementation of NPG: MDR-TB has a significant impact in changing the preventive practice for the prevention of MDR-TB among hospitalized patients, the efficiency of the guidelines should be tested on a large scale. Therefore, the present evaluation process of the NPG: MDR-TB could be repeated with a large number of sample sizes from different levels of TB and MDR-TB hospitals all over the country to increase the generalizability and reliability of the result. In addition, in a further study, it is recommended to test the effectiveness on the incidence of MDR-TB in the hospital.

As mentioned previously, a large number of statements included in the NPG: MDR-TB may limit its use in daily clinical practice, further work is needed to reduce the number of statements.

Implications of the Study

The knowledge of this study may have important implications on the various aspects and levels in preventing and controlling TB and MDR-TB. The findings confirm that the developed NPG: MDR-TB would be beneficial for individual nurses to gain knowledge in identifying the risks of developing MDR-TB among hospitalized patients that should be assessed and minimized by them. It may also be useful for other health care professionals working in different risk settings such as hospitals, laboratories, and DOTS or TB centers in preventing the transmission of TB and MDR-TB. In addition, the obtained information in this study can also be helpful to the authorities of the health care and TB control program (at local and national levels) for professional training for nurses to increase awareness and knowledge about the risks of MDR-TB and improve preventive nursing practice

to prevent MDR-TB. Moreover, as the guidelines have been developed in a systematic approach using several steps and methods, researchers will find it beneficial to use the NPG: MDR-TB as a guide, and reference for future research. Furthermore, after ensuring the cultural sensitivity of the NPG: MDR-TB, it can also be applied in other countries particularly in the developing and TB burdened countries.

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APPENDICES

APPENDIX A

INFORMED CONSENT FORM

APPENDIX A 1

INFORMED CONSENT FORM FOR SEMI-STRUCTURED INTERVIEW

Research Title: Development of the Nursing Practice Guidelines for Prevention of Multidrug-Resistant Tuberculosis among Hospitalized Adult Patients in Bangladesh

Researcher: Mohammad Nurul Anowar
Senior Staff Nurse, NIDCH, Mohakhali, Dhaka 1212, and
Student, PhD-nursing, Prince of Songkla University, Thailand
Mobile: 88-01675 741520, E-mail: mn.anowar@yahoo.com

Dear Participant,

Assalamu Alaikum. My name is Mohammad Nurul Anowar and I am a student of PhD in Nursing at Prince of Songkla University, Thailand. As a part of my study, I am conducting research to develop nursing practice guidelines for the prevention of MDR-TB among hospitalized adult patients in Bangladesh. This study is reviewed and approved by the Institutional Review Board (IRB), Faculty of Nursing, Prince of Songkla University and NIDCH, Dhaka.

This study will be helpful for to makeing informed decisions that lead to quality of care, improved outcomes and patient safety. I would like to collect some valuable information as baseline data to develop the guidelines. If you agree to participate in this study, you will be interviewed by the researcher for around thirty to sixty minutes. The interview will be tape recorded. The researcher will keep you anonymous in every step of the research. In this study there is no risks attached to participating. You will have the opportunity to ask any questions to the researcher and to withdraw any time from participating in the research.

I agree to participate in the study.

Signature of the Participant:…….Date:…….

I have explained all of above conditions clearly to the participant for his/her informed consent.

Signature of the Investigator: ……Date:……

APPENDIX A 2

INFORMED CONSENT FORM FOR THE EVALUATION OF NPG: MDR-TB

Research Title: Development of the Nursing Practice Guidelines for Prevention of Multidrug-Resistant Tuberculosis among Hospitalized Adult Patients in Bangladesh

Researcher: Mohammad Nurul Anowar
Senior Staff Nurse, NIDCH, Mohakhali, Dhaka 1212, and
Student, PhD-nursing, Prince of Songkla University, Thailand
Mobile: 88-01675 741520, E-mail: mn.anowar@yahoo.com

Dear Participant,

Assalamu Alaikum. As the requirement of my doctoral degree in nursing, I am conducting a research entitled "Development of the Nursing Practice Guidelines for Prevention of Multidrug-Resistant Tuberculosis among Hospitalized Adult Patients in Bangladesh". This study is reviewed and approved by the Institutional Review Board (IRB), Faculty of Nursing, Prince of Songkla University and NIDCH, Dhaka.

This study will be helpful for both health care providers and patients by improving the quality of nursing care in caring for the patient for the prevention of MDR-TB. If you agree to participate in this study you will be interviewed by the researcher. The interview will be held 3 times and each interview will take about 20-30 minutes. Information collected from you will be used only for research purposes. The researcher will keep you anonymous in every step of the research. In this study there is no chance of penalties, discomfort or other relative risks. You will have the opportunity to ask any questions to the researcher and research assistant and to withdraw any time from participating in the research activities.

I agree to participate in the study.

Signature of the Participant:……Date:……..

I have explained all of above conditions clearly to the participant for his/her informed consent

Signature of the Investigator: ……..Date:……

APPENDIX B

PERMISSION LETTER

APPENDIX B 1

PERMISSION LETTER FOR COLLECTING DATA

22 March, 2011

To
The Director
National Institute of Diseases of the Chest and Hospital
Mohakhali, Dhaka 1212.

Through proper channel

Subject: Asking permission for collecting data

Sir,

With due respect, I beg to state that I am Mohammad Nurul Anowar Senior Staff Nurse of this institution. Now, I am studying PhD in Nursing at Prince of Songkla University (PSU), Thailand. To fulfill the partial requirement of my doctoral degree, I am conducting a research entitle "Development of Nursing Practice Guideline for Prevention of Multidrug-resistant Tuberculosis among adult Hospitalized Patients in Bangladesh". This study is reviewed and approved by the Institutional Review Board (IRB), Faculty of Nursing, PSU, Thailand. I would like to collect data from Senior Staff Nurses/Staff Nurses who are working in non-TB, TB and MDR-TB wards in this institution to test the reliability of my questionnaires and evaluate the applicability of newly developed nursing practice guideline for prevention of MDR-TB among adult hospitalized patients in Bangladesh. Data will be collected from 23 March to 30 April, 2011. So, in this moment, I am applying for your kind permission for collecting data in this institution to complete my doctoral study.

অগ্রবর্তী করা হইল
২২/৩/১১
উপপরিচালক তত্ত্বাবধায়ক
জাতীয় বক্ষব্যাধি ইনস্টিটিউট ও হাসপাতাল
মহাখালী, ঢাকা-১২১২।

I, therefore, pray and hope that you would be kind enough to give me permission to collect data and oblige thereby.

22.03.11
DR. MD. ABU RAIHAN
Medical Superintendent
N.I.D.C & H. Mohakhali
Dhaka-1212

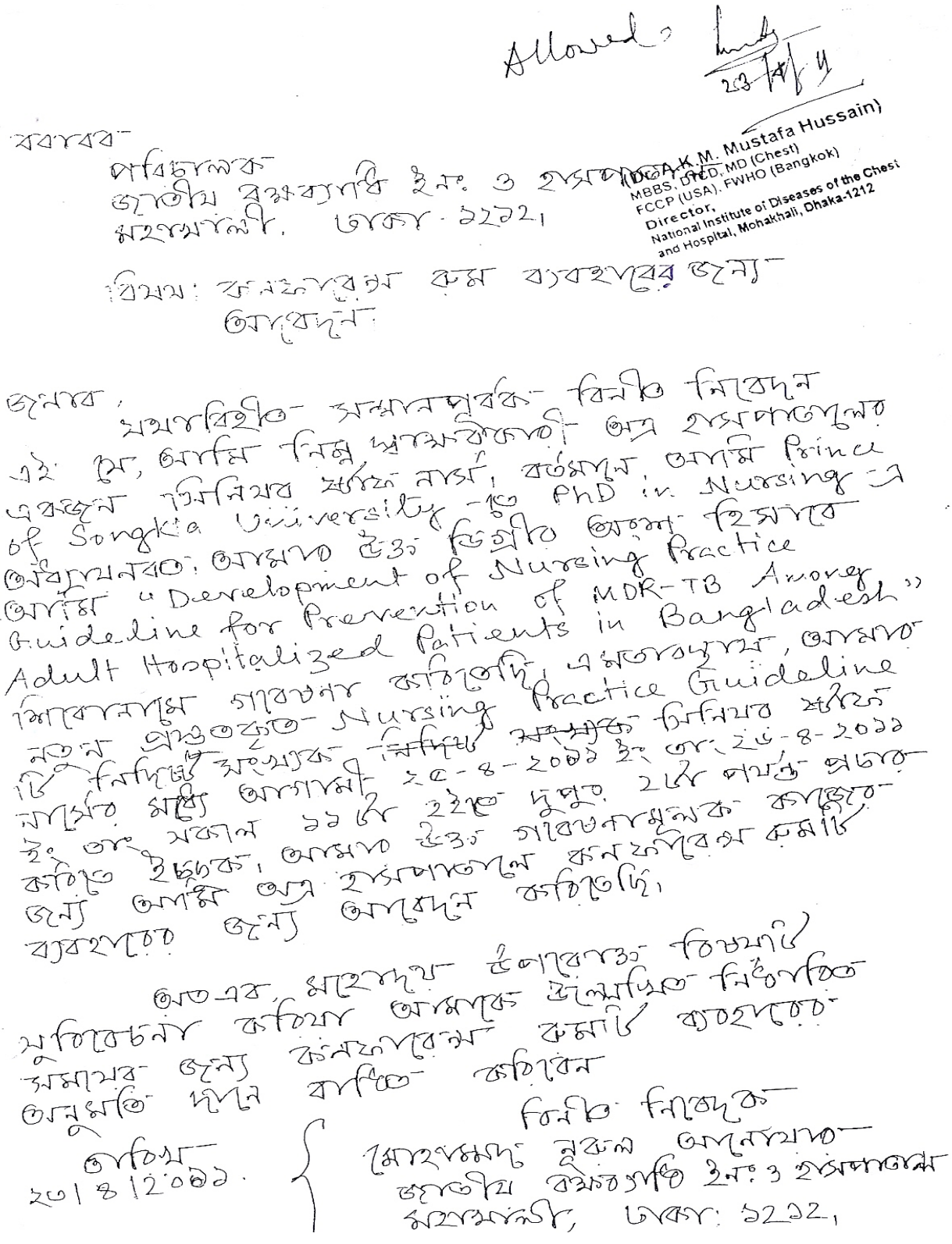
Yours sincerely

(Mohammad Nurul Anowar)
Senior Staff Nurse
National Institute of Diseases of the Chest and Hospital
Mohakhali, Dhaka 1212, and

Student of PhD in Nursing, Faculty of Nursing
Prince of Songkla University
P.O. Box 9, Khor Hong, Hat Yai
Songkhla, Thailand

APPENDIX B 2

PERMISSION LETTER FOR CONDUCTING WORKSHOP TO DISSEMINATE THE GUIDELINES IN THE HOSPITAL CONFERENCE ROOM



Allowed
23/4/22

(Dr. A.K.M. Mustafa Hussain)
MBBS, DTCD, MD (Chest)
FCCP (USA), FWHO (Bangkok)
Director,
National Institute of Diseases of the Chest
and Hospital, Mohakhali, Dhaka-1212

বরাবর
পরিচালক
জাতীয় বক্ষব্যাধি ইন্সঃ ও হাসপাতাল
মহাখালী, ঢাকা-১২১২।

বিষয়: কনফারেন্স রুম ব্যবহারের জন্য আবেদন।

জনাব,
সবিনয় নিবেদন এই যে, আমি নিম্ন স্বাক্ষরকারী এ হাসপাতালের একজন গবেষক। বর্তমানে আমি Princa of Songkla University-তে PhD in Nursing-এ অধ্যয়নরত। আমার গবেষণার শিরোনাম "Development of Nursing Practice Guideline for Prevention of MDR-TB Among Adult Hospitalized Patients in Bangladesh" নতুন প্রস্তুতকৃত Nursing Practice Guideline টি নির্দিষ্ট সংখ্যক নার্সের মধ্যে আগামী ২৫-৪-২০২২ ইং তারিখ সকাল ১১টা হতে ২২টা মধ্যে ২৫-৪-২০২২ ইং তারিখ সকাল ১১টা হতে দুপুর ২টা পর্যন্ত প্রচার করিতে ইচ্ছুক। আমার এই গবেষণাকর্মটি কার্যকর করার জন্য আপনি এই হাসপাতালের কনফারেন্স রুমটি ব্যবহারের জন্য আবেদন করিতেছি।

অতএব, মহোদয় ইতোমধ্যে বিষয়টি সুবিবেচনা করিয়া আমাকে উল্লেখিত নির্ধারিত সময়ের জন্য কনফারেন্স রুমটি ব্যবহারের অনুমতি দানে বাধিত করিবেন।

তারিখ
২৩/৪/২০২২.

বিনীত নিবেদক
মোহাম্মদ নুরুল আমিন
জাতীয় বক্ষব্যাধি ইন্সঃ ও হাসপাতাল
মহাখালী, ঢাকা: ১২১২।

APPENDIX C

INTERVIEW QUESTIONNAIRES

APPENDIX C 1

SEMI-STRUCTURED INTERVIEW GUIDELINES

Section 1: Demographic Data
Instruction: Please fill in the blank and put a tick (√) in the space ( ) that is true for you.

1. Age ……years.

2. Gender ( ) Male ( ) Female

3. Religion ( ) Muslim ( ) Hindu ( ) Buddhist ( ) Christian

4. Professional educational level

( ) Diploma ( ) Graduate (BSc/MBBS/Equivalent)

( ) Post Graduate (MSc/MPH/FCPS Equivalent) ( ) PhD

5. Total service ……years

6. Duration of working experience in TB clinic/hospital.....years

7. Official/Working position……

Section 2: Interview Questions

1. What are the causes/risk factors of MDR-TB?
2. What are the causes/risk factors of MDR-TB in health care settings/hospitals in Bangladesh?
3. Do you think that MDR-TB is caused by the some mistakes by the health care providers?
4. If yes, what kinds of mistakes? Please specify.
5. What else? What do you think about the cases/risk factors of the development of MDR-TB in health care a settings/hospitals in Bangladesh?
6. How can the nurses assess the causes/risk factors of the development of MDR-TB?
7. What are the nurses' roles or responsibilities in assessing the cases/risk factors of the development of MDR-TB in the hospital?
8. Do you think that the causes/risk factors of the development of MDR-TB can be prevented? If yes how?
9. Could you please explain in details causes/risk factors of the development of MDR-TB and how these risk factors can be prevented?
10. What are nurses' role/responsibilities in preventing the development of MDR-TB in healthcare setting/hospitals in Bangladesh?
11. What are the available resources and systems to prevent the development of MDR-TB and its risk factors in the healthcare setting/hospitals in Bangladesh?
12. What are lacking in resources and systems to prevent the development of MDR-TB and its risk factors in the healthcare setting/hospitals in Bangladesh?
14. Do you have any other suggestions?

APPENDIX C 2

FORMAT OF THE FIRST ROUND DELPHI QUESTIONNAIRES

The First Round Delphi Questionnaires of the Nursing Practice Guidelines to Prevent MDR-TB among Hospitalized Adult Patients in Bangladesh

Section 1: Demographic data

Instruction: Please fill in the blank and put a tick (√) in the space ( ) that is true for you.

1. Age ……years.

2. Gender ( ) Male ( ) Female

3. Educational level ( ) Graduate ( ) Post Graduate ( ) PhD.

4. Official position.....

.....

5. Duration of working/teaching experience in TB clinic/hospital/program/institute ……years.

6. Special course and/or study on TB, MDR-TB or/and chest diseases and disorders…….....

.....

Section 2 Questionnaire of the Draft Nursing Practice Guidelines to Prevent MDR-TB among Hospitalized Adult Patients in Bangladesh

Instruction:

1. Please mention how much you agree with each statement regarding its relevancy, clarity, and applicability for use in nursing practice for the prevention of MDR-TB in Bangladesh. In this questionnaire, 7-point Likert scale will indicate how much you agree with each statement such as:
   0 = strongly disagree,
   1 = quite disagree,
   2 = somewhat disagree,
   3 = neither agree nor disagree,
   4 = somewhat agree,
   5 = quite agree, and
   6 = strongly agree
   In addition, any suggestions, additions and corrections will be appreciated.

2. The first draft of guidelines to prevent MDR-TB among hospitalized adult patients in Bangladesh has three parts and each part has three dimensions:

Part 1 Prevention of MDR-TB and its risk factors control among hospitalized adult patients without TB and MDR-TB

a) Risk Identification
b) Risk Assessment
c) Risk Treatment

Part 2 Prevention of MDR-TB and its risk factors control among hospitalized adult patients with TB but without MDR-TB

a) Risk Identification
b) Risk Assessment
c) Risk Treatment

Part 3 Prevention of MDR-TB transmission in hospitalized adult patients

a) Risk Identification
b) Risk Assessment
c) Risk Treatment

3. Definitions of terms

Relevancy refers to how important or significant each statement is in nursing practice for the prevention of MDR-TB among hospitalized adult patients in Bangladesh.

Clarity refers to how meaningful, self-explanatory and understandable each statement is.

Applicability refers to how possible the usage for nurses of each statement for the prevention of MDR-TB in the context of Bangladesh in considering the cultural congruency for nurses' functions, available resources, and health system facilities.

Part 1 Prevention of MDR-TB and its Risk Factors Control among Hospitalized Adult Patients without TB and MDR-TB (level-0).

a) **Risk identification** for the prevention of MDR-TB and its risk factors among the hospitalized adult patients without TB and MDR-TB.

Statement		0 = strongly disagree, 1 = quite disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = quite agree, and 6 = strongly agree							Remarks /Comments
In identifying the risks for the development of MDR-TB among hospitalized adult patients without TB and MDR-TB, nurses should perform the following activities:									
	Identify Vulnerable patients								
1	Identify the patients who are previously came to contact with TB or MDR-TB patient	0	1	2	3	4	5	6	
2	Identify the patients having history of prior drug treatment for TB or MDR-TB	0	1	2	3	4	5	6	

Do you have any other suggestions, additions, and corrections?
Please mention here: ……..

b) **Risk assessment** for the prevention of MDR-TB and its risk factors among hospitalized adult patients without TB and MDR-TB.

……

c) **Risk treatment** for the prevention of MDR-TB and its risk factors among hospitalized adult patients without TB and MDR-TB

…….....

Part 2: Prevention of MDR-TB and its Risk Factors among Hospitalized Adult Patients with TB but without MDR-TB (level-1).

a) Risk identification for the prevention of MDR-TB and its risk factors among hospitalized adult patients with TB but without MDR-TB.

……

b) Risk assessment for the prevention of MDR-TB and its risk factors among hospitalized adult patients with TB but without MDR-TB.

……

c) Risk treatment for the prevention of MDR-TB and its risk factors among hospitalized adult patients with TB but without MDR-TB.

……

Part 3 Prevention of MDR-TB Transmission in Hospitalized Adult Patients (level-2)

a) Risk identification for the prevention of MDR-TB transmission in hospitalized adult patients.

……

b) Risk assessment for the prevention of MDR-TB transmission in hospitalized adult patients.

……

c) Risk treatment for the prevention of MDR-TB transmission in hospitalized adult patients.

……

APPENDIX C 3

FORMAT OF THE SECOND ROUND DELPHI QUESTIONNAIRE

The Second Round Delphi Questionnaires of the Nursing Practice Guidelines to Prevent MDR-TB among Hospitalized Adult Patients in Bangladesh

Section 1 Demographic data (same as round one)

Section 2 Questionnaire of the Second Draft Nursing Practice Guidelines to Prevent MDR-TB among Hospitalized Adult Patients in Bangladesh

Instruction: Please reconsider each of the retained and modified statements to finalize the content validity and prioritize each statement by ranking them on a 5-point Likert scale.

1) To confirm your ranked number for retained and modified statements, I would like to ask you to put a correction mark (√) in the columns that you accept:

A = not change, it means you do not want to change your previous score

B = change to group score

For a change to a new score, please re-rate your agreement on the following scale that is similar to the one used in the first round:

0 = strongly disagree,

1 = quite disagree,

2 = somewhat disagree,

3 = neither agree nor disagree,

4 = somewhat agree,

5 = quite agree, and

6 = strongly agree

2) To prioritize the statement, I would like to ask how much each statement is important to prevent MDR-TB and its risk factors control among hospitalized adult patients in Bangladesh. Please put a correction mark (√) on the number of the following rating scale that represents your opinion

0 = Unimportant

1 = Of Little Importance

2 = Moderately Important

3 = Important

4 = Very Important

Example:

	Retained and Modified statement	Group score	Your score	Score confirmation: Not change (A)	Score confirmation: Change to group Score (B)	Score confirmation: Change to new score							Prioritize the statement: 0 = Unimportant, 1 = Of Little Important, 2 = Moderately Important, 3 = Important, 4 = Very Important					Remarks/ Comments
In identifying the risks for the development of MDR-TB among hospitalized adult patients without TB and MDR-TB, nurses should perform the following activities:																		
	Identify Vulnerable patients																	
1	Identify the patients who has previously come in contact with TB or MDR-TB patients	5.46	5	A ✓	B	0	1	2	3	4	5	6	0	1	2 ✓	3	4	
2	Identify the patients having history of prior drug treatment for TB or MDR-TB	5.28	6	A	B ✓	0	1	2	3	4	5	6	0	1	2	3 ✓	4	

3) Similarly, I would like to ask you to give your agreement and give opinion on importance of new statement.

