

Guidelines to Enhance the Implementation of Effective Tuberculosis Control Measures in Rural Public Hospitals of Vhembe District, South Africa

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ABSTRACT This paper developed guidelines believed to enhance the implementation of effective measures of tuberculosis control. The reasoning strategies as well as the components of a theory were used to develop these guidelines. The guidelines assume that health care workers like any other employees need the support of management regarding the improvement of tuberculosis control-related dynamics at the workplace; and that the management was found to possess inadequate knowledge to deal with such dynamics. These guidelines therefore concluded that if managers can be the first to receive training based on national and international tuberculosis control protocols, they will be empowered with knowledge and skills to improve health care workers' tuberculosis control-related dynamics. The belief is that if the workplace dynamics are addressed, health care workers will be motivated to implement effective tuberculosis control measures even in rural hospitals.

INTRODUCTION

Infectious diseases including multidrug resistant tuberculosis (MDR-TB) and extensive drug resistant tuberculosis (XDR TB) was the leading cause of death in South Africa (Statistics South Africa 2014). According to the World Health organisation (WHO) TB report (2014), in 2013 alone, 1.3 million people died from TB. In addition, about 5.7 million newly diagnosed TB cases were notified in National TB programmes globally. South Africa (SA) is amongst the three countries that had almost 60 percent of the world cases of Multi- drug- resistant. SA up till now has not reached the global target of 85 percent TB cure rate as well as 70 percent detection rate; and as a country SA ranked the third highest in the world in terms of the TB burden in 2014, with an incidence that has increased by 400 percent over the past 15 years. In 2014 alone, the total new TB cases notified in South Africa were 296 664 (WHO Global TB Report 2014).

This increased incidence of new TB infections was attributed to the growing MDR-TB rates, with 15 419 confirmed cases in 2014. Of the 15 419 confirmed cases, only 6 494 patients were started on MDR-TB treatments, which is 42 percent. The remaining 68 percent were not started on MDR-TB treatments, which suggest that they continued to transmit the TB infection

to people around them (such as their relatives, friends, health care workers and other patients). The concern was that all infectious TB and untreated MDR/XDR-TB patients in Limpopo province including Vhembe district were first admitted at non-specialised hospitals in medical or TB wards, whilst appearing on the often long waiting lists for admissions to specialised public TB hospitals. Robinson et al. (2007) found in SA's nine provinces that non-specialised hospitals have no effective TB infection control programme in place, which suggest that there is an on-going substantial risk of hospital TB transmissions.

Increased rates of new cases of TB, MDR-TB and XDR-TB is a major threat to achieving TB control and elimination by the year 2050 as advocated by the Millennium Development Goal number 6 and STOP TB partnership. Singh et al. (2014) point out that if the spread of MDR-TB is not abated, there could be a potentially explosive international health crisis, given the airborne transmission of TB and grave threat that MDR-TB and XDR-TB pose, especially when considering the fact that South Africa is one of the world's fastest growing tourist destinations and home to millions of migrant labourers from neighbouring and other African countries. Javis (2014) therefore emphasise that there is need to implement practices that seek to reduce the risk of

contracting TB in public hospitals if the control of TB is to be achieved.

Despite Jarvis' (2014) call, a study conducted by Tshitangano (2014) revealed that health care workers in public hospitals still implement ineffective TB control measures such as placing infectious TB patients together with non-infected people; failing to triage or fast-track TB suspects in OPD/casualty etc. This paper aimed to develop guidelines, which will enhance the implementation of effective TB control measures in rural public hospitals of Vhembe district.

Objectives of the Study

- Set the goals of the developed guidelines
- Identify the concepts of the guidelines
- Define concepts of the guidelines
- Establish relational statements of the guidelines
- Describe the assumptions of the guidelines
- Describe the structure of the guidelines

METHODOLOGY

Study Design

The methods of Dublin's theory building (Lynham 2014) called reasoning strategies were used to develop the guidelines. These strategies include analysis, synthesis, deductive reasoning and inductive reasoning. The analysis strategy employed Tech's open coding method of data analysis described in Creswell (2009) to identify guideline concepts and their attributes. The synthesis strategy was used to construct relational statements. Deductive reasoning strategy permitted the authors an opportunity to make logical predictions in the form of assumptions based on the literature reviewed. The inductive reasoning strategy was used to draw conclusions in the form of a hypothesis. The developed guidelines were described using the components of a theory suggested by Chinn and Kramer (2011) namely the goal; concepts; definition of concepts; relation statements; the assumptions; and the structure of the guidelines.

