

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS CARING FOR DRUG
RESISTANT TUBERCULOSIS PATIENTS AT PRINCESS MARINA HOSPITAL,
GABORONE

Submitted in partial fulfilment for the completion of
Master of Nursing Science

By

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Approval Page

This special research project has been examined and is approved as meeting the required standards of scholarship in accordance with the requirements of the degree of Master of Nursing Science.

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Statement of Originality

This special research project contains work completed by the author at the University of Botswana, between months of January 2018 and June 2018. It is an original work except where due reference materials was used and neither has it been nor will it be submitted for the award in any other University.

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Date

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Dedications

This work is dedicated to all health care workers working in different health care facilities in Botswana. To my parents, Mrs Tshenyego Letota and Mr Letota Sebetwane (1933-2015) who taught me to be self reliant at an early age in life. To my husband, Mr Edward Stegling for his continued support. To my daughter Miss Anitah Frank whom I had during the time of my study

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Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
AFB	Acid-Fast Bacillus
ARV	Anti Retroviral Therapy
CPT	Cotrimoxazole Preventive Therapy
CTBC	Community Based Tuberculosis Program
DOT	Directly Observed Therapy
DR-TB	Drug-Resistant Tuberculosis
DST	Drug Susceptibility and Testing
FDC	Fixed Dose Combination
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
HIV	Human Immune Deficiency Virus
HCWs	Health care workers
IC	Infection Control
IDCC	Infectious diseases care clinics
MDR-TB	Multi drug resistant tuberculosis
NTRL	National Tuberculosis Reference Laboratory
NTP	National Tuberculosis Program
PMH	Princess Marina Hospital

TB	Tuberculosis
TDR-TB	Totally Drug-Resistant
WHO	World Health Organization
XDR-TB	Extensively Drug Resistant Tuberculosis

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Abstract

Background: Tuberculosis (TB) remains a major global health problem and ranks alongside HIV/AIDS as the top infectious killer worldwide, with 9.6 million new cases and 1.5 million deaths estimated to have occurred in 2014. Drug-resistant TB (DR-TB) threatens the global TB control and is a major public health concern in several countries. Botswana has one of the world's highest burdens of TB per capita with a TB notification rate currently placing Botswana as 10th highest worldwide. The literature reviewed revealed that health care settings lack adequate or effective infection control measures thereby predisposing health care workers (HCWs) to TB infection and that they have poor health seeking behaviour hence poor access to TB/HIV treatment. In Botswana, there is limited data regarding the prevalence nor the incidence of TB amongst HCWs and their experiences in caring for DR-TB patients. **Purpose:** The purpose of this study is to explore experiences of HCWs during the provision of care to patients diagnosed with DR-TB at Princess Marina Hospital, Gaborone. **Methods:** The study will utilise a descriptive phenomenological qualitative research design and non-probability purposive sampling will be used. Semi-structured in-depth interviewing will be used to collect data and it will be analysed using Colaizzi (1978) phenomenological analytic method. NVivo software will be used to analyse the clusters of themes emerging from the data. **Findings:** The study findings will assist HCWs to modify infection control practices to minimise the risks in health care settings. It is envisaged that this would ultimately improve their health care.

Key Words: Health care workers, Caring, Drug resistant tuberculosis, Experiences.

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Chapter 1

This chapter presents the background, statement of the problem, purpose, objectives and significance of the study.

Background

Tuberculosis (TB) remains a major global health problem (WHO, 2012). It ranks alongside HIV/AIDS as the top infectious killer worldwide, with 9.6 million new cases and 1.5 million deaths estimated to have occurred in 2014 (Raviglione & Sulis, 2016). Drug-resistant TB (DR-TB) threatens the global TB control and is a major public health concern in several countries (WHO, 2012).