Example:

	Statements	Rate the statement: 0 = strongly disagree, 1 = quite disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = quite agree, and 6 = strongly agree							Prioritize the statement: 0 = Unimportant, 1 = Of Little Important, 2 = Moderately Important, 3 = Important, 4 = Very Important					Remarks/ Comments
	Maintain infection control measures													
1	**Administrative control measures** During admission of a MDR-TB patient in a respective ward/unit/hospital, they should take a written consent from the patient and his/her attendance (if possible) on some ……	0	1	2	3	4	5 ✓	6	0	1	2	3 ✓	4	

Moreover, any kinds of suggestion, additions, corrections, and rationals will be appreciated for every statement. In the same way of the first round, the developed second version of guidelines/questionnaire has three parts and each part has three sub-parts/dimensions.

Part1:

Prevention of MDR-TB and its Risk Factors Among Hospitalized Adult Patients without TB and MDR-TB (level-0).

a) **Risk identification** for the prevention of MDR-TB and its risk factors among hospitalized adult patients without TB and MDR-TB.

Retained and Modified statement		Group score	Your score	Score confirmation										Prioritize the statement 0 = Unimportant 1 = Of Little Important, 2 = Moderately Important, 3 = Important 4 = Very Important					Remarks/ Comments
				Not change (A)	Change to group Score (B)	Change to new score													
In identifying the risks for the development of MDR-TB among hospitalized adult patients without TB and MDR-TB, nurses should perform the following activities:																			
	Identify Vulnerable patients																		
1	Identify the patients who has previously come in contact with TB or MDR-TB patients	5.46	**5**	A	B	0	1	2	3	4	5	6	0	1	2	3	4		
2	Identify patients having the history of prior drug treatment for TB or MDR-TB	5.28	**6**	A	B	0	1	2	3	4	5	6	0	1	2	3	4		
3	Identify the vulnerable patients to develop TB, and MDR-TB such as the patients from poor socio-economic condition, homelessness, prisoners, street based sex workers, garment's workers, persons, substance abusers and garment's workers.	5.56	**4**	A	B	0	1	2	3	4	5	6	0	1	2	3	4		

APPENDIX C 4

MDR-TB PREVENTIVE PRACTICE QUESTIONNAIRE (MDR-TB PPQ)

MDR-TB Preventive Practice Questionnaires of the Nursing Practice Guidelines for Prevention of MDR-TB among Hospitalized Adult Patients without TB and MDR-TB, (Level 0).

Section 1. Demographic Data

Instruction: Please fill in the blank and put a tick mark (√) in the space ( ) that is true for you.

1	Age:	..... years	
2	Gender:	( ) Male	( ) Female
3	Types of Service:	( ) Government	( ) Project
4	Designation:	( ) Senior Staff Nurse	( ) Staff Nurse
5	Level of general education	( ) SSC	( ) HSC
		( ) BA/BSc/Equivalent	( ) Master
6	Level of professional education :	( ) Diploma Nursing	( ) BSc. Nursing /BSc. PHN
		( ) MSc Nursing/Equivalent	

7 Duration of government/project service ..... months/years

8 Duration of working experience in the non TB ward of this hospital..... months/years

9 Do you have any training on TB, MDR-TB or/and chest diseases and disorders**:** ( ) yes / ( ) no

if yes, please mention:

a) Duration of the training: ..... months/years

b) Name of the training: .....

.....

Section 2. The Preventive Practice Questionnaires

Instruction: Please rate each task by putting a tick mark (√) in the box on the basis of how frequently you perform the following task in preventing the development of MDR-TB and its risk factors. In this questionnaire, number 0 indicates that you very rarely or almost never perform the task, 1 indicates you rarely perform, 2 indicates you sometimes perform, 3 indicates you often perform, and 4 indicates you very often or almost always perform.

	Preventive Practice	0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
Case finding measures for the prevention of MDR-TB among hospitalized adult patients without TB and MDR-TB						
	Identifying vulnerable patients					
1	I identify the patients who have had contact with someone known to have TB/MDR-TB	0	1	2	3	4
2	I identify the patients who have been treated for TB/MDR-TB	0	1	2	3	4
3	I identify the patients who are socio-economically at risk for the development of TB and MDR-TB such as homelessness, prisoners, sex workers etc	0	1	2	3	4
4	I identify the patients with medical risk factors for the development MDR-TB including silicosis, HIV infection, diabetes mellitus, lung cavities etc	0	1	2	3	4
	Identifying delay in the management of TB and MDR-TB					
5	I identify the delay in the process of investigating the patient to recognize TB/MDR-TB	0	1	2	3	4
6	I identify the delay in transferring the TB and MDR-TB patients admitted in non-TB ward to the respective ward/unit/hospitals	0	1	2	3	4
	Identifying the lack of TB and MDR-TB infection control measures in hospital					
7	I find out the TB and MDR-TB patients admitted in the non-TB wards	0	1	2	3	4
8	I identify the TB/MDR-TB patients in non-TB ward who do not maintain respiratory hygiene	0	1	2	3	4
9	I find out the infectious TB and MDR-TB patients in non-TB wards who do not use mask	0	1	2	3	4
	Identifying risks induced by treatment & investigation procedures					
10	I recognize the places and rooms of risk for the non-TB patients to getting the infection of TB/MDR-TB	0	1	2	3	4

Preventive Practice Questionnaires for Level 0 (continued)

	Preventive Practice	0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
11	I find out the devices, use in the treatment & investigation purposes that can the causes of getting the infection of TB and MDR-TB	0	1	2	3	4
	Screening and monitoring the patients for MDR-TB and its risk factors					
12	I check the patients' admission tickets, files and medical records during admission to recognize the patient with TB/MDR-TB	0	1	2	3	4
13	I ask the patients during admission whether he/she has ever been treated for TB or exposed to MDR-TB	0	1	2	3	4
14	I check the patients' drugs that they have during admission	0	1	2	3	4
15	I ask every patient for the presence of symptoms of TB/MDR-TB	0	1	2	3	4
16	I perform the prescribed sputum examination and x-ray chest for suspected TB/MDR-TB patients	0	1	2	3	4
17	I monitor the patients for development of MDR-TB if they have the history of exposed to MDR-TB	0	1	2	3	4
Case holding measures for the prevention of MDR-TB among hospitalized adult patients without TB and MDR-TB						
	Maintaining the TB and MDR-TB infection control measures					
18	I take necessary measures to isolate and transfer the TB and MDR-TB patients when they are admitted to the non-TB ward	0	1	2	3	4
19	I label the patient's file and inform the all care providers in the ward when a MDR-TB patient is admitted or diagnosed to the non-TB ward	0	1	2	3	4
20	I ask the infectious TB and MDR-TB patients in the non-TB ward to always use a surgical mask	0	1	2	3	4
21	I use the separate devices such as oxygen canula/mask, micromist etc for every individual patient	0	1	2	3	4
22	I ask the patients to collect sputum specimens for testing in a separate well ventilated room/space/place out of the ward	0	1	2	3	4
	Maintaining respiratory hygiene and collecting sputum samples for investigation					
23	I ask the TB and MDR-TB patients to cover their mouth and nose with handkerchief, tissue paper, cloth or other protectors during coughing, sneezing or talking, and to wash their hands frequently	0	1	2	3	4

Preventive Practice Questionnaires for Level 0 (continued)

Preventive Practice		0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
24	I ask the TB and MDR-TB patients to collect their sputum throughout the day in a pot with lid and then dispose in a selected container/place/pan	0	1	2	3	4
25	I collect the three samples of sputum for AFB with fully completed form from the suspected TB/MDR-TB patients	0	1	2	3	4
26	I follow the sputum collection procedures and explain to the patients to follow them during sputum collection.	0	1	2	3	4
27	I explain to the patients about the test to be done and the reason for doing it	0	1	2	3	4
28	I inform the patients when to expect test the results and how the results will be conveyed	0	1	2	3	4
29	I maintain the sputum register when I send a sputum for examination	0	1	2	3	4
30	I check the sputum register to see which results are outstanding/due each day	0	1	2	3	4
31	I help the patients to collect sputum when they can not produce sputum	0	1	2	3	4
	Providing health education and support					
32	I inform the patients about the risky places for getting infection of TB/MDR-TB in hospital	0	1	2	3	4
33	I teach the TB and MDR-TB patients admitted to non-TB ward about the different aspects of their disease including diagnosis, treatment, prevention, adverse effects of anti-TB drugs etc	0	1	2	3	4

Thank you for your time and cooperation

MDR-TB Preventive Practice Questionnaires of the Nursing Practice Guidelines for Prevention of MDR-TB among Hospitalized Adult TB Patients without MDR-TB, (Level 1)

Section 1. Demographic Data

Instruction: Please fill in the blank and put a tick (√) in the space ( ) that is true for you.

1	Age:	..... years	
2	Gender:	( ) Male	( ) Female
3	Types of Service:	( ) Government	( ) Project
4	Designation:	( ) Senior Staff Nurse	( ) Staff Nurse
5	Level of general education	( ) SSC	( ) HSC
		( ) BA/BSc/Equivalent	( ) Master
6	Level of professional education :	( ) Diploma Nursing	( ) BSc. Nursing /BSc. PHN
		( ) MSc Nursing/Equivalent	

7 Duration of government/project service ..... months/years

8 Duration of working experience in the TB ward of this hospital..... months/years

9 Do you have any training on TB, MDR-TB or/and chest diseases and disorders**:** ( ) yes / ( ) no

if yes, please mention:

a) Duration of the training: ..... months/years

b) Name of the training: .....

.....

Section 2. The Preventive Practice Questionnaires

Instruction: Please rate each task by putting a tick (√) in the box on the basis of how frequently you perform the following task in preventing the development of MDR-TB and its risk factors. In this questionnaire, number 0 indicates that you very rarely or almost never perform the task, 1 indicates you rarely perform, 2 indicates you sometimes perform, 3 indicates you often perform, and 4 indicates you very often or almost always perform.

	Preventive Practice	0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
Case finding measures for the prevention of MDR-TB among hospitalized adult TB patients but without MDR-TB						
	Identifying vulnerable patients					
1	I identify the patients who have had contact with someone known to have TB/MDR-TB	0	1	2	3	4
2	I identify the patients who have been treated for TB/MDR-TB	0	1	2	3	4
3	I identify the patients who are socio-economically at risk for the development of MDR-TB such as homelessness, prisoners, sex workers etc	0	1	2	3	4
4	I identify the patients with medical risk factors for development of MDR-TB including silicosis, HIV infection, diabetes mellitus, lung cavities etc	0	1	2	3	4
	Identifying the non-compliant patients with TB and MDR-TB treatment					
5	I find out the TB patients who do not take anti-TB drugs regularly	0	1	2	3	4
6	I find out the TB patients who are not taking correct dosages of anti-TB drugs	0	1	2	3	4
	Identifying delays and mistakes in the management of TB and MDR-TB					
7	I identify the delay in doing investigations for recognition of infectious and drug resistant TB patients	0	1	2	3	4
8	I recognize the delay in transferring the MDR-TB patients to the MDR-TB ward/unit/hospital	0	1	2	3	4
9	I find out the TB patients who do not have the anti-TB drugs for next dosages or days	0	1	2	3	4
	Identifying the lack of TB and MDR-TB infection control measures in hospital					
10	I find out the infectious TB patients who do not stay in the isolated rooms/wards	0	1	2	3	4

Preventive Practice Questionnaires for Level 1 (continued)

Preventive Practice		0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
11	I find out the infectious TB and MDR-TB patients in TB wards who do not use masks	0	1	2	3	4
12	I identify the patients who do not maintain respiratory hygiene	0	1	2	3	4
13	I find out the MDR-TB patients admitted in the TB wards	0	1	2	3	4
14	I find out the patients for whom DOT (directly observed treatment) is needed	0	1	2	3	4
15	I identify the inappropriate ventilation in the TB ward	0	1	2	3	4
	Identifying risks induced by treatment & investigation procedures					
16	I identify inappropriate procedures in collecting sputum	0	1	2	3	4
17	I find out the treatment and investigation procedures, and devices that can cause transmission of TB and MDR-TB	0	1	2	3	4
18	I recognize the places and rooms of risk for the transmission of TB and MDR-TB in the hospital	0	1	2	3	4
19	I find out the TB patients who have developed side effects of anti-TB drugs	0	1	2	3	4
	Screening and monitoring the patient for TB/MDR-TB and its risk factors					
20	I check the patients' admission tickets, files and medical records during admission to recognize the patient with MDR-TB	0	1	2	3	4
21	I ask the patients whether they have ever been treated or exposed to MDR-TB	0	1	2	3	4
22	I check the patients' drugs that they have during admission	0	1	2	3	4
23	I perform the prescribed sputum smear, culture and drug susceptibility test for the suspected drug resistant or MDR-TB patients	0	1	2	3	4
24	I observe and monitor every TB patient for the development of MDR-TB	0	1	2	3	4
Case holding measures for the prevention of MDR-TB among hospitalized adult TB patients but without MDR-TB						
	Maintaining the TB and MDR-TB infection control measures					
25	I keep separate the infectious TB patients from non-infectious TB patients	0	1	2	3	4
26	I take necessary measures to isolate and transfer the MDR-TB patient when they are admitted to the TB ward or diagnosed as MDR-TB	0	1	2	3	4

Preventive Practice Questionnaires for Level 1 (continued)

	Preventive Practice	0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
27	I label the patient's file and inform all the related care providers when a MDR-TB patient is admitted to the TB ward	0	1	2	3	4
28	I ask and remind the infectious TB and MDR-TB patients to always use a surgical mask when they go out from the ward	0	1	2	3	4
29	I use separate devices such as oxygen canula/mask, micromist etc for every individual patient	0	1	2	3	4
30	I ensure the natural ventilation of the TB ward as much as possible	0	1	2	3	4
31	I ask the patients to collect sputum specimens for testing in a separate well ventilated room/space/place out of the ward	0	1	2	3	4
	Maintaining respiratory hygiene and collecting sputum samples for investigation					
32	I ask the TB and MDR-TB patients to cover their mouth and nose with handkerchief, tissue paper, cloth or other protectors during coughing, sneezing or talking, and to wash their hands frequently	0	1	2	3	4
33	I ask the TB and MDR-TB patients to collect their sputum throughout the day in a pot with a lid and then dispose in a selected container/place/pan	0	1	2	3	4
34	I follow the sputum collection procedures and explain to the patients to follow them during sputum collection	0	1	2	3	4
35	I explain to the patients about the test to be done and the reason for doing it	0	1	2	3	4
36	I inform the physician while the patient is evaluated for AFB positive or resistant to anti-TB drugs	0	1	2	3	4
37	I inform the patients when to expect test results and how the results will be conveyed	0	1	2	3	4
38	I maintain the sputum register when I send a sputum for examination	0	1	2	3	4
39	I check the sputum register to see which results are outstanding/due each day	0	1	2	3	4
40	I help the patients to collect sputum when they can not produce sputum	0	1	2	3	4

Preventive Practice Questionnaires for Level 1 (continued)

Preventive Practice		0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
	Ensuring the administration of anti-TB drugs					
41	I ensure the correct dosages of drugs during distributing the drugs and medicating the patients	0	1	2	3	4
42	I consult with physician if the patients are starting TB treatment with inappropriate dosages of anti-TB drugs	0	1	2	3	4
43	I ask and remind the patients to take their anti-TB drugs regularly	0	1	2	3	4
44	I do DOT for the patients who are not reliable for self administration of drugs	0	1	2	3	4
45	I check the patients' drugs to ensure that the patients have enough anti-TB drugs in hand for their next dosage	0	1	2	3	4
	Management of the side effects of anti-TB drugs					
46	I ask and observe the TB patients to assess their drug reactions	0	1	2	3	4
47	I take note of sides effect of anti-TB drugs and report to the physician	0	1	2	3	4
	Providing health education and support					
48	I respect and greet the TB patients	0	1	2	3	4
49	I inform the patients about the risky places for getting infection of MDR-TB in hospital	0	1	2	3	4
50	I teach the TB and MDR-TB patients admitted to TB ward about the different aspects of their disease including diagnosis, treatment, prevention, adverse effects of anti-TB drugs etc	0	1	2	3	4
51	I arrange or help to arrange the routine health education session for TB	0	1	2	3	4

Thank you for your time and cooperation

MDR-TB Preventive Practice Questionnaires of the Nursing Practice Guidelines for Prevention of Transmission of MDR-TB in Hospitalized Adult Patients, (Level 2)

Section 1. Demographic Data

Instruction: Please fill in the blank and put a tick mark (√) in the space ( ) that is true for you.

1	Age:	..... years	
2	Gender:	( ) Male	( ) Female
3	Types of Service:	( ) Government	( ) Project
4	Designation:	( ) Senior Staff Nurse	( ) Staff Nurse
5	Level of general education	( ) SSC	( ) HSC
		( ) BA/BSc/Equivalent	( ) Master
6	Level of professional education :	( ) Diploma Nursing	( ) BSc. Nursing /BSc. PHN
		( ) MSc Nursing/Equivalent	

7 Duration of government/project service ..... months/years

8 Duration of working experience in the MDR-TB ward of this hospital..... months/years

9 Do you have any training on TB, MDR-TB or/and chest diseases and disorders**:** ( ) yes / ( ) no

if yes, please mention:

a) Duration of the training: ..... months/years

b) Name of the training: .....

.....

Section 2. The Preventive Practice Questionnaires

Instruction: Please rate each task by putting a tick mark (√) in the box on the basis of how frequently you performed the task in preventing MDR-TB transmission in hospitalized adult patients. In this questionnaire, number 0 indicates that you very rarely or almost never perform the task, 1 indicates you rarely perform, 2 indicates you sometimes perform, 3 indicates you often perform, and 4 indicates you very often or almost always perform.

	Preventive Practice	0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
Case finding measures for the prevention of MDR-TB transmission in hospitalized adult patients						
	Identifying the non-compliant patients with MDR-TB treatment					
1	I find out the MDR-TB patients who do not take anti-TB drugs regularly	0	1	2	3	4
2	I identify the patients who are not taking correct dosages of anti-TB drugs	0	1	2	3	4
3	I find out the patients who do not collect and/or do not have anti-TB drugs for next day	0	1	2	3	4
	Identifying the lack of TB and MDR-TB infection control measures in hospital					
4	I identify the patients who are absent or do not regularly stay in the ward/hospital	0	1	2	3	4
5	I recognize the infectious MDR-TB patients who do not use masks when they go out from the isolated rooms/wards/units/hospitals	0	1	2	3	4
6	I identify the patients who do not maintain respiratory hygiene	0	1	2	3	4
7	I identify the non-TB and TB patients who are admitted in MDR-TB ward	0	1	2	3	4
8	I find out the patients for whom directly observed treatment (DOT) is needed	0	1	2	3	4
9	I find out the lacking in appropriate ventilation of the MDR-TB ward.	0	1	2	3	4
10	I find out the non-cooperative or unmotivated MDR-TB patients	0	1	2	3	4
	Identify risks induced by treatment & investigation procedures					
11	I identify inappropriate procedures in collecting sputum	0	1	2	3	4

Preventive Practice Questionnaires for Level 2 (continued)

Preventive Practice		0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
12	I find out the treatment and investigation procedures, and devices that can cause transmission of MDR-TB	0	1	2	3	4
13	I recognize the places and rooms of risk for the transmission of TB and MDR-TB in the hospital	0	1	2	3	4
14	I find out the TB patients who have developed side effects of anti-TB drugs	0	1	2	3	4
	Screening and monitoring the patient for TB and MDR-TB and its risk factors					
15	I check thoroughly the admission ticket file and other documents/medical records during admission or transfer in the patients in the MDR-TB ward	0	1	2	3	4
16	I assess the sputum conversion of MDR-TB patients by testing the sputum for AFB and culture monthly	0	1	2	3	4
Case holding measures for the prevention of MDR-TB transmission in hospitalized adult patients						
	Maintaining TB and MDR-TB infection control measures					
17	I strictly maintain isolation for MDR-TB patients	0	1	2	3	4
18	I keep the infectious and non- infectious MDR-TB patients in the separate rooms or places	0	1	2	3	4
19	I send the patients at the scheduled times for investigation or treatment proposes when waiting areas are less crowded	0	1	2	3	4
20	I ensure the use of surgical mask for MDR-TB patients when they come in contact with others	0	1	2	3	4
21	I use the separate devices such as oxygen canula/mask, micromist etc for every individual patient	0	1	2	3	4
22	I ensure the natural ventilation of the ward as much as possible	0	1	2	3	4
23	I ask the patients to collect sputum specimens for testing in a separate well ventilated room/space/place out of the ward	0	1	2	3	4
	Maintaining respiratory hygiene and collecting sputum sample for investigation					
24	I ask the TB/MDR-TB patients to cover their mouth and nose with handkerchief, tissue paper, cloth or other protector during coughing, sneezing or talking, and to wash their hands frequently	0	1	2	3	4
25	I ask the patients to collect the sputum throughout the day in a pot with lid and then dispose in a selected container/place/pan	0	1	2	3	4

Preventive Practice Questionnaires for Level 2 (continued)