The Goal of the Guidelines

The developed guidelines aimed at enhancing health care workers' implementation of effective TB control measures believed to minimise the risk of contracting TB in rural public hospitals; thereby assisting the district's achievement

of the national and international TB infection control targets namely, detection of 70 percent of infectious TB cases; successfully treating 85 percent of these identified cases (WHO 2009); and achieving TB elimination by 2050 (UN MDG Goals 2000).

Guideline Concepts

The following concepts were identified as the concepts of the guidelines:

- ♦ Lack of TB control plans;
- ♦ Ineffective practices of dealing with LTBI; Ineffective triage practices;
- ♦ Delay in TB suspicion, diagnosis and treatment;
- ♦ Ineffective practices of isolating infectious TB patients; and
- ♦ Unsafe sputum collection practices.
- ♦ Ineffective practices to improve room ventilation;
- ♦ Shortage of masks especially N95 respirators; and
- ♦ Ineffective practices regarding use, care and disposal of personal respiratory protective devices.
- ♦ Lack of clear directing TB control guidelines;
- ♦ Inadequate TB infection control training with insufficient content;
- ♦ Inappropriate designs of buildings;
- ♦ Inadequate material resources;
- ♦ Inadequate human resources;
- ♦ Inadequate management support;
- ♦ Incorrect attitudes towards TB control good practices; and
- ♦ Inadequate knowledge regarding good TB control practices (Tshitangano et al. 2013).

Definition of the Concepts

Each of the concepts identified above was defined on the bases of their attributes in order to provide details of what they entail. Additional definitions of these concepts (termed conceptual definitions) were from various sources such as the WHO (2009) policy as well as from dictionaries.

Relational Statements

When the concepts were compared based on their attributes, six relationships between them were discovered and described namely:

- ♦ Lack of clear directing guidelines influence health care workers' implementation of the majority of ineffective TB control measures;
- ♦ Inadequate management support is in the form of inadequate material resources; inadequate human resources; inadequate TB control trainings; lack of clear directing TB control guidelines; and inappropriate designs of buildings.
- ♦ Inadequate material resources influence HCWs' implementation of certain ineffective TB control measures;
- ♦ Inadequate human resources influence HCWs' implementation of certain ineffective TB control measures;
- ♦ Inadequate TB control trainings lead to inadequate knowledge and incorrect attitudes; and
- ♦ Incorrect attitudes influence HCWs' implementation of certain ineffective TB control measures.

The above relational statements were summarised to mean "inadequate management support in the form of inadequate material resources; inadequate human resources; inadequate TB control trainings; lack of clear directing TB control guidelines; inadequate knowledge; incorrect attitudes; and inappropriate designs of buildings influence HCWs' implementation of ineffective TB control measures at hospitals".

Guideline Assumptions

The guidelines assumes that if managers are the first to receive TB control training based on national and international TB infection control protocols, they will be empowered with knowledge and skills to deal with HCWs' workplace challenges referred to as dynamics in this guidelines. The believe being that if dynamics are improved, HCWs will be motivated to implement effective measures of TB control that will minimize the risk of contracting TB in rural public hospitals.

Guideline Structure

In order to design the structure of the guidelines, Dickoff et al.'s six elements of practice theory described by Meleis (2012), which are the context, agent, recipient, dynamic, procedure, and the terminus were adopted.

The *context* of guidelines refers to the hospital with its interrelated wards for TB managementnamely TB wards, medical wards, TB cubi-

cles, laboratory, X-ray department, OPD/casualty, the HIV unit, and the pharmacy department.

Agents of guidelines refer to hospital managers and TB control managers who will implement the guidelines.

Recipients of guidelines are all categories of the HCWs who provide TB care and treatment in hospital wards and departments, who will be affected by the implementation of the guidelines.

The *dynamics* identified for this guideline from data analysis include:

- Inadequate management support;
- Lack of clear TB control guidelines;
- Inadequate material resources;
- Inadequate human resources;
- Inadequate TB control trainings;
- Inadequate knowledge; and
- Incorrect attitudes.