	Preventive Practice	0 = Very rarely/almost never perform 1 = Rarely perform, 2 = Sometimes perform, 3 = Often perform, 4 = Very often/almost always perform				
26	I follow the sputum collection procedures and explain to the patients to follow them during sputum collection	0	1	2	3	4
27	I maintain the sputum register when I send sputum for examination	0	1	2	3	4
28	I check the sputum register to see which results are outstanding/due each day	0	1	2	3	4
29	I explain to the patients about the test to be done and the reason for doing it	0	1	2	3	4
30	I inform the patients when to expect test results and how the results will be conveyed	0	1	2	3	4
31	I help the patients to collect sputum when they can not produce sputum	0	1	2	3	4
	Ensuring the administration of anti-TB drugs					
32	I ensure the correct dosages of drug during distributing the drugs and medicating the patients	0	1	2	3	4
33	I consult with physician if patients are starting TB treatment with inappropriate anti-TB drugs	0	1	2	3	4
34	I ask and remind the patients to take their anti-TB drugs. regularly	0	1	2	3	4
	Management of the side effects of anti-TB drugs					
35	I ask and observe the TB patients to assess their drug reactions	0	1	2	3	4
36	I take note of side effect of anti-TB drugs and report to the physician	0	1	2	3	4
	Providing health education and support					
37	I respect and greet the MDR-TB patients	0	1	2	3	4
38	I provide emotional support to the MDR-TB patients.	0	1	2	3	4
39	I inform the patients about the risky places for transmission of MDR-TB to others	0	1	2	3	4
40	I teach the TB and MDR-TB patients admitted to MDR-TB ward about the different aspects of their disease including diagnosis, treatment, prevention, adverse effects of anti-TB drugs etc	0	1	2	3	4
41	I arrange or help to arrange the routine health education session for TB	0	1	2	3	4

Thank you for your time and cooperation

APPENDIX D

(TABLES)

APPENDIX D 1

EVIDENCE FROM LITERATURE REVIEW FOR THE DEVELOPMENT OF THE NPG: MDR-TB

Table 9
Evidence on Risk Identification for Prevention of MDR-TB and its Risk Factors in Hospital

	Evidence	Sources and levels of evidence
Treatment and investigation induced risk factors (6)		
1	Emergency department of hospital has a high risk for transmission of TB.	(Jiamjarasrangsi, Urith, & Srisintorn, 2006). – III
2	Treatment and procedure rooms in which the patients with TB and MDR-TB, undiagnosed pulmonary diseases or/and non-TB stay together are at the high risk for active diseases.	(CDC, 1994) - III
3	Respiratory wards, clinics, laboratories, bronchoscopy theatres, intensive care units, emergency departments, in-patient and out-patient settings where persons with TB or HIV infection are cared for or investigated are needed to be considered as the high risk places for transmission of TB.	(Department of Human Services, 2002) – III (WHO, 1999) – III
4	Patients did not remain under directly observed treatment was more likely to develop multi-drug resistant tuberculosis.	(Amin et al., 2009) -II
5	Patients failure to self-administer therapy were more likely to develop multi-drug resistant tuberculosis.	(Gelmanova et al., 2007). – II
6	Diagnostic or treatment procedures that stimulate coughing, such as bronchoscopy, endotracheal intubation and suctioning, sputum induction, and aerosol treatments that induce coughing significantly increase the risk of transmission from infected patients to others.	(CDC, 1994) – III
Patients vulnerable for development of MDR-TB and its risk factors (17)		
1	Sputum-smear positive status of the patients was found to strongly correlate with early acquisition of MDR-TB.	(Baghaei et al., 2009)- II (Gelmanova et al., 2007). – II
2	Patient's status as an immigrant or a refugee is an important risk factor for both MDR-TB and non-MDR-TB.	(Baghaei et al., 2009)- II
3	Patients with psychological disorder are associated with resistance to either isoniazid and rifampicin or resistance to isoniazid, ethambutol, and streptomycin.	(Kimerling et al., 2003) – III
4	Patients having pulmonary cavities are risk of development of MDR-TB.	(Choi et al., 2007) – III (Barroso et al., 2003) – II
5	Imprisonment is associated with the development of drug resistance and MDR-TB.	(Ruddy et al., 2005) – III
6	Patient with prior treatment of TB is the highest risk factor for the presence of MDR-TB.	(Faustini et al., 2006) - I
7	Patients began treatment in the hospital setting or who were hospitalized later during their treatment course are at a higher risk of developing multidrug-resistant TB.	(Gelmanova et al., 2007) - II
8	MDR-TB significantly correlated with bilateral and cavitary TB.	(Barroso et al., 2003)- II
9	The patients showing delayed sputum conversion is the best predictor of multidrug-resistant tuberculosis.	(Amin et al., 2009) -II

Table 9 (continued)

	Evidence	Sources and levels of evidence
10	The history of contact with known cases of Drug Resistant/MDR-TB patients is one of the susceptive risk factors for occurrence of MDR-TB.	(Prasad, 2007) - III
11	Hepatic cirrhosis was also an independent risk factor in the presence of resistance to anti-tuberculosis drugs.	(Arevalo, Solera, Cebrian, Bartolome, & Robles, 1996) - III
12	Patients in younger age groups are considered at risk for drug-resistant tuberculosis.	(Arevalo et al., 1996) - III (Faustini et al., 2006) - I
13	Patients with a history of substance abuse including use of alcohol, smoking, and injectable drugs are risk factors for MDR-TB.	(Mdivani et al., 2008) III (Barroso et al., 2003) - II
14	Patient's status as foreign born is an important risk factor for both MDR and non-MDR TB.	(Faustini et al., 2006) - I
15	Health-care providers should identify the patients with medical risk factors for TB. These are HIV infection, diabetes mellitus, conditions requiring prolonged high-dose corticosteroid, therapy and other immu-nosuppressive therapy, chronic renal failure, some hematologic disorders (e.g., leukemias and lymphomas), other specific malignancies (e.g., carcinoma of the head or neck), weight of =10% below ideal body weight, silicosis, gastrectomy, and jejunoileal bypass.	(CDC, 1995) - III (Nair, 2002)- III
16	The population risk groups are at increased risk of becoming infected with TB including recent immigrants from certain countries, medically underserved populations such as minority groups, alcoholics, injecting-drug users, the elderly, persons with immune system disorders or those receiving immunosuppressive therapy, congregate housing such as homeless shelters and correctional facilities, low income, underlying medical condition, and aboriginal background or occupation in health.	(CDC, 1995) - III (Department of Human Services, 2002) – III (Toth et al., 2004) III (WHO, 2003) – III (Cogliano, 1995) III
17	The socio-economic factors such as: occupation, residential status, and lack of home-dwelling sewer system are found to be the risk factors for the development of MDR-TB.	(Barroso et al., 2003) - II (Amin et al., 2009)- II
Non-compliance with TB treatment in patients (3)		
1	TB treatment default is associated with development of MDR-B.	(Kimerling et al., 2003) - III
2	Interruption in intake of anti-TB drugs is a significant risk for development of drug resistant TB.	(Toungoussova et al., 2002) – III
3	Irregular treatment is a significant risk factor for the development of MDR-TB.	(Barroso et al., 2003) - II (Amin et al., 2009)- II
Delays in the management of TB and MDR-TB (5)		
1	Delayed recognition of drug resistance TB and MDR-TB.	(Wenger et al., 1995)– III (Cookson & Jarvis, 1997)
2	Delays in the diagnosis of tuberculosis.	(Field & Vezean, 1998) – III (Wenger et al., 1995) – III
3	Delay in initiation of treatment of TB and MDR-TB.	(CDC, 1994) – III (Field & Vezean, 1998) - III
4	Delay in the patients' isolation.	(Cookson & Jarvis, 1997) - III
5	Delayed communication of results.	(Cookson & Jarvis, 1997)
Mistakes in the management of TB and MDR-TB (5)		
1	Failure to obtain drug sensitivity testing when ordering cultures.	(Field & Vezean, 1998) – III
2	Inappropriate initial drug treatment.	(Field & Vezean, 1998) – III
3	Failure to modify the treatment regimen when result of the sensitivity report indicates resistance pattern.	(Field & Vezean, 1998) – III
4	Failure to identify and remedy patient non adherence by proving DOT.	(Field & Vezean, 1998) – III
5	Inadequacy of TB treatment is a significant risk for the development of MDR-TB.	(Amin et al., 2009) – II

Table 9 (continued)

	Evidence	Sources and levels of evidence
Lack of TB and MDR-TB infection control measures in hospital (6)		
1	Inadequate isolation of TB and MDR-TB patients: positive pressure, air recirculation, door left open.	(Cookson & Jarvis, 1997) – III
2	Inadequate infection control practices.	(Field & Vezean, 1998) – III
3	Inadequate ventilation in TB isolation rooms.	(CDC, 1994) – III
4	Lack of adequate respiratory protection.	(CDC, 1994). – III
5	Inadequate precautions during aerosol generating procedures.	(CDC, 1994). – III (Cookson & Jarvis, 1997) – III
6	Inadequate isolation facilities.	(Wenger et al., 1995) – III

Table 10
Evidence on Risk Assessment for Prevention of MDR-TB and its Risk Factors in Hospital

	Evidence	Sources and levels of evidence
Screening the patients for MDR-TB and its risk factors (9)		
1	Ask the patients whether he/she has ever been tested for TB.	(Field & Vezean, 1998) – III (Nair, 2002) – III
2	Collect data from medical notes and communicating with and observing the patients.	(ICN, 2008) – III
3	Take a full medical history including duration of symptoms, other medical conditions, previous health-seeking behavior and outcome thereof, previous treatment for or exposure to TB or MDR-TB.	(ICN, 2008) – III
4	The nurses must listen to the patient and assess what is important to patients.	(ICN, 2008) – III
5	All nurses should know the signs and symptoms of TB disease.	(Toth et al., 2004) – III (ICN, 2008)
6	Nurses should be familiar with the risk factors for TB infection.	(Toth et al., 2004) – III
7	Nurses should be familiar with the risk settings.	(Toth et al., 2004) - III
8	Nurses need to check the physical status of the patients with TB in the hospital and assess whether they are still adhering to the treatment	(Widjanarko, Gompelman, Dijkers, & van der Werf, 2009) – III
9	Nurses need to review the admission data base in their facilities that help to ensure that information regarding history and/or exposure of TB or being at-risk to TB is obtained.	(Cogliano, 1995) – III
Monitoring the patients for MDR-TB and its risk factors (10)		
1	Suspect TB-responsive or resistant if the patient or any family members or friends have been exposed to the disease or have spent time recently in a hospital, or homeless shelter and/or with infected persons.	(Casey, 1993) – III
2	Suspect the patients for TB and MDR-TB if your patient responds positively when you ask about a cough, fever, weight loss, night sweats, and fatigue.	(Casey, 1993) – III
3	Suspect the patients for TB/MDR-TB, if he/she has a history of blood in the sputum, chills, dyspnea, and chest pain.	(Casey, 1993) – III

Table 10 (continued)

	Evidence	Sources and levels of evidence
4	TB patients admitted in a hospital (particularly where care is provided for HIV or other inmmunocompromised patients) should be considered infectious and stay in a negative-pressure room until: the patients had at least 2 weeks of appropriate multiple drug therapy, the patient has had at least three negative microscopic smears on separate occasions over a 14-day period, the patient is showing tolerance to the prescribed treatment and an ability agreement to adhere to treatment, and either any cough has resolved completely, or there is definite clinical improvement on treatment, for example remaining febrile for a week .	(National Institute for Health and Clinical Excellence, 2006) – III
5	Hospitalized TB patients should be monitored for relapse by having sputum AFB smears examined regularly (eg every two weeks).	(CDC, 1994). – III
6	Nurses are responsible to follow the monthly smear and culture data for each MDR-TB patient and inform the physician.	(Palacios et al., 2003). – III
7	Nurses should check the weights of patients at specified intervals and alert the clinicians whenever a patient has lost weight or failed to gain.	(Palacios et al., 2003) – III
8	Assess the patient physically to ensure adequate progress has been made.	(ICN, 2008). – III
9	Patients with TB should be monitored regularly to ensure that: no interruptions occur in treatment, serious side-effects from the treatment are quickly identified, and there is improvement in the patient's condition, although this is often very gradual.	(Bell, 2004) – III
10	Nurses need to maintain vigilance for monitoring laboratory culture reports on the patients/clients.	(Cogliano, 1995) – III
Investigating the patients for TB, and MDR-TB (10)		
1	Nurses usually carrying out the routine investigation of TB patients.	(Singla et al., 1998) – III
2	Nurses need to advocate for the prompt diagnosis for suspected and confirmed TB patients.	(Toth et al., 2004) – III
3	To rule out TB, nurses should collect sputum specimens for AFB and culture and sensitivity, obtain orders for chest X-ray, and administer the PPD test, interpreting skin response at 48 to 72 hours.	(Field & Vezean, 1998). – III
4	Health care providers, including nurses, clinicians, pharmacists and others should be educated about the use and interpretation of diagnostic for TB infection and disease.	(American Thoracic Society et al., 2005)
5	Promptly and accurately documents the dates that test are ordered and the result.	(ICN, 2008). – III
6	If the test result is confusing, takes another specimen to check the laboratory result.	(ICN, 2008) – III
7	Every patient admitted in the trauma ward should be assessed for TB.	(Jiamjarasrangsi et al., 2006). – III
8	All patients with productive cough should be evaluated for TB infection.	(Field & Vezean, 1998). – III
9	All patients with TB should have risk assessments for drug resistance.	(National Institute for Health and Clinical Excellence, 2006) – III
10	Every patient who has coughed for 3 weeks or more with or without other symptoms should have 3 sputum samples examined for AFB.	(Central TB Division, 2000) – III

Table11

Evidence on Risk Treatment for Prevention of MDR-TB and its Risk Factors in Hospital.

	Evidence	Sources and levels of evidence
Maintaining TB and MDR-TB infection control measure in hospital (25)		
1	If admitted to units/wards, patient with suspected or known TB or MDR-TB should be given a negative pressure room.	(CDC, 1994) - III (National Institute for Health and Clinical Excellence, 2006) – III
2	Implementing control measures: 1) prompt isolation and treatment of patients with tuberculosis; 2) rapid diagnostic techniques for processing Mycobacterium tuberculosis specimens; 3) negative-pressure isolation rooms; and 4) molded surgical masks for health care workers can reduce nosocomial transmission of MDR-TB strains to patients and health care workers.	(Maloney et al., 1995) - II
3	Patients placed in isolation should remain in their isolation rooms with the door closed. If possible, diagnostic and treatment procedures should be performed in the isolation rooms to avoid transporting patients through other areas of the facility.	(CDC, 1994) – III
4	Patients suspected of having MDR-TB should be placed in a separate area or building in the facility, preferably in well-ventilated individual patient rooms where the possibility of contact with other patients who do not have TB or do not have MDR-TB is minimal.	(WHO, 1999)
5	Two patients be nursed in a same room if both patients have culture-confirmed TB with drug susceptibility patterns known to be identical, and if both patients are HIV negative	(Department of Human Services, 2002) – III
6	If only one ward is available, a separate area within the ward can be established for patients with TB preferably in a better ventilated portion of the ward.	(WHO, 1999). – III
7	Nurses must arrange for the transfer the patients with active TB to an AFB isolation room as soon as possible after admission to the inpatient facility.	(Grimes & Grimes, 1995) – III
8	Smear positive TB patients without risk factors for MDR TB should be cared for in a single room, until: they have completed two weeks of the standard treatment regimen or discharged from hospital.	(National Institute for Health and Clinical Excellence, 2006) – III
9	The healthcare worker should wear N95 protector when present in infectious patients' rooms, and during performing cough inducing procedures and transporting the patients with suspected or confirmed infectious TB disease.	(CDC, 2005) - III
10	Nurses should consult with the patient's physician about AFB isolation while the patient is being evaluated for active TB.	(Grimes & Grimes, 1995). - III
11	If the physician does not order isolation, the nurse should consult the policymakers of hospital including nursing and hospital administrator.	(Grimes & Grimes, 1995). - III
12	Keep the door shut of isolation room and isolation signs posted at all the time.	(Casey, 1993)– III
13	Suspected of having pulmonary TB patients must remain in their rooms with the door closed.	(Bell, 2004)- III
14	Healthcare providers caring for patient with TB should not use masks, gowns or barrier nursing techniques unless: MDR-TB suspected, and aerosol-generating procedures are being performed	(National Institute for Health and Clinical Excellence, 2006) – III
15	Inpatients with smear-positive respiratory TB should be asked to wear a mask (surgical mask) whenever they leave their room for investigation.	(Ministry of Health, 2002) – III (CDC, 1994) – III

Table11 (continued)

	Evidence	Sources and levels of evidence
16	Universal precautions are important to protect continuous transmission of TB from body substances containing M. tuberculosis.	(Ministry of Health, 2002) – III
17	Nurses need to institute recommended infection control measures and practices according to the policies and procedures governing their professional setting.	(Toth et al., 2004) - III
18	Medically essential procedures that can not be performed in the isolation rooms for infectious patients, should be scheduled at times when they can be performed rapidly and when waiting areas are less crowded	(CDC, 1994). – III
19	The patients' visitors should be advised to wear respirator while in the isolation room.	(CDC, 1994) – III (National Institute for Health and Clinical Excellence, 2006) – III
20	Instruments, such as bronchoscopes and nebulizers, when used for patients with TB should be cleaned and sterilized.	(Ministry of Health, 2002) – III
21	Aerosol-generating procedures such as bronchoscopy, nebulizer, and sputum induction on patients with TB should be carried out in respiratory isolation conditions.	(Ministry of Health, 2002) – III (CDC, 1994)
22	The number of persons entering an isolation room should be minimal.	(CDC, 1994) – III
23	Patients should wear surgical masks and should stay in the radiology suite the minimum amount of time possible, then be returned promptly to their isolation rooms.	(CDC, 1994) – III
24	Continued isolation throughout the hospitalization should be strongly considered for patients who have MDR-TB.	(CDC, 1994) – III
25	Remind the patient to cover his/her mouth when coughing or sneezing, to use disposable tissues, not handkerchiefs, and wash hands frequently.	(Casey, 1993)– III
Proving health education and support the patients (8)		
1	Educating staff about signs and symptoms of TB/MDR-TB so that they will suspect and promptly identify infectious TB patients.	(Cookson & Jarvis, 1997). – III
2	Health education of patients should cover the mode of transmission of TB infection, natural history of TB infection, clinical and epidemiological features of TB disease, importance of prompt identification and isolation of persons suspected or known to have infectious TB, engineering and personal protective strategies available to prevent nosocomial transmission of TB, role of tuberculin skin testing of staff, procedures for contact tracing, referral, treatment and counseling of health care workers infected with TB during their employment, and institution's policies and procedures for TB management, prevention and control.	(Department of Human Services, 2002) – III
3	Nurses are responsible to teach the patients about isolation procedures; particularly how and when to wear the mask.	(Grimes & Grimes, 1995) – III
4	Nurses should teach suspected and confirmed TB patients about the preventive measures of TB including covering the mouth with hand when coughing, and using sputum pots with lids.	(Puri & John, 1997) – III
5	Nurses are responsible person for educating patients, their families, and health care providers about TB, MDR-TB, the medications used to treat TB, and their potential averse effects, and ways to decrease the risk of infections of family members.	(Palacios et al., 2003). – III
6	Nurses teach the patients how to spit and destroy sputum.	(Kellner, 1999) – III
7	Treat the patient with respect and establishes a rapport.	(ICN, 2008) - III

Table11 (continued)

	Evidence	Sources and levels of evidence
8	Nurses provide emotional support to the MDR-TB patients and their family.	(Chalco et al., 2006) – III
Ensuring administration of anti-TB drugs (12)		
1	Nurses should ensure the correct medication for TB patients.	(Bell, 2004) – III (WHO, 2009) – III
2	Nurses should support the patients and their relatives or carriers to prevent lapses in treatment.	(Bell, 2004) – III
3	All sputum smear positive TB patients receive DOT during the initial, intensive phase of their treatment to improve treatment success and reduce the risk of disease transmission, treatment failure, relapse and drug resistance. Where possible, DOT should be continued throughout the entire course of therapy, especially in the case of MDR-TB.	(ICN, 2008) – III
4	In the care of MDR-TB, nurses need to ensure that physicians' orders are carried out.	(Shin et al., 2004) – III
5	DOT has a significant effect on improvement of treatment outcomes and other additional benefits.	(Wright et al., 2004) – I (Kamolratanakul, Sawert, Lertmaharit, et al., 1999) - I
6	Nurses are responsible to obtain necessary medicine from the pharmacy.	(Palacios et al., 2003) – III
7	People with TB who should always be on DOT include all cases on intermittent regimens, cases resistant to rifampicin, multi-drug-resistant cases (resistant to isoniazid and rifampicin), relapses/reactivations, cases that clearly demonstrate an inability or unwillingness to self-medicate, cases that have been placed under closer supervision and who then fail to improve their commitment to treatment.	(Ministry of Health, 2002) – III
8	People with TB should be considered for DOT when there is: extensive disease and/or a high degree of infectiousness, weak or absent social support, a complex treatment regimen, serious multiple drug-resistances, or where side-effects necessitate the use of two or more second-line drugs.	(Ministry of Health, 2002) – III
9	Nurses providing TB care should receive regular updates about TB drugs.	(Zvavamwa & Ehlers, 2008)
10	Nurses should be knowledgeable about TB and its treatment and adverse effects.	(ICN, 2008)
11	Nurses can help to manage side-effects or drug formulations**.**	(Bell, 2004) – III
12	Nurses are primarily responsible for ensuring DOTS.	(Shin et al., 2004) – III
Maintaining records (5)		
1	Record on the treatment card each time the patient takes the drugs.	(WHO, 2009) – III
2	Nurses record the daily regimen in the treatment history.	(Palacios et al., 2003) – III
3	Nurses working in TB clinic should maintain meticulous records.	(Zvavamwa & Ehlers, 2008) – III
4	Nurses should record the patient's progress promptly, clearly and accurately and any changes or problems should be referred as appropriately.	(ICN, 2008) – III
5	Nurses should document the test result.	(ICN, 2008). – III
Collection of sputum specimen for investigation (11)		
1	Explain the patients about test to be done and the reason for doing them e.g., sputum testing, and x-ray, if available.	(ICN, 2008) – III (Williams et al., 2007) – III