The *protocols* governing the developed guidelines were national and international TB control policies and guidelines namely:

- The who (2009) policy on TB infection control;
- The South African national TB control programme practical guidelines (DOH 2004);
- The management of drug-resistant TB (DOH 2012);
- National TB management guidelines (DOH 2009);
- Guidelines for tuberculosis preventive therapy among HIV infected individuals in South Africa (DOH 2010);
- The national infection prevention and control policy for TB, MDR-TB and XDR-TB part 1 and2 (DOH 2007);
- The multi-drug resistant tuberculosis – policy framework on decentralised and deinstitutionalised management for South Africa (DOH 2011);
- The 2012-2016 national TB strategic plan (DOH 2012); and
- The TB infection control guideline (DOH 2010).

The *terminus* of the guideline is to achieve HCWs' implementation of effective tuberculosis control measures believed to minimise the risks of contracting TB in public hospitals.

OBSERVATIONS AND DISCUSSION

Guidelines to Enhance Health Care Workers' Implementation of Effective Measures of TB Control

The developed guidelines are organized into sub-topics of activities responding to the workplace dynamics identified namely:

- Appointment of appropriate TB control human resources;
- Development of TB control plan/guidelines;
- Designing and building or renovating wards and TB isolation wards;
- Providing appropriate TB control material resources;
- Conducting trainings regarding the developed TB control guidelines; and
- Implementation of the guidelines, supervision and control

These sub-topics of activities are discussed based on the literature as well as national and international TB control legislative framework as follows:

Appointment of Appropriate TB Infection Control Human Resources

A retrospective observational study by Dara et al. (2015) with a sample size of 770 infection control nurses conducted to explore measurement of infection control nurses in Thailand suggested that if an infection control program is adequately resourced, its ability should be strengthened to reduce the transmission opportunities, which suggests that if TB infection control is to be realised at hospital of Vhembe district, human and material resources should be adequately provided.

Thus, hospital managers at district and hospital levels have to

- Appoint infection prevention and control teams comprised of medically trained microbiologist and a registered nurse trained in infection control (DOH 2007); and
- Establish multi-disciplinary infection prevention and control committee comprised of microbiologist, pharmacist, housekeeping supervisor, laundry service manager, and hospital manager (DOH 2007).

According to the CDC (2015), the infection control team is responsible for the day-to-day functions of TB infection control, as well as preparing the yearly work plan for review by the TB infection control committee and administration. These individuals have a scientific and technical support role: for example, surveillance and research, developing and assessing policies and practical supervision, evaluation of material and products, control of sterilization and disinfection, and implementation of training programmes. The team also supports and participates in re-

search and assessment programmes at national and international level (CDC 2015).

The Role of TB Infection Control Nurses

The TB control nurse coordinates the TB control committee, writes an infection control plan for the hospital and obtains approval from appropriate authorities. According to the WHO (2014), the TB infection control nurse monitors the implementation of and adherence to the TB infection control plan by:

- Identifying TB nosocomial infections in the hospital;
- Participating in training of health care workers;
- Surveillance of hospital TB infections;
- Participating in outbreak investigation;
- Developing TB infection control guidelines and review and approval of patient care policies relevant to TB infection control;
- Ensuring compliance with local and national regulations;
- Liaising with public health and other facilities, where appropriate; and
- Providing expert consultative advice to health care workers and other appropriate hospital programmes in matters relating to transmission of TB infections (WHO 2014).

The Role of the Microbiologist in Effective TB Control

These include:

- Handling patient and staff specimens to maximize the likelihood of a microbiological diagnosis;
- Developing guidelines for appropriate collection, transport, and handling of specimens;
- Ensuring that laboratory practices meet appropriate standards;
- Ensuring safe laboratory practice to prevent infections in staff;
- Performing antimicrobial susceptibility testing following internationally recognized methods, and providing summary reports of prevalence of resistance;
- Monitoring sterilization, disinfection and the environment where necessary; and
- Timely communicating results to the infection control committee (WHO 2014).

The Role of the TB Control Committee

The tasks of the committee are to:

- Review and approve a yearly programme of activity for surveillance and prevention of TB;
- Review TB epidemiological surveillance data and identify areas for intervention;
- Assess and promote improved practice at all levels of the health facility;
- Ensure appropriate staff training in TB infection control and safety;
- Review risks associated with new TB technologies, and monitor TB infectious risks of new devices and products, prior to their approval for use;
- Review and provide input into investigation of TB epidemics; and
- Communicate and cooperate with other committees of the hospital (WHO 2014).