Table11 (continued)

	Evidence	Sources and levels of evidence
2	Inform the patient about when to expect test results and how the results will be conveyed.	(ICN, 2008). – III (Williams et al., 2007) – III
3	Collect the three sputum specimens with fully completed form as follows: an initial 'spot' specimen taken at the first time or first day, an early morning specimen, the next day if possible, and another 'spot' specimen when the second sample (early morning sample)is collected from the patient.	(ICN, 2008) – III (Puri & John, 1997) – III
4	Clearly label the container first with ward number, bed number and patient's name.	(ICN, 2008). – III
5	Maintain appropriate method in collecting sputum sample. - explain the reason for collecting specimen. - explain the steps fully in language that the patient understands - allow the patient to rinse his/her mouth with water, especially after eating. - give the labeled container to the patient. - ask the patient to carefully direct the sputum into the container, and not to contaminate the outside of it, which puts others at risk - demonstrate a deep cough from the bottom of the chest, beginning with deep breathing. - supervise the collection, but without standing in front of the person attempting to produce the sputum. - Close the lid of the container carefully and tightly. - Check the specimen with the patient present to ensure that it is sputum not just saliva. If it is insufficient , ask the patient for another specimen - wash the hands with soap and water.	(ICN, 2008). – III (WHO, 2009) – III
6	If it takes time to send the sputum in the laboratory, store the specimen in a cool place or refrigerator, but do not keep the sputum in freezer.	(ICN, 2008). – III
7	Collect the report of the sputum. Ensure that responsible person checks the sputum registered to see which results are outstanding each day and contact the laboratory to get results of any outstanding specimens.	(ICN, 2008) – III
8	If special facility is not available, sputum collection always should be done outside (open environment) and away from others, not in small rooms such as toilets or other enclosed areas.	(WHO, 1999) – III (WHO, 2003) – III
9	If the patients cannot cough up sputum on his or her own, necessary techniques could be used to obtain sputum.	(Nair, 2002)– III
10	Send the specimen to the laboratory as soon as possible after collection.	(ICN, 2008) – III
11	Ensure that specimens are protected from exposure to direct sunlight during transportation.	(ICN, 2008) – III

APPENDIX D 2

STRUCTURE OF THE NPG: MDR-TB

Table 12

The Structure of the NPG: MDR-TB V_1, V_2, and V_3

Category/Subcategory		Number of recommendation								
		NPG: MDR-TB V_1 (n = 227)			NPG: MDR-TB V_2 (n = 232)			NPG: MDR-TB V_3 (n = 189)		
		L 0	L 1	L 2	L 0	L 1	L 2	L 0	L 1	L 2
Risk identification										
1.	Identify vulnerable patients.	4	4	-	4	4	-	4	4	-
2.	Identify non-compliance to anti-TB treatment.	-	3	3	-	3	3	-	3	3
3.	Identify mistakes in administration of anti-TB drugs.	-	7	4	-	7	4	-	5	4
4.	Identify delays in the management of TB and MDR-TB patients in hospital.	3	5	2	3	4	2	2	3	2
5.	Identify the lacks of TB and MDR-TB infection control measures in hospital.	5	10	10	5	10	10	4	9	9
6.	Identify risks induced by treatment & investigation procedures.	3	5	5	3	5	5	3	5	5
Risk assessment										
1.	Screening the patient for MDR-TB and its risk factors during admission.	4	4	2	4	4	2	3	3	2
2.	Assess the patient for non-compliance with TB treatment.	-	3	3	-	3	3	-	2	2
3.	Monitoring & preventing TB and MDR-TB transmission in hospital.	6	4	1	6	4	1	4	3	1
4.	Assess the side effects of anti-TB drugs.	-	3	2	-	3	2	-	2	2
5.	Investigate the patients for MDR-TB and its risk factors.	3	3	2	2	3	2	2	3	2
Risk treatment										
1.	Maintain infection control measures.	10	12	11	10	12	12	9	10	11
2.	Maintain respiratory hygiene/cough etiquette.	3	3	3	3	3	3	3	3	3
3.	Provide health education and support.	5	5	4	5	5	4	4	5	5
4.	Sputum Collection and investigation.	9	10	9	11	12	11	9	9	9
5.	Ensure the administration of anti-TB drugs.	-	13	9	-	13	9	-	10	8
6.	Management of drug side effects.	-	5	3	-	5	3	-	2	2
	Total	55	99	73	56	100	76	47	81	70

APPENDIX D 3

PARTICIPANTS' CHARACTERISTICS OF SEMI-STRUCTURED INTERVIEW

Table 13

Demographic Characteristics of the Participants of Semi-structured Interview

Characteristics	Number (n=11)	Percentage (%)
Gender		
Male	6	54.5
Female	5	45.5
Age (years)		
30-34	1	9.1
35-39	4	36.4
40-44	3	27.3
45-49	3	27.3
Min.= 33, Max. = 48, X = 40.64, SD = 5.70		
Working experiences in the TB/MDR-TB hospital		
< 5	4	36.4
5-9	3	27.3
10-14	1	9.1
≥15	3	27.3
Min.= 3, Max. = 24, $\overline{X}$ = 9.64, SD = 7.7		
Level of professional education		
Diploma	2	18.2
Graduate	3	27.3
Post Graduate	6	54.5
Official position		
Senior Staff Nurse	5	45.5
Nursing Incharge	2	18.2
Nursing Supervisor	1	9.1
Respiratory Physician	3	27.3

APPENDIX D 4

PARTICIPANTS' CHARACTERISTICS OF DELPHI PROCESS

Table 14
Demographic Characteristics of the Experts of Delphi Process

Characteristics	Number (n=25)	Percentage (%)
Age (years)		
31-39	7	28
40-49	11	44
50-56	7	28
Min. = 31, Max. = 56, X = 44.6 , SD = 7.16		
Sex		
Male	11	44
Female	14	56
Level of professional education		
Graduate	7	28
Post Graduate	17	68
PhD	1	4
Working position		
Senior Staff Nurse	11	44
Nursing Administrator	3	12
Nursing Educator	3	12
TB/MDR-TB Physician	4	16
Director (Ex) of NTP	1	4
DOTS-Plus Coordinator	2	8
Laboratory Specialist	1	4
Working/ teaching experiences on TB/MDR-TB		
< 5	6	24
5-9	3	12
10-14	6	24
≥15	10	40
Min. = 3, Max. = 28, $\overline{X}$ = 12.32, SD = 7.40		

APPENDIX D 5

PARTICIPANTS' CHARACTERISTICS OF THE GUIDELINES EVELUATION

Table 15

Demographic Characteristics of the Nurses in Implementation of the NPG: MDR-TB by levels (Level 0, N = 20; Level 1, N = 23; Level 2, N = 21)

Characteristics	Level 0		Level 1		Level 2	
Demographic data in nominal level	Frequency	%	Frequency	%	Frequency	%
Gender						
Male	4	20	2	8.7	2	9.5
Female	16	80	21	91.3	19	90.5
Professional Education						
Diploma	16	80	13	56.5	14	66.6
Bachelor	3	15	8	34.8	6	28.5
Master	1	5	2	8.7	1	4.7
Type of Service						
Government	18	90	21	91.3	21	100
Project	2	10	2	8.7	-	-
Training						
1-3 days TB, DOTS or DRS Training	3	15	8	34.8	1	4.8
1 week TB training	-	-	-	-	2	9.5
1 year Diploma on Chest Diseases	1	5	2	8.7	-	-
No Training	16	80	13	56.5	18	85.7
Demographic data in interval level	Mean Min-Max	SD	Mean Min-Max	SD	Mean Min-Max	SD
Age (in years)	40.45 (31-54)	6.13	43.48 (30-50)	5.17	40.05 (33-50)	4.52
Length of Service (in years)	15.10 (7-30)	6.88	19.35 (1-28)	7.53	13.88 (1-28)	6.74
Working experience in the respective level (in years)	7.35 (1-23)	6.90	5.39 (.50-15)	4.70	3.43 (.50-12)	3.10

APPENDIX D 6

RESULTS OF TWO-ROUND DELPHI

Table 16

List of Statements, and Results of Two-Round Delphi on Content Validation of the NPG: MDR-TB in the Risk Identification Category of Level 0.

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Identify vulnerable patients.														
1 Identify the patient who has previously come in contact with TB or MDR-TB patients.	24	5.46 (1.03)	6 (1)	23 (95.83)	Retained	24	5.62 (0.56)	6 (1)	24 (100)	23	3.22 (0.80)	3 (1)	18 (78.26)	Retained
2 Identify the patients having history of prior drug treatment for TB or MDR-TB.	25	5.28 (1.67)	6 (1)	23 (92)	Retained	24	5.51 (1.24)	6 (0.72)	23 (95.83)	23	3.61 (0.50)	4 (1)	23 (100)	Retained
3 Identify the vulnerable patients to develop TB, MDR-TB such as the patients from poor socio-economic conditions, homelessness, prisoners, substance abusers, and garment's workers.	25	5.56 (0.92)	6 (0.5)	23 (92)	Revised	24	5.40 (1.38)	6 (0.86)	22 (91.67)	23	3.57 (0.73)	4 (1)	20 (86.96)	Revised

Table 16 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
4 Identify the patients with medical risk factors known to develop TB, MDR-TB if M tuberculosis infection has occurred such as patients with - silicosis - HIV infection - status post gastrectomy bypass surgery - weight less than 10% below ideal body weight - chronic renal failure - diabetes mellitus - immunosuppression - hematological disorder - lung cavities.	24	5.63 (0.77)	6 (0.5)	23 (95.83)	Revised	23	5.64 (0.77)	6 (0.37)	22 (95.65)	24	3.71 (0.55)	4 (0.75)	23 (95.83)	Retained
Identify delays in the management of TB and MDR-TB patients in hospital.														
1 Identify the causes of delay in diagnosis of TB and MDR-TB.	25	5.12 (1.27)	5 (1)	24 (96)	Revised	24	5.52 (0.49)	5.56 (1)	24 (100)	24	3.38 (0.58)	3 (1)	23 (95.83)	Combined with # 2

Table 16 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
2 Identify the causes of delay in getting the results of investigation.	25	5.16 (1.28)	5 (1)	24 (96)	Retained	24	5.52 (0.65)	6 (1)	24 (100)	24	3.46 (0.51)	3 (1)	24 (100)	Combined with # 1
3 Identify the causes of delay in transferring the TB and MDR-TB patients to the respective ward/hospital.	25	5.20 (1.38)	6 (1)	23 (92)	Retained	24	5.48 (0.82)	6 (0.95)	23 (95.83)	24	3.50 (0.51)	3.50 (1)	24 (100)	Retained
Identify the lack of TB and MDR-TB infection control measures in hospital.														
1 Identify the TB and MDR-TB patients admitted in non-TB wards.	25	5.40 (1.29)	6 (1)	24 (96)	Retained	24	5.62 (0.63)	6 (0.9)	24 (100)	24	3.54 (0.59)	4 (1)	23 (95.83)	Retained
2 Identify the infectious TB and MDR-TB patients admitted to non-TB wards who do not use handkerchief or tissues or other protectors during coughing and sneezing.	25	5.80 (0.50)	6 (0)	25 (100)	Retained	23	5.82 (0.49)	6 (0)	23 (100)	23	3.74 (0.45)	4 (1)	23 (100)	Discarded
3 Identify the infectious TB and MDR-TB patients admitted to non-TB wards who do not use mask when they go out of isolated bed, room, or ward.	25	5.48 (1.53)	6 (0)	23 (92)	Retained	23	5.61 (1.27)	6 (0)	22 (95.65)	23	3.70 (0.47)	4 (1)	23 (100)	Retained

Table 16 (continued)

Statements	Round 1					Round 2							
	Consensus					Consensus confirmation				Prioritization			
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
4 Identify the patients who go to the TB and MDR-TB ward to meet with their friends, relatives or known persons.	25	5.04 (1.31)	5 (1)	23 (92)	Retained	24	5.30 (0.69)	5.02 (1)	23 (95.83)	24	3.29 (0.55)	3 (1)	23 (95.83)	Retained
5 Identify the lack of maintaining sputum hygiene.	25	5.84 (0.47)	6 (0)	25 (100)	Retained	24	5.91 (0.41)	6 (0)	24 (100)	24	3.54 (0.59)	4 (1)	23 (95.83)	Revised
Identify risks induced by treatment & investigation procedures.														
1 Identify the places/rooms of risk for transmission of TB and MDR-TB where the patients gather for treatment and investigation purpose.	25	5.48 (0.87)	6 (1)	24 (96)	Retained	24	5.56 (0.83)	6 (0.88)	23 (95.83)	24	3.54 (0.59)	4 (1)	23 (95.83)	Retained
2 Identify the devices that can cases transmission of TB and MDR-TB such as micromist, oxygen canula/mask, suction tube, and Spirometer.	25	5.60 (0.71)	6 (1)	24 (96)	Retained	24	5.67 (0.70)	6 (0.75)	23 (95.83)	24	3.83 (0.38)	4 (0)	24 (100)	Revised
3 Identify inappropriate sputum collection procedures in the ward.	25	5.60 (1.2)	6 (0)	24 (96)	Retained	24	5.63 (1.28)	6 (0)	23 (95.83)	24	3.88 (0.34)	4 (0)	24 (100)	Retained

Table 17

List of Statements, and Results of Two- Round Delphi on Content Validation of the NPG: MDR-TB in the Risk Assessment Category of Level 0.

Statements	Round 1					Round 2							
	Consensus					Consensus confirmation				Prioritization			
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Screening patient for MDR-TB and its risk factors during admission.														
1 Nurses should check thoroughly patient's admission ticket and all medical records during admission to confirm whether the patient is non-TB or TB, or MDR-TB.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.83 (0.38)	6 (0)	24 (100)	24	3.75 (0.53)	4 (0)	23 (95.83)	Combined with # 4
2 Nurses should ask every patient whether he/she has ever been tested or treated for TB.	25	5.76 (0.44)	6 (0.50)	25 (100)	Revised	24	5.82 (0.38)	6 (0)	24 (100)	23	3.61 (0.50)	4 (1)	23 (100)	Retained
3 Nurses should ask the patients whether he/she has ever been exposed to TB and MDR-TB patient.	25	5.76 (0.66)	6 (0)	24 (96)	Revised	24	5.72 (0.67)	6 (0.24)	23 (95.83)	24	3.46 (0.66)	4 (1)	22 (91.67)	Retained
4 Nurses should check the medicines every patient has on admission to confirm whether the patient has been taking anti-TB drugs or not	25	5.92 (0.28)	6 (0)	25 (100)	Retained	24	5.96 (0.20)	6 (0)	24 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Combined with # 1

Table 17 (continued)

Statements	Round 1					Round 2							
	Consensus					Consensus confirmation							
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Monitoring and preventing TB and MDR-TB transmission in hospital														
1 Every patient admitted in the hospital should be assessed for TB and MDR-TB.	25	5.68 (0.85)	6 (0)	24 (96)	Revised	24	5.42 (1.44)	6 (0.75)	22 (91.67)	24	3.25 (0.99)	3.50 (1)	20 (83.33)	Revised
2 Nurses should be knowledgeable on symptomatology and risk factors to assess the patients for having TB and MDR-TB, and their risk factors.	25	5.64 (0.70)	6 (1)	24 (96)	Retained	24	5.68 (0.68)	6 (0.42)	23 (95.83)	24	3.54 (0.59)	4 (1)	23 (95.83)	Retained
3 Nurses should suspect and monitor the patient for TB/MDR-TB when he/she has the presence of any one or more of the following symptoms including cough, fever, weight loss, night sweats, and fatigue.	25	5.68 (0.60)	6 (0)	25 (100)	Revised	24	5.70 (0.62)	6 (0.24)	24 (100)	23	3.52 (0.67)	4 (1)	21 (91.30)	Retained
4 Nurses should suspect the patients for TB and MDR-TB, if he/she has a history of blood in the sputum, chills, dyspnea, and chest pain.	24	5.38 (0.82)	6 (1)	23 (95.83)	Revised	24	5.43 (0.83)	6 (1)	23 (95.83)	23	3.48 (0.67)	4 (1)	21 (91.30)	Discarded

Table 17 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
5 Nurses should suspect the patients having MDR-TB and its risk factors if the patient or any family members or friends have a history of being exposure to the patient with MDR-TB or have spent time recently in a hospital, prisoners, or homeless shelter.	25	5.16 (1.65)	6 (1)	23 (92)	Revised	24	5.28 (1.26)	5.58 (1)	23 (95.83)	23	3.22 (1.04)	4 (1)	18 (78.26)	Discarded
6 Nurses should suspect the patients with MDR-TB and its risk factors if the patient has the history of previous treatment of TB.	25	5.32 (1.25)	6 (1)	24 (96)	Revised	24	5.54 (0.56)	6 (1)	24 (100)	23	3.70 (0.56)	4 (1)	22 (95.65)	Retained
Investigate the patients for TB and MDR-TB.														
1 Nurses should be knowledgeable about the common investigations for the diagnosis and assessment of TB and MDR-TB.	25	5.52 (1.26)	6 (0.5)	24 (96)	Retained	23	5.78 (0.52)	6 (0)	23 (100)	17	3.82 (0.39)	4 (0)	17 (100)	Retained

Table 17 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
2	For the suspected TB/MDR-TB patients, nurses should send the sputum for AFB to assess the infectiousness of the patients without any delaying for doctors' order.	25	5.12 (1.88)	6 (1)	22 (88)	Retained	23	5.48 (1.31)	6 (0.88)	22 (95.65)	17	3.76 (0.44)	4 (0.5)	17 (100)	Retained
3	Nurses should assess the sputum conversion by testing sputum smear and culture monthly.	24	5.08 (1.71)	6 (1)	21 (87.50)	Discarded	-	-	-	-	-	-	-	-	-

Table 18

List of Statements, and Results of Two-Round Delphi on Content Validation of the NPG: MDR-TB in the Risk Treatment Category of Level 0.

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Maintain infection control measures in hospital.															
1	**Administrative control measures.** Nurses can and should take initiative to isolate the patients with TB and MDR-TB from non-TB patients.	25	5.76 (0.60)	6 (0)	25 (100)	Retained	24	5.78 (0.59)	6 (0)	24 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Retained
2	Nurses should keep the suspected or known TB/MDR-TB patients in a separate room. If this facility is not available at least the TB and MDR-TB patient should be kept in a side bed until the patient is transferred to the respective ward/hospital.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.88 (0.34)	6 (0)	24 (100)	24	3.71 (0.55)	4 (0.75)	23 (95.83)	Retained
3	If MDR-TB patient is admitted in a non-TB ward, nurses should label the patient's bed as MDR-TB.	25	5.52 (1.00)	6 (1)	23 (92)	Revised	24	5.59 (1.01)	6 (0.36)	22 (91.67)	24	3.71 (0.55)	4 (0.75)	23 (95.83)	Retained

Table 18 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
4	If the physician does not order isolation for TB and MDR-TB patients from non-TB wards/units/hospitals, the nurse should consult with the policy of the hospital including nursing and hospital management**.**	25	5.60 (0.76)	6 (1)	24 (96)	Revised	24	5.67 (0.70)	6 (0.75)	23 (95.83)	24	3.71 (0.55)	4 (0.75)	23 (95.83)	Retained
5	Nurses should take the following action to transfer the TB and MDR-TB patients to the respective ward/unit/hospital immediately after admission in a non-TB hospital or ward: - inform and discuss with the physicians or professors about the transfer of TB and MDR-TB patients - communicate with TB and MDR-TB units/wards/hospitals and take information about the availability of vacant seat/bed. - prepare the patient's file to transfer the patient.	25	5.56 (1.26)	6 (0)	23 (92)	Retained	24	5.75 (0.85)	6 (0)	23 (95.83)	24	3.75 (0.53)	4 (0)	23 (95.83)	Revised

Table 18 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
6	**Use personal respiratory protectors and devices.** Nurses should ask the non-TB patients to use at least surgical mask when they come into contact with infectious TB and MDR-TB patients.	25	5.92 (0.28)	6 (0)	25 (100)	Retained	24	5.96 (0.20)	6 (0)	24 (100)	24	3.75 (0.44)	4 (0.75)	24 (100)	Discarded
7	Nurses should ask and ensure the infectious TB and MDR-TB patients to always use a surgical mask until they transfer to the respective wards or hospitals.	25	5.60 (1.08)	6 (0)	24 (96)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Retained
8	Nurses should use separate respiratory devices including O_2 canula/mask, micromist, suction tube, spirometer, respo-chamber, and inhaler for each patient.	25	5.68 (1.03)	6 (0)	24 (96)	Revised	24	5.88 (0.34)	6 (0)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Revised
	Engineering or environmental control measures.														
9	Nurses should keep open the windows and doors (if necessary) to facilitate the natural ventilation of the ward.	25	5.76 (0.52)	6 (0.0)	25 (100)	Revised	24	5.79 (0.51)	6 (0)	24 (100)	24	3.67 (0.56)	4 (1)	23 (95.83)	Revised
10	No cloth should be hung inside the ward that can hampered the natural ventilation of the ward.	25	5.56 (1.04)	6 (1)	24 (96)	Retained	24	5.82 (0.38)	6 (0)	24 (100)	24	3.54 (0.66)	4 (1)	22 (91.67)	Retained

Table18 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Maintain respiratory hygiene/cough etiquette.														
1 Nurses should ask and remind the patients to cover his/her mouth during coughing or sneezing by using disposable tissues or handkerchiefs, and wash their hands frequently.	25	6.00 (0.00)	6 (0)	25 (100)	Retained	24	6.00 (0.00)	6 (0)	24 (100)	24	3.67 (0.48)	4 (1)	24 (100)	Revised
2 Nurses should ask the patients to collect the sputum in a plastic container with lid then throw it in the toilet pan and wash the container properly.	25	5.12 (1.59)	6 (1.5)	22 (88)	Revised	24	5.69 (0.54)	6 (0.88)	24 (100)	24	3.50 (0.83)	4 (1)	21 (87.50)	Revised
3 Nurses should provide disinfectant in the sputum container to prevent the transmission of germs TB and MDR-TB.	24	5.54 (1.35)	6 (0)	22 (91.67)	Retained	23	5.90 (0.25)	6 (0)	23 (100)	23	3.57 (0.73)	4 (1)	22 (95.65)	Revised
Provide health education and support.														
1 Nurses should provide necessary information to the hospitalized patients and their attendants about the different wards and settings, and risky places for transmitting TB and MDR-TB, particularly about the TB and MDR-TB wards.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.83 (0.38)	6 (0)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Revised

Table 18 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
2	Nurses should provide written instruction or oral education to the TB and MDR-TB patients admitted in non-TB ward about: - diagnosis - transmission - the prevention of TB/MDR-TB transmission to others - medication - the effects of inadequately treated TB - the importance of completing the prescribed course of treatment - the consequences to the individual if he or she is unwilling to adhere to the treatment plan, and - the health care system, - the possible side-effects of anti-TB drugs, - how to collect the sputum sample, and - when and how to use the mask.	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.76 (0.41)	6 (0.24)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Revised

Table 18 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
3	Nurses should reinforce education to patients when they encounter any problems regarding management of TB and MDR-TB.	25	5.48 (1.05)	6 (1)	24 (96)	Retained	24	5.73 (0.53)	6 (0.39)	24 (100)	24	3.63 (0.65)	4 (1)	22 (91.67)	Retained
4	Nurses should arrange a weekly health education/ patient teaching session for TB and MDR-TB patients admitted in a non-TB ward.	25	5.72 (0.68)	6 (0)	24 (96)	Retained	24	5.57 (1.35)	6 (0)	22 (91.67)	24	3.42 (0.97)	4 (1)	21 (87.50)	Discarded
5	The nurses should treat the patients with respect and establish a rapport.	24	5.88 (0.33)	6 (0)	24 (100)	Retained	23	5.86 (0.34)	6 (0)	23 (100)	24	3.67 (0.64)	4 (0.75)	22 (91.67)	Retained
Sputum specimen collection and investigation															
1	Nurses should collect the three samples of sputum specimens for AFB with fully completed form as follows - an initial 'spot' specimen taken at the first time or first day - an early morning specimen, the next day, and - another 'spot' specimen when the second sample (early morning sample) is collected from the patient	25	5.76 (0.52)	6 (0)	25 (100)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	24	3.63 (0.58)	4 (1)	23 (95.83)	Discarded

Table 18 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
2	Nurses should clearly label the specimen container with ward number, bed number, patient's name and necessary information. The label should be on the outer side of container never on the lid.	25	5.92 (0.28)	6 (0)	25 (100)	Retained	24	5.96 (0.20)	6 (0)	24 (100)	24	3.96 (0.20)	4 (0)	24 (100)	Revised
3	Nurses should maintain appropriate method and precautions in collecting a sputum sample.	25	5.92 (0.28)	6 (0)	25 (100)	Retained	24	5.96 (0.20)	6 (0)	24 (100)	24	3.92 (0.28)	4 (0)	24 (100)	Retained
4	Nurses should maintain separate sputum register, and should promptly and accurately document all the necessary information including the dates that the test are ordered, the samples are sent for examination, and the results.	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.77 (0.41)	6 (0.24)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Revised
5	Nurses should explain the test to be done and the reason for doing to the patients e.g., sputum testing, x-ray and others if available.	25	5.68 (0.48)	6 (1)	25 (100)	Revised	24	5.74 (0.44)	6 (0.83)	24 (100)	24	3.42 (0.65)	3.50 (1)	22 (91.67)	Retained
6	Nurses should inform the patient in writing or orally about when to expect test results and how the results will be conveyed.	25	5.48 (0.71)	6 (1)	25 (100)	Retained	24	5.54 (0.64)	6 (1)	24 (100)	24	3.29 (0.81)	3 (1)	21 (87.50)	Retained

Table 18 (continued)

	Statements	Round 2													
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
7	Nurses should check the sputum register to see which results are outstanding each day and contact the laboratory to get results of any outstanding specimens.	25	5.80 (0.50)	6 (0)	25 (100)	Retained	24	5.78 (0.51)	6 (0)	24 (100)	24	3.58 (0.65)	4 (1)	22 (91.67)	Retained
8	Nurses should collect the sputum in a separate well ventilated room or at least nurses should arrange an area or place in a side of the ward by using screens.	25	5.72 (0.61)	6 (0)	25 (100)	Retained	24	5.82 (0.48)	6 (0)	24 (100)	24	3.50 (0.59)	4 (1)	23 (95.83)	Retained
9	Nurses should help the patient to collect sputum when the patient can not produce sputum by: - nebulizing the patients with ventoline solution - helping the patient to do physical exercise.	25	5.72 (0.54)	6 (0.5)	25 (100)	Revised	24	5.78 (0.41)	6 (0.21)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Revised
New statements added after round one.															
10	Nurses should send the sputum specimen as early as possible after collection.	-	-	-	-	-	23	5.65 (1.30)	6 (0)	22 (95.65)	23	3.78 (0.85)	4 (0)	22 (95.65)	Combined with # 11
11	Nurses should ensure that specimens are protected from exposure to direct sunlight during storage and transportation**.**	-	-	-	-	-	23	5.57 (1.31)	6 (0)	22 (95.65)	23	3.74 (0.86)	4 (0)	22 (95.65)	Combined with # 10

Table 19

List of Statements, and Results of Two- Round Delphi on Content Validation of the NPG: MDR-TB in the Risk Identification Category of Level 1

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Identify vulnerable patients.														
1 Identify the patients who have previously come in contact with TB or MDR-TB patients.	25	5.44 (1.12)	6 (1)	24 (96)	Retained	24	5.64 (0.63)	6 (0.89)	24 (100)	24	3.50 (0.59)	4 (1)	23 (95.83)	Retained
2 Identify the patients having history of prior drug treatment for TB/MDR-TB.	25	5.84 0.37	6 (0)	25 (100)	Retained	24	5.83 (0.38)	6 (0)	24 (100)	24	3.67 (0.56)	4 (1)	23 (95.83)	Retained
3 Identify the vulnerable patients to develop TB, MDR-TB such as the patients from poor socio-economic conditions, homelessness, prisoners, substance abusers, and garment's workers.	25	5.60 (0.91)	6 (0)	23 (92)	Revised	24	5.53 (1.35)	6 (0)	22 (91.67)	24	3.50 (0.93)	4 (1)	22 (91.67)	Revised

Table 19 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
4	Identify the patients with medical risk factors known to develop TB, MDR-TB if M tuberculosis infection has occurred such as patients with - silicosis - HIV infection - status post gastrectomy bypass surgery - weight less than 10% below ideal body weight - chronic renal failure - diabetes mellitus - immunosuppressant - hematological disorder - lung cavities.	25	5.64 (0.57)	6 (1)	25 (100)	Revised	24	5.65 (0.56)	6 (1)	24 (100)	24	3.54 (0.59)	4 (1)	23 (95.83)	Retained
Identify non-compliance to TB treatment in patients.															
1	Identify the TB patients for self discontinuation of anti-TB drugs.	25	5.76 (0.52)	6 (0)	25 (100)	Retained	24	5.75 (0.53)	6 (0)	24 (100)	24	3.88 (0.34)	4 (0)	24 (100)	Revised
2	Identify the TB patients for irregular intake of anti-TB drugs.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	23	3.91 (0.29)	4 (0)	23 (100)	Revised
3	Identify the patients who are taking incorrect dosages of anti-TB drugs.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	23	3.83 (0.39)	4 (0)	23 (100)	Retained

Table 19 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Identify mistakes in the management of TB and MDR-TB patients.														
1 Identify the TB patients who finished or do not have the anti-TB drugs for next day particularly for holidays.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.78 (0.41)	6 (0.15)	24 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Combined with # 2
2 Identify the TB patients who do not take or do not have all kinds of anti-TB drugs as physicians' prescribed/standard regimen.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Combined with # 1
3 Identify the TB patients who are absent in ward/hospital and do not collect anti-TB drugs.	25	5.84 (0.47)	6 (0)	25 (100)	Retained	24	5.83 (0.48)	6 (0)	24 (100)	24	3.75 (0.44)	4 (0.75)	24 (100)	Combined with # 4
4 Identify the TB patients who resist collecting or taking anti-TB drugs.	25	5.68 (0.56)	6 (1)	25 (100)	Retained	24	5.63 (0.77)	6 (0.75)	23 (95.83)	24	3.54 0.59	4 (1)	23 (95.83)	Combined with # 3
5 Identify the TB patients who throw anti-TB drugs or hide the drugs under the pillow or bedding.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	24	3.79 (0.51)	4 (0)	23 (95.83)	Revised
6 Identify the patient who has started on less than four anti-TB drugs or with inappropriate or subnormal or inadequate dosages of anti-TB drugs.	25	5.52 (1.08)	6 (1)	24 (96)	Revised	24	5.73 (0.53)	6 (0.36)	24 (100)	24	3.83 (0.38)	4 (0)	24 (100)	Retained

Table 19 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
7	Identify the causes of missing orders or requisition of investigations and results of investigations.	25	5.72 (0.54)	6 (0.5)	25 (100)	Retained	24	5.81 (0.48)	6 (0)	24 (100)	24	3.50 (0.66)	4 (1)	22 (91.67)	Retained
Identify delays in the management of TB and MDR-TB patients in hospital.															
1	Identify the causes of delay in recognition of infectious TB and MDR-TB patients.	25	5.48 (0.82)	6 (1)	24 (96)	Discarded	-	-	-	-		-	-	-	-
2	Identify the causes of delay in doing investigations or sending the sample for investigations.	25	5.44 (1.16)	6 (1)	23 (92)	Revised	24	5.60 (0.71)	6 (1)	23 (95.83)	24	3.46 (0.66)	4 (1)	22 (91.67)	Combined with # 3
3	Identify the causes of delay in getting the results of investigations.	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.74 (0.44)	6 (0.81)	24 (100)	24	3.50 (0.51)	3.50 (1)	24 (100)	Combined with # 2
4	Identify the causes of delay in giving the anti-TB drugs to the patients.	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.82 (0.38)	6 (0)	24 (100)	24	3.63 (0.65)	4 (1)	22 (91.67)	Retained
5	Identify the causes of delay in transferring MDR-TB patients (admitted to TB wards) to the MDR-TB ward or hospital.	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.78 (0.41)	6 (0.18)	24 (100)	24	3.58 (0.58)	4 (1)	23 (95.83)	Retained

Table 19 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Identify the lack of TB and MDR-TB infection control measures in hospital.														
1 Identify the infectious TB patients who do not always stay in isolated room/ward/bed of the hospital.	25	5.60 (0.71)	6 (1)	24 (96)	Retained	24	5.78 (0.41)	6 (0.18)	24 (100)	24	3.42 (0.72)	4 (1)	21 (87.50)	Retained
2 Identify the causes why the infectious TB patients do not stay in isolated rooms/ wards/beds of the hospital.	25	5.44 (1.00)	6 (1)	23 (92)	Retained	24	5.63 (0.70)	6 (0.89)	23 (95.83)	24	3.42 (0.72)	4 (1)	21 (87.50)	Retained
3 Identify the infectious TB patients who do not use a mask when they go out of isolated rooms/wards/hospital.	25	5.80 (0.40)	6 (0)	25 (100)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	21	3.67 (0.48)	4 (1)	21 (100)	Retained
4 Identify the infectious TB patients who do not use tissues, handkerchiefs, or others protectors during coughing and sneezing.	25	5.76 (0.52)	6 (0)	25 (100)	Retained	24	5.74 (0.53)	6 (0.15)	24 (100)	24	3.63 (0.49)	4 (1)	24 (100)	Discarded
5 Identify the non-TB and suspected or diagnosed MDR-TB patients who are admitted to TB wards.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.63 (0.49)	4 (1)	24 (100)	Retained
6 Identify the TB patients who go to the non-TB and MDR-TB ward to meet with or visit the MDR-TB patients as their friends, relatives or known persons.	25	5.56 (1.04)	6 (1)	24 (96)	Retained	24	5.82 (0.38)	6 (0)	24 (100)	24	3.50 (0.72)	4 (1)	21 (87.50)	Retained

Table 19 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
7	Identify the TB patients for whom Directly Observed Treatment (DOT) is needed for.	25	5.68 (0.75)	6 (0)	24 (96)	Retained	24	5.78 0.51	6 (0)	24 (100)	24	3.71 (0.55)	4 (0.75)	23 (95.83)	Retained
8	Identify the lack in maintaining sputum hygiene.	25	5.76 (0.43)	6 (0.50)	25 (100)	Retained	24	5.82 0.38	6 (0)	24 (100)	24	3.58 (0.58)	4 (1)	23 (95.83)	Revised
9	Identify the lack of appropriate ventilation in the TB wards/rooms.	25	5.72 (0.54)	6 (0.5)	25 (100)	Retained	24	5.74 (0.53)	6 (0.18)	24 (100)	24	3.58 (0.65)	4 (1)	22 (91.67)	Retained
10	Identify the non-cooperative or unmotivated TB and MDR-TB patients.	25	5.52 (0.65)	6 (1)	25 (100)	Retained	24	5.61 (0.64)	6 (0)	24 (100)	24	3.54 (0.66)	4 (1)	22 (91.67)	Retained
Identify risks induced by treatment & investigation procedures.															
1	Identify inappropriate sputum collection procedures in the ward.	25	5.40 (1.15)	6 (1)	24 (96)	Retained	24	5.59 (0.63)	6 (0.9)	24 (100)	24	3.54 (0.59)	4 (1)	23 (95.83)	Retained
2	Identify the treatment and investigation procedures that can cause transmission of TB and MDR-TB.	25	5.64 (1.04)	6 (0)	24 (96)	Retained	24	5.82 (0.38)	6 (0)	24 (100)	23	3.61 (0.58)	4 (1)	22 (95.65)	Retained
3	Identify the places/rooms of risk for the transmission of TB and MDR-TB where the patients gather for treatment and investigation purposes.	25	5.64 (0.64)	6 (1)	25 (100)	Retained	24	5.83 (0.34)	6 (0.27)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Retained

Table 19 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
4	Identify the devices that can help to transmit the TB and MDR-TB to other patients such as micromist, oxygen canula/mask, suction tube, and spirometer.	25	5.76 (0.52)	6 (0)	25 (100)	Revised	24	5.82 (0.48)	6 (0)	24 (100)	24	3.67 (0.48)	4 (1)	24 (100)	Revised
5	Identify the side effects of anti-TB drugs.	25	5.72 (0.61)	6 (0)	25 (100)	Retained	24	5.74 (0.61)	6 (0)	24 (100)	24	3.83 (0.38)	4 (0)	24 (100)	Retained

Table 20

List of Statements, and Results of Two- Round Delphi on Content Validation of the NPG: MDR-TB in the Risk Assessment Category of Level 1.

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Screening patient for MDR-TB and its risk factors during admission.														
1 Nurses should check thoroughly the admission ticket and all medical records of every patient during admission to find out/confirm whether the patient is non-TB or TB, or MDR-TB.	25	5.84 (.47)	6 (0)	25 (100)	Retained	24	5.62 (1.28)	6 (0)	23 (95.83)	24	3.46 (0.93)	4 (1)	22 (91.67)	Combined with # 4
2 Nurses should ask every patient whether he/she has ever been tested or treated for TB.	25	5.52 (1.23)	6 (1)	24 (96)	Revised	24	5.46 (1.24)	6 (1)	23 (95.83)	24	3.42 (0.88)	4 (1)	23 (95.83)	Retained
3 Nurses should ask the patients whether he/she has ever been exposed to a MDR-TB patient.	25	5.80 (0.41)	6 (0)	25 (100)	Revised	24	5.91 (0.28)	6 (0)	24 (100)	24	3.58 (0.58)	4 (1)	23 (95.83)	Retained
4 Nurses should check the medicines every patient has on admission to confirm whether the patients have been taking anti-TB drugs or not.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Combined with # 1

Table 20 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Assessing patient for non-compliance with TB treatment.														
1 Nurses should observe the patient's medication.	25	5.64 (1.08)	6 (0)	24 (96)	Retained	24	5.82 (0.48)	6 (0)	24 (100)	24	3.67 (0.48)	4 (1)	24 (100)	Discarded
2 Nurses should ask the patients, patients' relatives, other patients and health care providers to assess the time, dose, and regular intake of anti-TB drugs.	25	5.52 (1.08)	6 (1)	24 (96)	Retained	24	5.71 (0.53)	6 (0.48)	24 (100)	24	3.50 (0.72)	4 (1)	23 (95.83)	Retained
3 Nurses should check the anti-TB drugs with the patients that have been previously provided to them.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.83 (0.38)	6 (0)	24 (100)	24	3.54 (0.59)	4 (1)	23 (95.83)	Retained
Monitoring and preventing TB and MDR-TB transmission in hospital.														
1 All persons with TB should be assessed for MDR-TB**.**	25	5.08 (1.58)	6 (1)	22 (88)	Retained	24	5.25 (1.36)	6 (1)	22 (91.67)	24	3.54 (0.72)	4 (1)	23 (95.83)	Retained
2 Suspect patients for having MDR-TB and its risk factors if the patient or any family members or friends have a history of being exposed to the disease or have spent time recently in a hospital, prison, or homeless shelter.	25	5.68 (0.75)	6 (0)	24 (96)	Revised	24	5.31 (1.39)	6 (1)	22 (91.67)	24	3.33 (1.13)	4 (1)	22 (91.67)	Discarded

Table 20 (continued)

Statements	Round 1					Round 2							
	Consensus					Consensus confirmation				Prioritization			
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
3 Suspect the patients for having MDR-TB and its risk factors if the patients have a history of previous treatment of TB.	25	5.44 (0.92)	6 (1)	23 (92)	Revised	24	5.56 (0.88)	6 (0.89)	22 (91.67)	24	3.42 (0.88)	4 (1)	23 (95.83)	Revised
4 Suspect the patients for infectious TB if - cough is present, - cough inducing procedures are performed, - sputum smears are known to contain AFB, - patients are not receiving anti-TB therapy or have not completed at least 3 to 4 weeks of therapy, and - no change in their symptoms since starting therapy.	25	5.44 (1.08)	6 (1)	24 (96)	Revised	24	5.64 (0.56)	6 (1)	24 (100)	24	3.58 (0.72)	4 (1)	23 (95.83)	Retained
Assess the side effects of anti-TB drugs.														
1 Nurses should have knowledge about the common side effects of anti-TB drugs.	25	5.80 (0.58)	6 (0)	25 (100)	Retained	24	5.78 (0.59)	6 (0)	24 (100)	24	3.75 (0.44)	4 (0.75)	24 (100)	Retained

Table 20 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
2	Nurses should assess for any signs of adverse drug reactions through patient interviews and periodic tests such as liver function tests, and vision disturbances, etc	25	5.48 (1.36)	6 (0)	23 (92)	Retained	24	5.67 (0.75)	6 (0.39)	23 (95.83)	24	3.58 (0.58)	4 (1)	23 (95.83)	Combined with #3
3	To assess the common side effects of anti-TB drugs, everyday nurses should - ask the patient about the development of side effects - observe the patient for the development of side effects - listen to the patients and others about the development of side effects.	25	5.44 (1.08)	6 (1)	23 (92)	Retained	24	5.66 (0.75)	6 (0.42)	23 (95.83)	24	3.63 (0.58)	4 (1)	23 (95.83)	Combined with # 2
	Investigate the patients for MDR-TB and its risk factors.														
1	Nurses should be knowledgeable about common investigations for the assessment of MDR-TB and risk factors.	25	5.64 (0.64)	6 (1)	25 (100)	Retained	24	5.78 (0.51)	6 (0)	24 (100)	24	3.67 (0.48)	4 (1)	24 (100)	Retained

Table 20 (continued)