The Role of the Hospital Pharmacist

These include:

- Obtaining, storing and distributing pharmaceutical preparations, using practices which limit potential transmission of *mycobacterium tuberculosis* to patients;
- Dispensing anti-infectious drugs and maintaining relevant records (potency, incompatibility, conditions of storage and deterioration);
- Obtaining and storing TB vaccines or sera, and making them available as appropriate;
- Maintaining records of TB drugs distributed to medical departments;
- Providing the infection control committee with summary reports and trends of antimicrobial use;
- The hospital pharmacist may also participate in the hospital sterilization and disinfection practices through:
- Participation in development of guidelines for antiseptics, disinfectants, and products used for washing and disinfecting the hands;
- Participation in guideline development for re-use of equipment and patient materials;
- Participation in quality control of techniques used to sterilize equipment in the hospital, including selection of sterilization equipment (type of appliances) and monitoring; and

- Having available the following information on disinfectants, antiseptics and other anti-infectious agents:

- ✓ Active properties in relation to concentration, temperature, length of action, antibiotic spectrum;
- ✓ Toxic properties, including sensitization or irritation of the skin and mucosa;
- ✓ Substances that are incompatible with antibiotics or reduce their potency;
- ✓ Physical conditions which unfavourably affect potency during storage: temperature, light, humidity (CDC 2015).

The next section discusses another activity meant to enhance the implementation of the effective TB practices in hospitals, which is

The Development of TB Control Plan/Guideline

In a study conducted in Queensland by Amon et al. (2009) to gain a context-based description of the scope of practice of infection control practitioners, a need for a shift from surveillance to strategic management was emphasized, which suggested a need for TB infection control plans and guidelines at hospital level.

Participants in a study conducted by Basu et al. (2007) to develop a model for infection control service delivery in Queensland identified a range of processes and resources that they perceived would improve their programs such as infection control management plans, suggesting a need for TB infection control plans and guidelines at hospitals of Vhembe district.

Another study conducted by Bednarsh et al. (2015) in Australia to identify the external influences on infection control revealed that clear concise, understandable and usable measures are needed to minimise health care workers' confusion, which suggested that TB infection control guidelines are necessary at hospitals of Vhembe district. Further studies by Chughtai et al. (2015) in USA conducted to propose elements of idealised future states and systems for infection prevention, revealed the need for clear guiding principle, which suggested a need for clear TB infection control guidelines based on national and international TB policies.

Thus, the appointed TB control committee and the team have to consult the following South African TB infection control guidelines and policies to get information that will assist them to

develop clear hospital level TB infection control guidelines:

- ♦ The South African national TB control programme practical guidelines (2004);
- ♦ The management of drug-resistant TB policy guidelines (2012);
- ♦ National TB management guidelines (2009); and
- ♦ Guidelines for tuberculosis preventive therapy among HIV infected individuals in South Africa (2010).
- ♦ The national infection prevention and control policy for TB, MDR-TB and XDR-TB part 1 and 2 (2007); and
- ♦ Multi-drug resistant tuberculosis – policy framework on decentralised and deinstitutionalised management for South Africa (2011).

Designing and Building or Renovating Appropriate Wards and TB Isolation Wards

In order to minimise exposure of non-infectious patients to TB infection, the hospital managers should motivate and make the budget available to build TB isolation wards away from non-infectious patients as recommended by the WHO (2009). In order to allow maximum air entry into the ward/rooms, a budget should be set aside to renovate buildings in order to ensure that waiting areas are opened to the environment; windows are placed on outer walls; the type of windows used allows maximum air entry into the wards; and that means for mechanical ventilation are installed.

Conducting Trainings Regarding the TB Control Guidelines

Infection prevention and control is effective only if all staff working in a facility understands the importance of the infection prevention and control policies and their role in implementing them (DOH 2007). Thus, the DOH (2007) prescribes that training should include the following:

- ♦ Basic concepts of mycobacterium tuberculosis transmission and pathogenesis, i.e. the difference between infection and disease;
- ♦ Risk of TB transmission to health care workers and staff;
- ♦ Symptoms and signs of TB;

- ♦ The impact of HIV infection on increasing risk of developing TB disease and the importance of TB as a major cause of disease and death in people living with HIV and AIDS;
- ♦ The importance of the infection prevention and control plan and the responsibility that each staff member has to implement and maintain infection prevention and control practices;
- ♦ Specific infection prevention and control measures and work practices that reduce the likelihood of transmitting TB; and
- ♦ Measures staff can take to protect themselves from contracting TB.

Training should also consider using the assumptions of the health belief model (HBM) of behaviour change described by (Akinsola 2006) to determine the readiness of the implementers to adopt developed TB control guidelines and be able to address any wrong attitudes/perceptions during training. This is because the HBM states that individuals will practice the recommended TB infection control measures only:

- ♦ If they believe they are at risk of contracting TB;
- ♦ If they believe that TB is serious and always has negative outcomes;
- ♦ If they believe that by adopting the TB infection control guidelines TB will be avoided or its seriousness will be reduced;
- ♦ If they believe that there are no barriers such as costs involved in practising the TB infection control guidelines;
- ♦ If they are internally or externally motivated by the death of someone very important to them due to TB; and
- ♦ If they are confident of their own ability to initiate and sustain the practice of guidelines.

The health care workers should be trained thoroughly on:

- ♦ Their TB prevention job duties;
- ♦ Expected standards of performance;
- ♦ The TB infection control team and committee they will be working with;
- ♦ Problems they might encounter in their work and what to do about them (Nagy and Vilela 2015).

Implementation of TB Control Guidelines, Supervision and Control

Implementation is the realization of an application, or execution of a plan, idea, model, design, specification, standard, algorithm, or poli-

cy (Jayi IT security 2015). Using these guidelines, the TB infection control team together with hospital management will support, control and evaluate health care workers' implementation efforts.

Support during the implementation of the guidelines will be shown in the following ways:

- ♦ Letting implementers know that the TB infection control team members (supervisors) are approachable and willing to listen to personal problems as well as work-related problems;
- ♦ ensuring that implementers are supplied continuously with the necessary resources they require;
- ♦ Involving implementers in decisions that will affect them in order to foster a sense of ownership that will enhance their connection with their work;
- ♦ Always reminding implementers that they are an important part of the hospital;
- ♦ Always encouraging personal initiatives if it works well and recognise the owner of the idea;
- ♦ Scheduling regular meetings where implementers can raise issues of concern to them; always giving implementers regular feedback (oral or written) regarding their work;
- ♦ Giving implementers a chance to evaluate the TB infection control team (supervisors);
- ♦ Always criticising privately and praise publicly.

Control in management means setting standards, measuring actual performance and taking corrective action. In these guidelines, to control is to check the errors made by implementers and take the corrective action so that deviation from developed guidelines are minimized and the stated goals are achieved.

Control during the implementation of the TB infection control guidelines will be done in the following manner:

- ♦ The TB infection control guidelines will be the standard against which deviant behavior should be judged;
- ♦ Health care workers' actual practices will be measured against these standards;
- ♦ Corrective actions against deviant behavior will be taken in line with the South African Labour relations act, no. 66 of 1995, in the form of counseling, training or discipline.

Evaluation of the implementation of the TB infection control guidelines will be done as follows:

- ♦ Assess the relevance of implemented guidelines to the context, people, health needs, available resources, technologies, and capacities.
- ♦ Assess the progress of implementation to periodically measure actual achievement against planned guideline objectives; identify gaps; and their causes.
- ♦ Assess the efficiency of the implementation of the guidelines to determine the relationship between actual implementation results, and resources utilised.
- ♦ Assess the effectiveness of implementation to determine immediate outputs and outcomes of the primary health care intervention, and degree to which predetermined objectives are achieved.
- ♦ Assess the impact after implementation to understand overall outcome of guideline implementation on the health of hospital users.
- ♦ Assess sustainability to determine the implementers' value and readiness to continue or maintain the practice of TB control guidelines (Dara et al. 2015).

CONCLUSION

According to the knowledge, attitude and practice (KAP) model, if people acquire knowledge, skills and correct attitudes from training they respond by getting motivated to adopt correct practices. Thus, it is believed that if HCWs' workplace dynamics are improved, health care workers would adopt effective TB infection control measures in hospitals. If managers continually supervise and control health care workers' practices, all national and international TB control targets would be accomplished.

RECOMMENDATIONS

Authors recommend that the guidelines be adopted by the Department of Health in order to be piloted for effectiveness evaluation.

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