	Statements	Round 1					Round 2							
		Consensus					Consensus confirmation				Prioritization			
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
2	Nurses should send the sputum for AFB for suspected MDR-TB patients to assess the infectiousness of the patients without delaying for doctors' order.	25	5.64 (0.86)	6 (0)	23 (92)	Revised	24	5.74 (0.67)	6 (0)	23 (95.83)	23	3.70 (0.47)	4 (1)	23 (100)	Retained
3	Nurses should assess the sputum conversion by testing sputum AFB smear.	25	5.20 (1.47)	6 (1)	21 (84)	Revised	24	5.61 (0.70)	6 (0.8)	23 (95.83)	24	3.50 (0.66)	4 (1)	22 (91.67)	Retained

Table 21

List of Statements, and Results of Two- Round Delphi on Content Validation of the NPG: MDR-TB in the Risk Treatment Category of Level 1

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Maintain infection control measures in hospital.														
1 **Administrative control measures.** Non-TB, TB and MDR-TB patients should be nursed separately in a separate room.	25	5.68 (1.03)	6 (0)	24 (96)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	24	3.58 (0.58)	4 (1)	23 (95.83)	Combined with # 4
2 If the physician does not order isolation for MDR-TB patients from TB wards/units/ hospitals, the nurse should consult with the policy maker of hospital including nursing and hospital management**.**	25	5.64 (0.70)	6 (1)	24 (96)	Revised	24	5.65 (0.70)	6 (0.84)	23 (95.83)	23	3.43 (0.73)	4 (1)	22 (95.65)	Retained
3 Nurses should take the following action to transfer the MDR-TB patients to the respective wards/units/hospitals immediately after admission in a TB hospital or ward: - inform and discuss with the physicians or professors about the transfer of MDR-TB patients - communicate with MDR-TB ward and take	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.77 (0.41)	6 (0.24)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Revised

Table 21 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	information about the availability of vacant seat/bed. - prepare the patient's file to transfer the patient														
4	The MDR-TB patient should be kept in a side bed until the patient is transferred to the MDR-TB wards/units/hospitals.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	24	3.67 (0.48)	4 (1)	24 (100)	Combined with # 1
5	If MDR-TB patient is admitted in a TB ward, nurses should label the patient's bed as MDR-TB.	25	5.52 (1.00)	6 (1)	23 (92)	Revised	24	5.69 (0.67)	6 (0.48)	23 (95.83)	24	3.67 (0.56)	4 (1)	23 (95.83)	Retained
6	**Use personal respiratory protector.** Nurses should ensure the use of masks for TB patients when they: - come into contact with patients - go out of the ward - wait together for investigations with other patients.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Combined with # 7
7	Nurses should ask and remind the patients with smear-positive TB to wear a surgical mask that covers their mouth and nose if they need.	25	5.76 (0.43)	6 (0.5)	25 (100)	Retained	24	5.82 (0.38)	6 (0)	24 (100)	24	3.63 (0.49)	4 (1)	24 (100)	Combined with # 6

Table 21 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	to leave the room for medically essential procedures until the patient: - has had 2 weeks' drug treatment - has had at least three negative microscopic smears on separate occasions over a 12-day period - shows tolerance to the prescribed treatment and an ability and agreement to adhere to treatment.														
8	Nurses should ensure the use of masks for infectious TB and MDR-TB patents when come into contact with others by - asking them to use a mask - influencing/motivating them to use a mask - forcing them to use a mask.	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.78 (0.41)	6 (0.18)	24 (100)	23	3.70 (0.47)	4 (1)	23 (100)	Retained

Table 21 (continued)

	Statements	Round 1					Round 2							
		Consensus					Consensus confirmation				Prioritization			
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	Use separate devices														
9	Nurses should use separate respiratory devices for each patient including O_2 canula/mask, micromist, suction tube, spirometer, and inhaler.	24	5.58 (1.25)	6 (0)	23 (95.83)	Retained	23	5.76 (0.42)	6 (0.42)	23 (100)	23	3.65 (0.57)	4 (1)	22 (95.65)	Revised
10	**Engineering or environmental control measures**. Nurses should keep open the windows and doors (if necessary) to facilitate the natural ventilation of the ward.	25	5.52 (1.26)	6 (0.5)	24 (96)	Revised	24	5.48 (1.28)	6 (0.87)	23 (95.83)	23	3.52 (0.51)	4 (1)	23 (100)	Revised
11	No cloth should be hung inside the ward that can hamper the natural ventilation of the ward.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.78 (0.41)	6 (0.15)	24 (100)	24	3.50 (0.66)	4 (1)	22 (91.67)	Retained
12	For infectious TB and MDR-TB patients, nurses should performed the aerosol-generating procedures in an appropriately engineered or well ventilated area/room.	25	5.76 (0.52)	6 (0)	25 (100)	Retained	24	5.81 (0.38)	6 (0.18)	24 (100)	24	3.50 (0.59)	4 (1)	23 (95.83)	Retained
	Maintain respiratory hygiene/cough etiquette.														
1	Nurses should ask and remind the patient to cover his/her mouth during coughing, sneezing or talking, by using disposable tissues or handkerchiefs, and wash their hands frequently.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.78 (0.41)	6 (0.15)	24 (100)	23	3.70 (0.47)	4 (1)	23 (100)	Revised

Table 21 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
2	Nurses should ask the patients to collect the sputum in a plastic container with lid then throw it in a selected container/place/pan and wash the container properly.	25	4.96 (1.95)	6 (1)	21 (84)	Revised	24	5.33 (1.28)	6 (1)	22 (91.67)	24	3.42 (1.02)	4 (1)	22 (91.67)	Revised
3	Nurses should provide disinfectant (if possible/available) in the sputum container to prevent the transmission of TB or MDR-TB germs.	25	4.92 (1.82)	6 (1)	22 (88)	Retained	24	5.53 (0.53)	6 (1)	24 (100)	24	3.42 (0.93)	4 (1)	22 (91.67)	Revised
Provide health education and support.															
1	Nurses should provide necessary information to the TB patients about the different wards and settings, and risky places in the hospital for transmitting MDR-TB.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	23	3.43 (0.59)	3 (1)	22 (95.65)	Revised
2	Nurses should provide written instruction or oral education to the TB patients on: - diagnosis - transmission - the prevention of TB/MDR-TB transmission to others - medication	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.78 (0.41)	6 (0.15)	24 (100)	24	3.46 (0.66)	4 (1)	22 (91.67)	Revised

Table 21 (continued)

	Statements	Round 1					Round 2							
		Consensus					Consensus confirmation				Prioritization			
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	- the effects of inadequately treated TB - the importance of completing the prescribed course of treatment - the consequences to the individual if he or she is unwilling to adhere to the treatment plan, - the health care system, - the possible side-effects of anti-TB drugs, - how to collect the sputum sample, and when and how to use the mask.														
3	Nurses should reinforce education to patients when they encounter any problems regarding management of TB and MDR-TB.	25	5.60 (0.76)	6 (1)	24 (96)	Retained	24	5.63 0.56	6 (1)	24 (100)	24	3.29 (0.62)	3 (1)	22 (91.67)	Retained
4	Nurses should arrange a weekly health education session for admitted TB patients.	25	5.72 (.68)	6 (0)	24 (96)	Retained	24	5.80 (0.38)	6 (0.28)	24 (100)	24	3.38 (0.65)	3 (1)	22 (91.67)	Retained
5	The nurses should treat the patients with respect and establish a rapport.	25	5.68 (0.56)	6 (1)	25 (100)	Retained	24	5.85 (0.34)	6 (0)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Retained

Table 21 (continued)

	Statements	Round 1					Round 2							
		Consensus					Consensus confirmation				Prioritization			
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	Sputum specimen collection and investigation.														
1	Nurses should collect the three sputum specimens for AFB with fully completed form as follows - an initial 'spot' specimen taken at the first time or first day - an early morning specimen, the next day, and - another 'spot' specimen when the second sample (early morning sample) is collected from the patient.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.58 (0.65)	4 (1)	22 (91.67)	Discarded
2	Nurses should clearly label the specimen container first with ward number, bed number, patient's name and necessary information . The label should be on the outer side of container never on the lid.	25	5.96 (0.20)	6 (0)	25 (100)	Retained	24	5.96 (0.20)	6 (0)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Revised
3	Nurses should maintain the appropriate methods and precautions in collecting a sputum sample.	25	5.92 (0.28)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	24	3.67 (0.56)	4 (1)	23 (95.83)	Retained

Table 21 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
4	Nurses should maintain separate sputum register, and should promptly and accurately document all the necessary information including the dates that the tests are ordered, the samples are sent for examination, and the results.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Revised
5	Nurses should explain the test to be done and the reason for doing it to the patients e.g., sputum testing, x-ray and others if available.	25	5.64 (0.76)	6 (0.5)	24 (96)	Revised	24	5.65 (0.76)	6 (0.27)	23 (95.83)	24	3.33 (0.64)	3 (1)	22 (91.67)	Retained
6	Nurses should consult with the patient's physician about isolation while the patient is being evaluated for AFB positive.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.83 (0.38)	6 (0)	24 (100)	24	3.54 (0.51)	4 (1)	24 (100)	Discarded
7	Nurses should inform the patient in writing or orally about when to expect test results and how the results will be conveyed.	25	5.72 (0.46)	6 (1)	25 (100)	Retained	24	5.74 (0.44)	6 (0.82)	24 (100)	24	3.38 (0.71)	3.50 (1)	21 (87.50)	Retained
8	Nurses should check the sputum register to see which results are outstanding each day and contact the laboratory to get results of any outstanding specimens.	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.78 (0.41)	6 (0.18)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Retained

Table 21 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
9	Nurses should collect the sputum in a separate well ventilated room or at least nurses should arrange an area or space in a corner of the ward by using screens.	25	5.52 (1.29)	6 (0)	24 (96)	Retained	24	5.73 (0.59)	6 (0.36)	24 (100)	24	3.58 (0.58)	4 (1)	23 (95.83)	Retained
10	Nurses should help the patient to collect sputum when the patient can not produce sputum by: - nebulizing the patients with normal saline - helping the patient to do physical exercise.	25	5.80 (0.50)	6 (0)	25 (100)	Revised	24	5.90 (0.28)	6 (0)	24 (100)	24	3.54 (0.66)	4 (1)	22 (91.67)	Revised
New statements added after round one.															
11	Nurses should send the sputum specimen as early as possible after collection.	-	-	-	-	-	23	5.65 (1.30)	6 (0)	22 (95.65)	23	3.78 (0.85)	4 (0)	22 (95.65)	Combined with # 12
12	Nurses should ensure that specimens are protected from exposure to direct sunlight during storage and transportation**.**	-	-	-	-	-	23	5.57 (1.31)	6 (0)	22 (95.65)	23	3.74 (0.86	4 (0)	22 (95.65)	Combined with # 11
Ensure administration of anti-TB drugs.															
1	Nurses should ensure that patients are given the correct medication and can provide support for patients and their	25	5.72 (0.54)	6 (0.5)	25 (100)	Retained	24	5.74 (0.53)	6 (0.21)	24 (100)	24	3.63 (0.71)	4 (1)	23 (95.83)	Combined with # 3

Table 21 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	relatives or carers to prevent lapses in treatment.														
2	Nurses should be knowledgeable about the standard dose and duration of anti-TB drugs as national TB control guidelines.	25	5.76 (0.66)	6 (0)	24 (96)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	24	3.75 (0.53)	4 (0)	23 (95.83)	Retained
3	Nurses should inform the physician if the patient has started inappropriate or subnormal or inadequate dosages of anti-TB drugs.	25	5.76 (0.52)	6 (0)	25 (100)	Retained	24	5.90 (0.28)	6 (0)	24 (100)	24	3.58 (0.58)	4 (1)	23 (95.83)	Combined with # 1
4	Nurses should take body weight of the patient to - help the physician to prescribed correct doses of anti-TB drugs - check the correct dose of anti-TB drugs - assess the improvement of the patient.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	24	3.75 (0.44)	4 (0.75)	24 (100)	Revised
5	In case of newly admitted patients, nurses can provide or continue the anti-TB drugs without doctors' orders when - nurses have confirmed that the patient is under anti-TB treatment and - there is a risk for	25	5.16 (1.75)	6 (1)	22 (88)	Revised	24	5.56 (1.05)	6 (0.84)	23 (95.83)	24	3.63 (0.58)	4 (1)	23 (95.83)	Retained

Table 21 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	missing or discontinuation of the anti-TB drugs.														
6	Nurses should directly observed the patient's medication (directly observed treatment; DOT).	25	5.52 (1.53)	6 (0)	23 (92)	Retained	24	5.92 (0.24)	6 (0)	24 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Retained
7	Nurses should evaluate every admitted tuberculosis patient for the need for directly observed treatment (DOT) and must maintain DOT for the patients with certain conditions such as: - homelessness - drug abuser - psychiatric disorder - intolerance to anti-TB drugs.	25	5.84 (0.62)	6 (0)	24 (96)	Retained	24	5.83 0.64	6 (0)	23 (95.83)	24	3.83 (0.38)	4 (0)	24 (100)	Revised
8	In doing DOT, nurses may share their responsibilities with other patients, patients' relatives, and subordinate staff.	25	5.48 (1.08)	6 (1)	24 (96)	Retained	24	5.67 (0.55)	6 (0.88)	24 (100)	24	3.42 (0.58)	3 (1)	23 (95.83)	Revised
9	Nurses should ask the TB patients at least one time in a day whether she/he has taken the anti-TB drugs or not.	25	5.60 (1.04)	6 (0.5)	24 (96)	Retained	24	5.82 (0.38)	6 (0)	24 (100)	24	3.75 (0.44)	4 (0.75)	24 (100)	Revised
10	Nurses should ensure that a weekend supply of medication is available.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.83 (0.38)	6 (0)	24 (100)	23	3.83 (0.39)	4 (0)	23 (100)	Combined with # 11

Table 21 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
11	Nurses should arrange for the patient to have enough TB drugs on hand for weekends or holidays or until his/her next medicine distribution day.	25	5.92 (0.28)	6 (0.5)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	23	3.78 (0.42)	4 (0)	23 (100)	Combined with # 10
12	Drug order changes must be obtained promptly to prevent any interruption in therapy, and nurses need to contact the physician if the patient is started on inadequate and/or inappropriate drugs.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.67 (0.48)	4 (1)	24 (100)	Revised
13	During distributing medicine nurses should check the anti-TB drugs that have been previously distributed to the patients or they have collected from DOT to ensure - the proper intake of anti-TB drugs - having the proper amount of anti-TB drugs for the next days particularly for holidays.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Discarded

Table 21 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Management of side effects from anti-TB drugs.														
1 Nurses should be knowledgeable about common side effects of anti-TB drugs.	25	5.80 (0.50)	6 (0)	25 (100)	Retained	24	5.78 (0.51)	6 (0)	24 (100))	24	3.79 (0.41)	4 (0)	24 (100)	Discarded
2 Nurses should evaluate the patient's clinical response to therapy and prevent the development of drug resistance, adverse reactions, or further morbidity and consult with the physician if patient fails to improve.	25	5.68 (0.69)	6 (0.5)	24 (96)	Retained	24	5.75 (0.65)	6 (0.24)	23 (95.83)	24	3.71 (0.46)	4 (1)	24 (100)	Discarded
3 Nurses should look after the patients for the drugs' side effects from the start to finish of the drugs.	25	5.80 (0.50)	6 (0)	25 (100)	Retained	24	5.82 0.48	6 (0)	24 (100)	24	3.54 (0.59)	4 (1)	23 (95.83)	Combined with # 5
4 Nurses should take note of side effects of anti-TB drugs and report to the physicians.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.90 (0.28)	6 (0)	24 (100)	24	3.67 (0.48)	4 (1)	24 (100)	Retained
5 Nurses should tell the patient to discontinue medications and report the symptoms when there are indications of adverse reactions, and consult with the physician immediately.	25	5.64 (0.76)	6 (0.5)	24 (96)	Retained	24	5.72 (0.67)	6 (0.27)	23 (95.83)	24	3.75 (0.53)	4 (0)	23 (95.83)	Combined with # 3

Table 22

List of Statements, and Results of Two- Round Delphi on Content Validation of the NPG: MDR-TB in the Risk Identification Category of Level 2.

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Identify non-compliances to TB treatment in patients.														
1 Identify the patient who does not take anti-TB drugs or injection regularly.	25	5.80 (0.5)	6 (0)	25 (100)	Retained	24	5.90 (0.28)	6 (0)	24 (100)	24	3.75 (0.44)	4 (0.75)	24 (100)	Revised
2 Identify the patient who refused to take anti-TB drugs or injection.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Retained
3 Identify the patients who are taking incorrect dosage of anti-TB drugs.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	24	3.83 (0.38)	4 (0)	24 (100)	Retained
Identify mistakes in the management of TB and MDR-TB patients.														
1 Identify the patients who are absent or do not regularly stay in ward/hospital and do not collect anti-TB drugs.	25	5.92 (0.28)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	22	3.86 (0.35)	4 (0)	22 (100)	Revised
2 Identify the patients who throw the anti-TB drugs or hide the drugs under the pillow or bedding.	24	5.92 (0.28)	6 (0)	24 (100)	Retained	23	5.95 (0.21)	6 (0)	23 (100)	23	3.87 (0.34)	4 (0)	23 (100)	Revised
3 Identify the inappropriate or suboptimal or inadequate dosages of anti-TB drugs.	25	5.64 (0.76	6 (0.5)	24 (96)	Retained	24	5.85 (0.34)	6 (0)	24 (100)	23	3.65 (0.49)	4 (1)	23 (100)	Revised

Table 22 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
4 Identify the causes of missing order or requisition of investigations and results of investigations.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.95 (0.20)	6 (0)	24 (100)	20	3.70 (0.47)	4 (1)	20 (100)	Retained
Identify delays in the management of TB and MDR-TB patients.														
1 Identify the causes of delay in getting the results of investigations.	25	5.56 (0.82)	6 (1)	24 (96)	Retained	24	5.52 (0.83)	6 (1)	23 (95.83)	24	3.54 (0.72)	4 (1)	23 (95.83)	Revised
2 Identify the causes of delay in giving the anti-TB drugs to the patients.	25	5.56 (0.92)	6 (1)	24 (96)	Retained	24	5.61 (0.92)	6 (0.33)	23 (95.83)	22	3.68 (0.48)	4 (1)	22 (100)	Retained
Identify the lack of TB and MDR-TB infection control measures in hospital.														
1 Identify the patients who do not stay in isolated room/ward/unit but walk around the hospital without any purposes related to diagnosis or treatment procedures.	25	5.44 (1.39)	6 (1)	23 (92)	Retained	24	5.79 (0.39)	6 (0.42)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Revised
2 Identify the causes, why the patients do not stay in isolated room/ward of the hospital.	25	5.48 (1.08)	6 (1)	24 (96)	Retained	24	5.71 (0.53)	6 (0.52)	24 (100)	23	3.48 (0.59)	4 (1)	22 (95.65)	Retained
3 Identify the infectious MDR-TB patients who do not use a mask when they go out of isolated rooms/wards/units/hospitals.	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.74 (0.44)	6 (0.81)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Retained

Table 22 (continued)

	Statements	Round 1					Round 2							
		Consensus					Consensus confirmation				Prioritization			
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
4	Identify the infectious MDR-TB patients who do not use handkerchief, tissues or other protectors during coughing, sneezing or talking.	25	5.76 (0.44)	6 (0.5)	25 (100)	Retained	24	5.78 (0.41)	6 (0.18)	24 (100)	24	3.58 (0.58)	4 (1)	23 (95.83)	Discarded
5	Identify the non-TB and TB patients who are admitted to MDR-TB wards.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	24	3.71 (0.46)	4 (1)	24 (100)	Retained
6	Identify the MDR-TB patients who go to the non-TB or TB wards to meet with or visit other patients as their friends, relatives or known persons.	25	5.60 (1.04)	6 (1)	24 (96)	Retained	24	5.78 (0.41)	6 (0.3)	24 (100)	24	3.63 (0.49)	4 (1)	24 (100)	Retained
7	Identify the patients for whom the directly observed treatment (DOT) is needed for.	25	5.56 (0.92)	6 (1)	24 (96)	Retained	24	5.67 (0.85)	6 (0.33)	23 (95.83)	24	3.71 (0.46)	4 (1)	24 (100)	Retained
8	Identify the lack in maintaining sputum hygiene.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.83 (0.38)	6 (0)	24 (100)	24	3.54 (0.59)	4 (1)	23 (95.83)	Revised
9	Identify the lack of appropriate ventilation in MDR-TB wards or rooms.	25	5.64 (0.70)	6 (1)	24 (96)	Retained	24	5.79 (0.38)	6 (0.36)	24 (100)	24	3.42 (0.72)	4 (1)	21 (87.50)	Retained
10	Identify the non-cooperative or unmotivated MDR-TB patients.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.58 (0.65)	4 (1)	22 (91.67)	Retained

Table 22 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Identify risks induced by treatment & investigation procedures.															
1	Identify inappropriate sputum collection procedures in the ward.	25	5.72 (0.46)	6 (1)	25 (100)	Retained	24	5.78 (0.41)	6 (0.21)	24 (100)	24	3.58 (0.58)	4 (1)	23 (95.83)	Retained
2	Identify the treatment and investigation procedures that can causes transmission of TB and MDR-TB.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	24	3.71 (0.55)	4 (0.75)	23 (95.83)	Retained
3	Identify the places/rooms of risk for the transmission of TB and MDR-TB where the patients gather for treatment and investigation purposes.	25	5.56 (1.16)	6 (0)	23 (92)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	24	3.58 (0.58)	4 (1)	23 (95.83)	Retained
4	Identify the devices that can help to transmit the TB and MDR-TB to other patients such as micromist, oxygen canula/mask, suction tube, and spirometer.	25	5.92 (0.28)	6 (0)	25 (100)	Revised	24	5.91 (0.28)	6 (0)	24 (100)	24	3.58 (0.65)	4 (1)	22 (91.67)	Revised
5	Identify the side effects of anti-TB drugs.	24	5.58 (0.93)	6 (0.75)	23 (95.83)	Retained	23	5.59 (0.94)	6 (0.42)	22 (95.65)	24	3.71 (0.46)	4 (1)	24 (100)	Retained

Table 23

List of Statements, and Results of Two- Rounds Delphi on Content Validation of the NPG: MDR-TB in the Risk Assessment Category of Level 2.

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Screening the patient for MDR-TB and its risk factors during admission.														
1 During admission of or transfer in the patient in MDR-TB ward, nurses should check thoroughly the admission ticket and all medical records of every patient to confirm whether the patient is non-TB or TB, or MDR-TB.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.66 (1.24)	6 (0)	23 (95.83)	24	3.54 (0.93)	4 (1)	22 (91.67)	Retained
2 Nurses should ask the every patient whether he/she has ever been treated for TB or MDR-TB and exposed to MDR-TB.	25	5.8 (0.41)	6 (0)	25 (100)	Retained	24	5.58 (1.25)	6 (0.15)	23 (95.83)	24	3.38 (0.88)	3.50 (1)	23 (95.83)	Retained
Assess the patient for non-compliance with MDR-TB treatment.														
1 Nurses should observe the patient's medication.	25	5.64 (1.08)	6 (0.5)	24 (96)	Retained	24	5.82 (0.48)	6 (0)	24 (100)	23	3.78 (0.42)	4 (0)	23 (100)	Discarded
2 Nurses should ask the patients, patients' relatives, other patients and health care providers to assess the time, dose, and regular intake of anti-drugs.	25	5.80 (0.50)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	23	3.74 (0.45)	4 (1)	23 (100)	Retained

Table 23 (continued)

statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
3 Nurses should check the anti-TB drugs of the patients that have been previously provided to them.	25	5.68 (1.03)	6 (0)	24 (96)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	23	3.70 (0.56)	4 (1)	22 (95.65)	Retained
Monitoring and preventing TB and MDR-TB transmission in hospital.														
1 Suspect the patients for infectious MDR-TB if - cough is present, - cough inducing procedures are performed, - sputum smears are known to contain AFB, - patients are not receiving anti-TB therapy, and - no change in their symptoms since starting therapy.	25	5.44 (0.92)	6 (1)	23 (92)	Revised	24	5.64 (0.54)	6 (0.89)	24 (100)	24	3.63 (0.58)	4 (1)	23 (95.83)	Retained
Assess the side effects of anti-TB drugs.														
1 Nurses should be knowledgeable about the common side effects of second line anti-TB drugs.	25	5.76 (0.83)	6 (0)	24 (96)	Retained	24	5.74 (0.85)	6 (0)	23 (95.83)	23	3.83 (0.39)	4 (0)	23 (100)	Revised

Table 23 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
2 To assess the common side effects of anti-TB drugs, everyday nurses should - ask the patient about the development of side effects - observe the patient for the development of side effects - listen to the patients and others about the development of side effects.	25	5.44 (1.08)	6 (1)	23 (92)	Retained	24	5.51 (0.96)	6 (0.56)	23 (95.83)	23	3.57 (0.59)	4 (1)	22 (95.65)	Revised
Investigate the patients for MDR-TB and its risk factors														
1 Nurses should be knowledgeable about the common investigations for the assessment of MDR-TB.	25	5.80 (0.50)	6 (0)	25 (100)	Retained	24	5.78 (0.51)	6 (0)	24 (100)	24	3.63 (0.77)	4 (0.75)	22 (91.67)	Retained
2 Nurses should assess the sputum conversion by testing sputum AFB, culture and DST routinely.	25	5.56 (1.26	6 (0)	24 (96)	Retained	24	5.80 (0.35)	6 (0.44)	24 (100)	24	3.67 (0.64)	4 (0.75)	22 (91.67)	Retained

Table 24

List of Statements, and Results of Two- Rounds on Delphi Content Validation of the NPG: MDR-TB in the Risk Treatment Category of Level 2

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
Maintain infection control measures in hospital.														
1 **Administrative control measures.** Suspected or diagnosed infectious MDR-TB patients should be nursed in a separate room from the non-TB, TB and non-infectious MDR-TB.	25	5.84 (0.47)	6 (0)	25 (100)	Retained	24	5.90 (0.28)	6 (0)	24 (100)	24	3.63 (0.65)	4 (1)	22 (91.67)	Combined with # 3
2 Nurses should strongly considered the continue isolation for throughout the hospitalization for suspected or diagnosed infectious MDR-TB patients.	25	5.60 (.71)	6 (1)	24 (96)	Revised	24	5.65 (0.70)	6 (0.85)	23 (95.83)	23	3.74 (0.54)	4 (0)	22 (95.65)	Retained
3 Patients with infectious MDR-TB should be nursed in an isolated from other patients in a negative pressure room. If it is available, at least the patient be kept in a separate well ventilated room ideally until culture is negative; three negative sputum smears have been obtained.	25	5.52 (1.08)	6 (1)	24 (96)	Retained	24	5.69 (0.55)	6 (0.87)	24 (100)	23	3.65 (0.57)	4 (1)	22 (95.65)	Combined with # 1

Table 24 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
4	Medically essential procedures that can not be performed in the isolation rooms for infectious MDR-TB patients, should be scheduled at times when they can be performed rapidly and when waiting areas are less crowded.	25	5.48 (0.65)	6 (1)	25 (100)	Retained	24	5.56 (0.58)	6 (1)	23 (95.83)	23	3.52 (0.59)	4 (1)	22 (95.65)	Retained
5	**Use personal respiratory protector** Nurses should ensure the use of surgical mask for infectious MDR-TB patients when they: - come to contact with other (non-TB and TB) patients - go out of the ward - wait together with other (non-TB and TB) patients for investigations.	25	5.68 (0.75)	6 (0)	24 (96)	Retained	24	5.85 (0.34)	6 (0)	24 (100)	23	3.78 (0.42)	4 (0)	23 (100)	Combined with # 6
6	Nurses should ask and remind the patients wear a surgical mask that cover their mouth and nose if they need to leave the room for medically essential procedures until they had at least three negative microscopic smears on	25	5.60 (1.25)	6 (0)	24 (96)	Retained	24	5.80 (0.48)	6 (0)	24 (100)	23	3.70 (0.56)	4 (1)	22 (95.65)	Combined with # 5

Table 24 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	separate occasions**.**														
7	Nurses should ensure the use of mask for MDR-TB patents when come to contact with others by - asking them to use a mask - influencing/motivating them to use a mask - forcing them to use mask.	24	5.75 (0.61)	6 (0)	24 (100)	Retained	23	5.77 (0.60)	6 (0)	23 (100)	23	3.74 (0.45)	4 (1)	23 (100)	Retained
	Use separate devices														
8	Nurses should use separate respiratory devices for each patient including O_2 canula/mask, micromist, suction tube, spirometer, respo-chamber, and inhaler.	25	5.84 (0.62)	6 (0)	24 (96)	Retained	24	5.83 (0.64)	6 (0)	23 (95.83)	24	3.83 (0.38)	4 (0)	24 (100)	Revised
	Engineering or environmental control measures														
9	Nurses should keep open the windows and doors (if necessary) to facilitate the natural ventilation of the ward.	25	5.80 (0.41)	6 (0)	25 (100)	Retained	24	5.78 (0.41)	6 (0.15)	24 (100)	24	3.67 (0.56)	4 (1)	23 (95.83)	Revised
10	No cloth should be hung inside the ward that can hampered the natural ventilation of the ward.	25	5.80 (.49)	6 (0)	25 (100)	Retained	24	5.78 (0.41)	6 (0.15)	24 (100)	24	3.54 (0.59)	4 (1)	23 (95.83)	Retained

Table 24 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
11	Special cleaning of rooms following isolation for MDR-TB is not required.	25	5.48 (0.77)	6 (1)	24 (96)	Retained	24	5.44 (0.77)	6 (1)	23 (95.83)	21	3.29 (0.96)	3 (1)	19 (90.48)	Retained
New statements added after round one.															
12	During admission of MDR-TB patient, nurses should take a written consent from the patient and his/her attendance (if available) on some terms and conditions approved by the local authority.	-	-	-	-	-	23	5.52 (0.73)	6 (1)	23 (100)	23	3.61 (0.89)	4 (1)	22 (95.65)	Retained
New statements added after round two.															
13	For infectious MDR-TB patients, nurses should performed the aerosol-generating procedures such as sputum induction, nesogastric suction or nebulization in an appropriately engineered or well ventilated area/room.	-	-	-	-	-	-	-	-	-	-	-	-	-	Added
Maintain respiratory hygiene/cough etiquette															
1	Nurses should ask and remind the patient to cover his/her mouth when coughing or sneezing, to.	25	5.80 (0.50)	6 (0)	25 (100)	Retained	24	5.78 (0.51)	6 (0)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Revised

Table 24 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score 3 (%)	Decision
use disposable tissues , or handkerchiefs, and wash their hands frequently														
2 Nurses should ask the patients to collect the sputum in a plastic container with lid then throw it in the toilet pan and wash the container properly.	25	5.28 (1.51)	6 (0)	22 (88)	Revised	24	5.36 (1.46)	6 (0.72)	22 (91.67)	24	3.50 (0.88)	4 (1)	23 (95.83)	Revised
3 Nurses should provide disinfectant (if possible/available) in the sputum container to prevent the transmission of MDR-TB germs.	25	5.68 (.69)	6 (1)	24 (96)	Retained	24	5.81 (0.38)	6 (0.24)	24 (100)	23	3.52 (0.90)	4 (1)	22 (95.65)	Revised
Provide health education and support.														
1 Nurses should provide necessary information to the TB patients about the different wards and settings, and risky places in the hospital for transmitting MDR-TB patients.	25	5.84 (.37)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	23	3.65 (0.49)	4 (1)	23 (100)	Revised
2 Nurses should provide health education on - transmission of MDR-TB - the prevention of MDR-TB transmission to	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.83 (0.38)	6 (0)	24 (100)	23	3.78 (0.42)	4 (0)	23 (100)	Revised

Table 24 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	others - medication - the effects of inadequately treated TB - the importance of completing the prescribed course of treatment - the consequences to the individual if he or she is unwilling to adhere to the treatment plan, and - the health care system, - the possible side-effects of anti-TB drugs, - how to collect the sputum sample, and - when and how to use the mask.														
3	Nurses should arrange a weekly health education/ patient teaching session for admitted MDR-TB patients.	25	5.52 (0.92)	6 (1)	23 (92)	Retained	24	5.67 (0.69)	6 (0.48)	23 (95.83)	24	3.29 (0.91)	3 (1)	22 (91.67)	Retained
4	The nurses should treat the patients with respect and establish a rapport.	23	5.78 (0.42)	6 (0)	23 (100)	Retained	22	5.76 (0.43)	6 (0.41)	22 (100)	24	3.63 (0.49)	4 (1)	24 (100)	Retained

Table 24 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
New statements added after round two.														
5 Nurses should reinforce education to patients when they encounter any problems regarding management of TB and MDR-TB.	-	-	-	-	-	-	-	-	-	-	-	-	-	Added
Sputum specimen collection and investigation.														
1 Nurses should collect the three sputum specimens for AFB with fully completed form as follows - an initial 'spot' specimen taken at the first time or first day - an early morning specimen, the next day, and - another 'spot' specimen when the second sample (early morning sample) is collected from the patient.	24	5.71 (0.55)	6 (0.75)	24 (100)	Retained	24	5.77 (0.51)	6 (0.22)	24 (100)	24	3.63 (0.58)	4 (1)	23 (95.83)	Discarded
2 Nurses should clearly label the specimen container first with ward number, bed number, patient's name and necessary information. The label should be	25	5.96 (0.20)	6 (0)	25 (100)	Retained	24	5.96 (0.20)	6 (0)	24 (100)	24	3.92 (0.28)	4 (0)	24 (100)	Revised

Table 24 (continued)

	Statements	Round 1					Round 2							
		Consensus					Consensus confirmation				Prioritization			
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
	on the outer side of container never on the lid.														
3	Nurses should maintain the appropriate method and precautions in collecting a sputum sample.	25	5.88 (0.44)	6 (0)	25 (100)	Retained	24	5.95 (0.20)	6 (0)	24 (100)	24	3.88 (0.34)	4 (0)	24 (100)	Retained
4	Nurses should maintain separate sputum register, and should promptly and accurately document all the necessary information including the dates that the test are ordered, the samples are sent for examination, and the results.	24	5.88 (0.34)	6 (0)	24 (100)	Retained	23	5.86 (0.34)	6 (0)	23 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Revised
5	Nurses should explain the test to be done and the reason for doing them e.g., sputum testing, and x-ray, if available.	25	5.72 (0.46)	6 (1)	25 (100)	Revised	24	5.77 (0.41)	6 (0.28)	24 (100)	24	3.63 (0.49)	4 (1)	24 (100)	Retained
6	Nurses should inform the patient in writing or orally about when to expect test results and how the results will be conveyed.	25	5.80 0.41	6 (0)	25 (100)	Retained	24	5.82 (0.38)	6 (0.15)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Retained
7	Nurses should check the sputum register to see which results are outstanding each day and contact the laboratory to get results of any outstanding specimens.	25	5.72 (0.54)	6 (0.5)	25 (100)	Retained	24	5.74 (0.53)	6 (0.21)	24 (100)	24	3.63 (0.49)	4 (1)	24 (100)	Retained

Table 24 (continued)

	Statements	Round 1					Round 2							
		Consensus					Consensus confirmation				Prioritization			
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
8	Nurses should collect the sputum in local exhaust ventilation devices (booths or special enclosures) or in a separate well ventilated room or at least nurses should arrange a space or area in a corner of the ward by using screens.	25	5.52 (1.12)	6 (0.5)	24 (96)	Retained	24	5.75 (0.51)	6 (0.36)	24 (100)	23	3.48 (0.51)	3 (1)	23 (100)	Revised
9	Nurses should help the patient to collect sputum when the patient can not produce sputum by: - nebulizing the patients with normal saline - helping the patient to do physical exercise.	25	5.80 (0.50)	6 (0)	25 (100)	Revised	24	5.78 (0.51)	6 (0)	24 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Revised
New Statements added after round one.															
10	Nurses should send the sputum specimen as early as possible after collection.	-	-	-	-	-	23	5.65 (1.30)	6 (0)	22 (95.65)	23	3.78 (0.85)	4 (0)	22 (95.65)	Combined with # 11
11	Nurses should ensure that specimens are protected from exposure to direct sunlight during storage and transportation**.**	-	-	-	-	-	23	5.57 (1.31)	6 (0)	22 (95.65)	23	3.74 (0.86)	4 (0)	22 (95.65)	Combined with # 10

Table 24 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
E**nsure administration of anti-TB drugs**.														
1 Nurses should ensure that patients are given the correct medication and can provide support for patients and their relatives or carers to prevent lapses in treatment.	25	5.92 (0.28)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	24	3.83 (0.38)	4 (0)	24 (100)	Combined with # 3
2 Nurses should be knowledgeable about the standard dose and duration of anti-TB drugs as national TB control guidelines.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	24	3.88 (0.34)	4 (0)	24 (100)	Retained
3 Nurses should inform the physician if the patient has started inappropriate or subnormal or inadequate dosages of anti-TB drugs.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.91 0.28	6 (0)	24 (100)	24	3.88 (0.34)	4 (0)	24 (100)	Combined with # 1
4 Nurses should provide second-lines anti-TB and other additional drugs daily instead of twice or trice in a week.	25	5.36 (1.29)	6 (1)	23 (92)	Retained	24	5.61 (0.87)	6 (0.64)	23 (95.83)	24	3.58 (0.50)	4 (1)	24 (100)	Revised
5 Nurses should directly observed the patient's medication (directly observed treatment; DOT).	25	5.76 (.83)	6 (0)	24 (96)	Retained	24	5.77 (0.83)	6 (0)	23 (95.83)	24	3.83 (0.38)	4 (0)	24 (100)	Retained

Table 24 (continued)

	Statements	Round 1					Round 2								
		Consensus					Consensus confirmation				Prioritization				
		N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
6	Nurses must maintain the DOT for the patients with certain conditions such as: - homelessness - drug abuser - psychiatric disorder - intolerance to anti-TB drugs .	25	5.88 (0.44)	6 (0)	25 (100)	Retained	24	5.94 (0.20)	6 (0)	24 (100)	24	3.67 (0.87)	4 (0)	23 (95.83)	Revised
7	Nurses can do DOT by themselves, patients relative, and subordinate staff.	25	5.68 (0.63)	6 (0.5)	25 (100)	Retained	24	5.70 (0.62)	6 (0.24)	24 (100)	24	3.58 (0.50)	4 (1)	24 (100)	Revised
8	Nurses should ask the TB patients at least one time in a day whether she/he has taken the anti-TB drugs or not or not.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.86 (0.34)	6 (0)	24 (100)	24	3.79 (0.41)	4 (0)	24 (100)	Revised
9	During distributing medicine nurses should check the anti-TB drugs that have been previously distributed or have collected from DOT to ensure the - the proper intake of anti-TB drugs - having the proper amount of anti-TB drugs for next days particularly for holidays.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	24	3.88 (0.34)	4 (0)	24 (100)	Discarded

Table 24 (continued)

Statements	Round 1					Round 2								
	Consensus					Consensus confirmation				Prioritization				
	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	Decision	N	M (SD)	Median (IQR)	N of Score ≥ 4 (%)	N	M (SD)	Median (IQR)	N of Score ≥ 3 (%)	Decision
New statements added after round two.														
Nurses should take and record the body weight of patient to help for prescribe correct dose of anti-TB drugs, and to assess the patient's improvement.	-	-	-	-	-	-	-	-	-	-	-	-	-	Added
Management of drug side effects.														
1 Nurses should be knowledgeable about common side effects of anti-TB drugs.	25	5.88 (0.33)	6 (0)	25 (100)	Retained	24	5.87 (0.34)	6 (0)	24 (100)	24	3.83 (0.48)	4 (0)	23 (95.83)	Discarded
2 Nurses should look after the patients for the drugs' side effects from the start to finish of the drugs.	25	5.84 (0.37)	6 (0)	25 (100)	Retained	24	5.83 (0.38)	6 (0)	24 (100)	24	3.83 (0.38)	4 (0)	24 (100)	Revised
3 Nurses should take note of side effect of anti-TB drugs and report to the physicians.	25	5.92 (0.28)	6 (0)	25 (100)	Retained	24	5.91 (0.28)	6 (0)	24 (100)	21	4.00 (0.00)	4 (0)	21 (100)	Retained

APPENDIX D 7

RESULTS OF THE EFFICIENCY OF THE NPG: MDR-TB

Table 25

Mean, Standard Deviation, and the Level of Significance Differences of Preventive Practices Score in Each Sub-category and Items Related to the Case Finding Measures in Pre and Post Implementation of the NPG: MDR-TB at the Level 0 (N = 20)

Preventive Practices	Pretest		Posttest		
	Mean	SD	Mean	SD	*p*
Identifying vulnerable patients.	1.60	0.81	2.99	0.35	$< .001^{t}$
1 I identify the patients who have ……	1.50	0.89	2.85	0.37	$< .001^{z}$
2 I identify the patients who have ……	1.85	1.09	3.45	0.51	$< .001^{t}$
3 I identify the patients who are ……	1.50	1.05	2.90	0.64	$< .001^{t}$
4 I identify the patients with ……	1.55	0.89	2.75	0.72	$< .001^{t}$
Identifying delay in the management ...	2.20	0.99	3.40	0.45	$< .001^{t}$
5 I identify the delay in the process …	2.10	1.02	3.20	0.70	$< .01^{t}$
6 I identify the delay in transferring …	2.30	1.26	3.60	0.60	$< .001^{t}$
Identify the lacking of TB and MDR….	2.72	0.61	3.60	0.28	$< .001^{z}$
7 I find out the TB and MDR-TB ……	2.65	0.81	3.45	0.51	$< .01^{t}$
8 I identify the TB/MDR-TB ……...	2.75	0.91	3.65	0.59	$< .01^{t}$
9 I find out the infectious TB and ……	2.75	0.91	3.70	0.47	$< .001^{t}$
Identifying risks induced by ……..	1.83	0.96	3.20	0.50	$< .001^{t}$
10 I recognize the places/rooms of ……	1.40	1.10	3.00	0.65	$< .001^{t}$
11 I find out the devices, use in the …...	2.25	1.12	3.40	0.60	$< .001^{t}$
Screening and monitoring the ……...	2.43	0.63	3.53	0.21	$< .001^{t}$
12 I check the patients' admission …….	2.55	1.15	3.60	0.68	$< .01^{t}$
13 I ask the patients during ……	2.20	1.01	3.30	0.47	$< .001^{t}$
14 I check the patients' drugs ……	2.90	1.07	3.95	0.22	$< .01^{z}$
15 I ask every patient for the ……	2.20	1.11	3.30	0.57	$< .01^{t}$
16 I perform the prescribed sputum …...	3.00	1.03	3.90	0.31	$< .01^{z}$
17 I monitor the patients for ……..	1.75	1.12	3.10	0.55	$< .001^{t}$

Table 26

Mean, Standard Deviation, and the Level of Significance Differences of Preventive Practices Score in Each Sub-category and Items Related to the Case Holding Measures in Pre and Post Implementation of the NPG: MDR-TB at the Level 0 (N = 20)

Preventive Practices		Pretest		Posttest		
		Mean	SD	Mean	SD	*p*
Maintaining the TB/MDR-TB infection control measures.		2.51	0.55	3.53	0.21	$< .001^{t}$
1	I take necessary measures to ……	2.60	0.99	3.35	0.67	$< .05^{t}$
2	I label the patient's file and …….	2.45	0.94	3.60	0.50	$< .001^{t}$
3	I ask the infectious TB and ……..	3.10	0.72	3.95	0.22	$< .01^{z}$
4	I use the separate devices such as ….	3.25	0.85	3.85	0.37	$< .05^{z}$
5	I ask the patients to collect ……...	1.15	1.18	2.90	0.72	$< .001^{t}$
Maintain respiratory hygiene and ……		2.70	0.69	3.55	0.22	$< .001^{t}$
6	I ask the TB/MDR-TB patients to …	2.85	0.99	3.85	0.37	$< .01^{z}$
7	I ask the TB/MDR-TB patients to …	2.85	1.14	3.65	0.49	$< .01^{t}$
8	I collect the three samples of ……	3.25	1.07	3.95	0.22	$< .05^{z}$
9	I follow the sputum collection …….	2.70	1.03	3.45	0.60	$< .01^{t}$
10	I explain the patients about the …….	2.45	1.05	3.40	0.68	$< .01^{t}$
11	I inform the patients when to ……	2.55	1.05	3.30	0.66	$< .01^{t}$
12	I maintain the sputum register …….	3.60	0.75	4.00	0.00	$< .05^{z}$
13	I check the sputum register to …….	2.30	1.03	3.40	0.68	$< .01^{t}$
14	I help the patients to collect ……..	1.75	1.07	2.95	0.51	$< .001^{t}$
Providing health education and ……		2.05	0.93	3.25	0.55	$< .001^{t}$
15	I inform the patients about the ……..	1.70	1.13	3.15	0.75	$< .001^{t}$
16	I teach the TB and MDR-TB ……	2.40	0.99	3.35	0.59	$< .001^{t}$

Table 27

Mean, Standard Deviation, and the Level of Significance Differences of Preventive Practices Score in Each Sub-category and Items Related to the Case Finding Measures in Post and Post Implementation of the NPG: MDR-TB at the Level 1 (N = 23)

Preventive Practices	Pretest		Posttest		
	Mean	SD	Mean	SD	*p*
Identifying vulnerable patients	2.01	0.60	2.97	0.24	$< .001^{t}$
1 I identify the patients who have …..	1.83	0.94	3.00	0.30	$< .001^{z}$
2 I identify the patients who have …..	2.04	0.93	3.13	0.69	$< .01^{t}$
3 I identify the patients who are ……..	1.96	0.88	2.48	0.51	$< .05^{t}$
4 I identify the patients with ……	2.22	0.80	3.26	0.54	$< .001^{t}$
Identifying the patients' non-……	2.37	0.83	3.57	0.48	$< .001^{t}$
5 I find out the TB patients who ……..	2.35	0.93	3.52	0.59	$< .001^{t}$
6 I find out the TB patients who …….	2.39	0.94	3.61	0.50	$< .001^{t}$
Identifying delays and mistakes in ……	2.32	0.76	3.39	0.30	$< .001^{t}$
7 I identify the delay in doing …….	2.26	0.92	3.26	0.45	$< .001^{t}$
8 I recognize the delay in ……	2.00	0.90	3.04	0.47	$< .001^{t}$
9 I find out the TB patients who ……..	2.70	1.22	3.87	0.34	$< .01^{z}$
Identifying the lacking of TB and …….	2.71	0.56	3.46	0.24	$< .001^{t}$
10 I find out the infectious TB …….	2.43	0.84	3.22	0.67	$< .01^{t}$
11 I find out the infectious TB and ……	3.00	0.90	4.00	0.00	$< .001^{t}$
12 I identify the patients who ……	2.91	0.79	3.57	0.51	$< .001^{t}$
13 I find out the MDR-TB patients …..	2.74	0.86	3.26	0.45	$< .05^{t}$
14 I find out the patients for whom …..	2.78	0.85	3.22	0.60	$>.05^{t}$
15 I identify the inappropriate ……..	2.39	0.94	3.48	0.51	$< .001^{t}$
Identifying risks induced by …….	2.34	0.70	3.53	0.24	$< .001^{t}$
16 I identify inappropriate ……	1.96	0.98	3.26	0.54	$< .001^{t}$
17 I find out the treatment and …….	2.43	1.08	3.74	0.45	$< .001^{t}$
18 I recognize the places and ……	2.39	0.72	3.61	0.50	$< .001^{t}$

Table 27 (continued)

	Preventive Practices	Pretest		Posttest		
		Mean	SD	Mean	SD	*p*
19	I find out the TB patients who …….	2.57	0.95	3.52	0.51	< .001[t]
Screening and monitoring ……		2.43	0.66	3.38	0.24	< .001[t]
20	I check the patients' admission …….	2.83	0.98	3.65	0.49	< .01[t]
21	I ask the patients whether they ……	2.35	0.83	3.57	0.51	< .001[t]
22	I check the patients' drugs that …….	2.57	1.04	3.48	0.51	< .01[t]
23	I perform the prescribed sputum …..	2.35	1.15	3.04	0.56	< .05[t]
24	I observe and monitor every TB …..	2.04	0.82	3.17	0.39	< .001[z]

Table 28

Mean, Standard Deviation, and the Level of Significance Differences of Preventive Practices Score in Each Sub-category and Items Related to the Case Holding Measures in Pre and Post Implementation of the NPG: MDR-TB at the Level 1 (N = 23)

	Preventive Practices	Pretest		Posttest		
		Mean	SD	Mean	SD	*p*
Maintaining the TB/MDR-TB ……..		2.61	0.71	3.47	0.20	< .001[t]
1	I keep separate the infectious TB…	2.39	1.16	3.39	0.58	< .01[t]
2	I take necessary measures to …….	2.87	1.01	3.43	0.51	< .01[t]
3	I label the patient's file …….	2.57	1.16	3.57	0.59	< .01[t]
4	I ask and remind the infectious ……	2.87	0.81	3.83	0.39	< .001[z]
5	I use separate devices such as …….	3.26	0.62	3.96	0.21	< .001[z]
6	I ensure the natural ventilation …….	2.57	0.84	3.35	0.57	< .01[t]
7	I ask the patients to collect ……...	1.74	1.18	2.78	0.67	< .001[t]
Maintain respiratory hygiene ……		2.97	0.53	3.56	0.19	< .001[t]
8	I ask the TB/MDR-TB patients ……	2.96	0.82	3.91	0.29	< .001[z]
9	I ask the TB/MDR-TB patients ……	3.26	0.81	4.00	0.00	< .01[z]
10	I follow the sputum collection …….	2.52	0.79	3.26	0.45	< .01[t]

Table 28 (continued)

	Preventive Practices	Pretest		Posttest		
		Mean	SD	Mean	SD	*p*
11	I explain the patients about test ……	3.13	0.63	3.39	0.58	$>.05^{t}$
12	I inform the physician while the ….	3.26	0.86	3.96	0.21	$< .01^{z}$
13	I inform the patients when to ……	2.74	0.81	3.17	0.58	$< .05^{t}$
14	I maintain sputum register ……	3.65	0.65	3.96	0.21	$< .05^{z}$
15	I check the sputum register to ……..	2.87	0.81	3.13	0.46	$>.05^{t}$
16	I help the patients to …….	2.30	1.15	3.22	0.42	$< .01^{z}$
Ensuring the intake of anti-TB drugs.		3.12	0.57	3.76	0.21	$< .001^{t}$
17	I ensure the correct dosages ……	3.39	0.84	3.96	0.21	$< .01^{z}$
18	I consult with physician if the ……..	3.13	0.69	3.87	0.34	$< .01^{z}$
19	I ask and remind the patients to ……	3.22	0.80	3.91	0.29	$< .01^{z}$
20	I do DOT for the patients who …..	2.83	1.07	3.52	0.51	$< .01^{t}$
21	I check the patients' drugs to ……	3.04	0.77	3.52	0.51	$< .05^{t}$
Management of side effects.		2.74	0.80	3.46	0.40	$< .001^{t}$
22	I ask and observe the TB ……..	2.65	1.07	3.52	0.51	$< .001^{t}$
23	I take note for side effect of ……..	2.83	0.72	3.39	0.50	$< .01^{t}$
Providing health education and ……		2.24	0.63	3.20	0.37	$< .001^{t}$
24	I respect and greet the TB patients	2.74	0.92	3.61	0.50	$< .001^{t}$
25	I inform the patients about the ……..	2.48	0.95	3.52	0.51	$< .001^{t}$
26	I teach the TB and MDR-TB ……..	2.48	0.95	3.22	0.52	$< .01^{t}$
27	I arrange or help to arrange the …….	1.26	1.01	2.43	0.59	$< .001^{t}$

Table 29

Mean, Standard Deviation, and the Level of Significance Differences of Preventive Practices Score in Each Sub-category and Items Related to the Case Finding Measures in Pre and Post Implementation of the NPG: MDR-TB at the Level 2 (N = 21)

Preventive Practices		Pretest		Posttest		
		Mean	SD	Mean	SD	*p*
Identifying the non-compliance patients with MDR-TB……..		2.75	0.53	3.30	0.39	$< .001^{t}$
1	I find out the MDR-TB patients …..	2.67	0.86	3.33	0.48	$< .01^{t}$
2	I identify the patients who are …….	2.81	0.93	3.33	0.48	$< .05^{t}$
3	I find out the patients who do not …	2.76	0.77	3.24	0.62	$>.05^{t}$
Identifying the lacks of TB and ……		2.90	0.59	3.60	0.16	$< .001^{t}$
4	I identify the patients who are …….	3.24	0.62	3.95	0.22	$< .001^{z}$
5	I recognize the infectious …….	2.95	0.97	3.19	0.60	$>.05^{t}$
6	I identify the patients who do ……..	2.95	0.80	3.76	0.44	$< .001^{t}$
7	I identify the non-TB and TB ……..	2.57	1.08	3.57	0.51	$< .01^{t}$
8	I find out the patients for …….	3.24	0.89	4.00	0.00	$< .01^{z}$
9	I find out the lacking in ……..	2.76	0.89	3.43	0.60	$< .05^{t}$
10	I find out the non-cooperative …….	2.57	0.75	3.29	0.46	$< .01^{t}$
Identify risks induced by treatment ….		2.36	0.91	3.29	0.33	$< .001^{t}$
11	I identify inappropriate …….	2.33	1.06	3.38	0.50	$< .01^{t}$
12	I find out the treatment and …….	2.43	1.08	3.33	0.58	$< .01^{t}$
13	I recognize the places and rooms …..	1.81	1.25	2.90	0.77	$< .01^{t}$
14	I find out the TB patients who …….	2.86	1.24	3.52	0.51	$< .01^{t}$
Screening and monitoring the …….		3.43	0.55	3.90	0.20	$< .01^{z}$
15	I check thoroughly the admission ….	3.57	0.60	4.00	0.00	$< .01^{z}$
16	I assess the sputum conversion …….	3.29	0.72	3.81	0.40	$< .05^{t}$

Table 30

Mean, Standard Deviation, and the Level of Significance Differences of Preventive Practices Score in Each Sub-category and Items Related to the Case Holding Measures in Pre and Post Implementation of the NPG: MDR-TB at the Level 2 (N = 21)

Preventive Practices		Pretest		Posttest		
		Mean	SD	Mean	SD	*p*
Maintaining TB/MDR-TB ……		2.73	0.77	3.60	0.17	$< .001^{t}$
1	I strictly maintain isolation ……..	2.29	1.23	3.24	0.44	$< .01^{t}$
2	I keep the infectious and ……..	2.76	1.22	3.43	0.51	$< .05^{t}$
3	I send the patients at the ……..	1.81	1.50	3.38	0.50	$< .001^{t}$
4	I ensure the use of surgical.. ……	3.52	0.60	3.95	0.22	$< .05^{z}$
5	I use the separate devices …….	3.57	0.68	3.90	0.30	$>.05^{t}$
6	I ensure the natural ventilation …….	3.19	0.81	3.90	0.30	$< .01^{z}$
7	I ask the patients to collect ……...	1.95	1.56	3.38	0.50	$< .001^{t}$
Maintaining respiratory hygiene ……..		3.11	0.62	3.74	0.12	$< .01^{z}$
8	I ask the TB/MDR-TB patients ……	3.24	0.77	3.90	0.30	$< .01^{z}$
9	I ask the patients to collect the ……	3.48	0.75	3.90	0.30	$< .05^{z}$
10	I follow the sputum collection …….	2.62	1.20	3.29	0.46	$< .05^{t}$
11	I maintain sputum register when I …	3.76	0.54	3.95	0.22	$>.05^{t}$
12	I check the sputum register to see …	3.10	0.70	3.86	0.36	$< .01^{z}$
13	I explain the patients about the …….	3.14	0.79	3.76	0.44	$< .05^{t}$
14	I inform the patients when to ……..	3.00	0.89	3.86	0.36	$< .01^{z}$
15	I help the patients to collect ……..	2.57	0.93	3.38	0.50	$< .01^{t}$
Ensuring the intake of anti-TB drugs.		3.43	0.56	3.89	0.24	$< .01^{z}$
16	I ensure the correct dosages of ……	3.62	0.74	3.90	0.30	$>.05^{t}$
17	I consult with physician if …….	3.29	0.64	3.90	0.30	$< .01^{z}$
18	I ask and remind the patients ……	3.38	0.67	3.86	0.36	$< .05^{z}$

Table 30 (continued)

Preventive Practices	Pretest		Posttest		
	Mean	SD	Mean	SD	*p*
Management of side effects.	3.05	0.77	3.93	0.18	< .01[z]
19 I ask and observe the TB ……	3.05	0.80	3.90	0.30	< .01[z]
20 I take note for side effect of ……..	3.05	0.86	3.95	0.22	< .01[z]
Providing health education and ……	2.56	0.88	3.43	0.18	< .001[t]
21 I respect and greet the MDR-TB ….	3.24	1.04	3.95	0.22	< .01[z]
22 I provide emotional support …….	3.05	0.86	4.00	0.00	< .01[z]
23 I inform the patients about the …….	2.38	1.40	3.33	0.48	< .01[t]
24 I teach the TB and MDR-TB ……	2.86	0.96	3.29	0.46	>.05[t]
25 I arrange or help to arrange ……	1.29	1.19	2.57	0.60	< .001[t]

APPENDIX E

LIST OF EXPERTS

LIST OF EXPERTS OF TWO-ROUND DELPHI

The twenty five expert participants of two-round Delphi

1 Prof. Dr. Pravat Chandra Barua
Professor & Head of the Department, Community Medicine, Chittagong Medical College Hospital, Chittagong, and
Ex. Director, MBDC and Line Director National TB Control and Leprosy, Dhaka, Bangladesh.

2 Assoc. Prof. Dr. Asif Mujtaba Mahmud
Sir Salimullah Medical College and Mitford Hospital (SSMCMH), Dhaka, and
Exp-DOTS-Plus Coordinator, NIDCH, Mohakhali, Dhaka, Bangladesh.

3 Assist. Prof. Dr. Md. Wahiduzzaman Akhanda
DOTS-Plus Coordinator and Assistant Professor, Respiratory Medicine, NIDCH, Mohakhali, Dhaka, Bangladesh.

4 Assist. Prof. Dr. Khairul Hasan Jessy
Respiratory Medicine, NIDCH, Mohakhali, Dhaka, Bangladesh.

5 Dr. S M Lutfar Rahman
Residential Medical Officer, NIDCH, Mohakhali, Dhaka, Bangladesh.

6 Dr Farzana Naheed
Residential Medical Officer, NIDCH, Mohakhali, Dhaka, Bangladesh.

7 Dr. Mohammad Abdur Rahim
Medical Officer. OSD, DG Health, Mohakhali, Dhaka, Bangladesh.

8 Saleha Khatum, MSc, RN
Instructor, College of Nursing, Mohakhali, Dhaka, Bangladesh.

9 Sayed Golam Hossain, MPH, RN
Deputy Nursing Superintendent; National Institute of Ophthalmology, Dhaka, Bangladesh.

10 Protiba Rani Kar, MSc, RN
Nursing Supervisor, NIDCH, Mohakhali, Dhaka, Bangladesh.

11 MD. Zasim Uddin, MPH, RN
Nursing Supervisor, NIDCH, Mohakhali, Dhaka, Bangladesh.

12 Bani Prova Basu, MPH, RN
Senior Staff Nurse, NIDCH, Mohakhali, Dhaka, Bangladesh.

13 Sanku Barua, MPH, RN
Senior Staff Nurse, Chest Diseases Hospital, Fozderhat, Chittagong Bangladesh.

14 Mahenur Begum, MSc, RN
Instructor, College of Nursing, Mohakhali, Dhaka, Bangladesh.

15 Nasrin Akhter, BSc, RN
Senior Staff Nurse, NIDCH, Mohakhali, Dhaka, Bangladesh.

16 Shila Rani Hira, MSc, RN
Instructor, College of Nursing, Mohakhali, Dhaka, Bangladesh.

17 Saleha Khatun, MPH, RN
Senior Staff Nurse, NIDCH, Mohakhali, Dhaka, Bangladesh.
18 MD Jewel Ahmed, BSc (Hon), MSc in Microbiology
Lab coordinator (microbiologist), National Tuberculosis Reference Laboratory, NIDCH, Mohakhali, Dhaka, Bangladesh.
19 Rina Sarker, BSc, RN
Senior Staff Nurse, NIDCH, Mohakhali, Dhaka, Bangladesh.
20 Sabitri Samadder, MSc, RN
Senior Staff Nurse. NIDCH, Mohakhali, Dhaka, Bangladesh.
21 Nazma Begum, BSc, RN
Senior Staff Nurse, NIDCH, Mohakhali, Dhaka, Bangladesh.
22 Ferdous Jahan, BSc, RN
Senior Staff Nurse. NIDCH, Mohakhali, Dhaka, Bangladesh.
23 Nasima Begum, MSc, RN
Senior Staff Nurse, NIDCH, Mohakhali, Dhaka, Bangladesh.
24 Biplab Halder, MSc, RN
Senior Staff Nurse. NIDCH, Mohakhali, Dhaka, Bangladesh.
25 Shahnaz Perveen, BSc, RN
Senior Staff Nurse. NIDCH, Mohakhali, Dhaka, Bangladesh.

LIST OF EXPERTS FOR CONTENT VALIDITY OF MDR-TB PPQ

The three sets of instruments used for assessing for the efficiency of the NPG: MDR-TB entitled “MDR-TB Preventive Practice Questionnaires” were validated by three experts as follows.

1. Dr. Abdus Sakur Khan, Assistant Professor, Chest Medicine, NIDCH, Mohakhali, Dhaka, Bangladesh.
2. Asst. Prof. Dr. Ploenpit Thaniwattananon, RN, PhD, Department of Adult Medical Nursing, Faculty of Nursing, Prince of Songkla University. Thailand.
3. Saleha Khatun, Instructor, College of Nursing, Mohakhali, Dhaka 1212, Bangladesh.

VITAE

Name Mohammad Nurul Anowar

Student ID 5110430012

Educational Attainment

Degree	Name of Institution	Year of graduation
Master of Public Health in Health Promotion and Health Education	National Institute of Preventive and Social Medicine (NIPSOM), Dhaka	2005
Bachelor of Nursing Science (Nursing)	College of Nursing, Dhaka	2001
Diploma in Orthopaedic Nursing	Nursing Institute, Chittagong	1993
Diploma in General Nursing	Nursing Institute, Chittagong	1992

Scholarship Award during Enrollment

2008-2010 Scholarship for the Degree of Doctor of Philosophy in Nursing, Faculty of Nursing, Prince of Songkla University, funded by the Government of the People's Republic of Bangladesh

Work–Position and Address

Senior Staff Nurse, National Institute of Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka 1212, Mobile: 88-01675 741520, E-mail: mn.anowar@yahoo.com

List of Publication and Proceedings

Anowar, M. N., Petpichetchian, W., & Isaramalai, S. (2010, 7-9 April). *Nursing contribution to the prevention of MDR-TB: A literature review.* Paper presented at the The 2010 International Nursing Conference, Graceland Resort and Spa, Phuket, Thailand.

Anowar, M. N., Petpichetchian, W., & Isaramalai, S. (2012, 22-23 February). *Development of nursing practice guidelines for prevention of multidrug-resistant tuberculosis among hospitalized adult patients in Bangladesh: A preliminary study.* Paper presented at the The 15th East Asian Forum of Nursing Scholars (EAFONS), Furama RiverFront Hotel, Singapore.