WHO (2012) estimated that there were 12 million cases of TB in 2011 and that 630 000 had MDR-TB. Approximately 1.4 million people died of TB. The burden of TB is highest in Asia and Africa; India and China together account for almost 40% of the world's TB cases and about 60% of cases are in the South-East Asia and Western Pacific regions. According to the WHO (2014), XDR-TB has been reported in 100 countries. The reports further assets that MDR-TB is difficult to treat and have significantly worse cure rates than standard TB. Globally, only 48% of MDR-TB patients were cured in 2013 (WHO, 2014). WHO estimated that 450,000 people fell ill with MDR-TB in 2012.China, India and the Russian Federation have the highest burden of MDR-TB. While the number of people detected worldwide with rapid diagnostic tests increased by more than 40% to 94,000 in 2012, around 16,000 MDR-TB cases reported to WHO in 2012 were not put on treatment, with long waiting lists increasingly becoming a problem. Furthermore, many countries are not achieving high cure rates due to a lack of service capacity and human resource shortages (Raviglione & Sulis, 2016).

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Multi-drug resistant TB (MDR-TB) refers to *Mycobacterium Tuberculosis* (*M.TB*) that is resistant to at least two of the most potent first line TB drugs (Isoniazid & Rifampicin). Extensively-drug resistant TB (XDR-TB) is defined as *M.TB* that is MDR and resistant to two of the most important classes of second-line anti-tuberculosis drugs; injectable agents (Amikacin) and fluoroquinilones. The management of MDR-TB/XDR-TB patients generally requires specialised centres and patients must take medication for at least 18-24 months (Botswana Tuberculosis Infection Control Guidelines, 2009). The emergence and spread of drug resistance mostly derive from mismanagement of TB cases such as the use of inappropriate dosages, inappropriate regimens, limited availability of quality-assured pharmaceutical products and little efforts to support patient's adherence (Raviglione & Sulis, 2016).

Botswana has one of the world's highest burdens of TB per capita with a TB notification rate currently placing Botswana as 10th highest worldwide. The current TB notification rate in Botswana is 505 per 100,000 populations per year (Tlale et al., 2015). Nationally, MDR-TB cases recorded from 2007 to 2013 were 611, and those suspected to have it but not confirmed were 142. In addition, the mono and poly resistance cases were 157 (Botswana National HIV & TB Drug Resistance Strategic & Operational Plan 2014-2017). HIV remains an important driver of the TB epidemic, with co-infection rates as high as 64% in 2011. National data in Botswana indicate that TB accounts for 13% of all adult deaths and 40% of deaths among people living with HIV & AIDS (Botswana National Tuberculosis Control Programme Strategic Plan, 2013-2017). It is unfortunate that DR-TB has no boundaries as it also infects and affects the HCWs who are service providers. There is

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limited data regarding the prevalence of HIV among the Botswana HCWs. A study by Siegel et al. (2015) revealed that there is an estimated 15.7% HIV prevalence among South African HCWs and that the risk of contracting TB for HCWs is nearly four times that of the general population which drove absenteeism, sick leave and attrition. Isaakidis et al. (2013) observed that MDR-TB patients co-infected with HIV experienced challenges in terms of the drug side effects such as depression and suicidal tendencies. Modongo et al. (2014) reported that 62% of MDR- TB patients on treatment developed hearing loss. Similarly, Zetola et al. (2013) reported that MDR –TB patients who had phenotypic DST heterogeneity were at greater risk of poor outcomes than those without phenotypic DST heterogeneity. These findings highlight the agony experienced by HCWs who are or have been DR-TB patients. TB in all its forms is a major occupational hazard for HCWs worldwide. The transmission of drug-sensitive and drug resistant strains of *Mycobacterium tuberculosis* occurs through infected droplets aerosolized by patients with active pulmonary TB (Delft et al., 2014).

The purpose of this study is therefore to explore experiences of health care workers providing care to patients diagnosed with drug resistant tuberculosis at Princess Marina Hospital, Gaborone.

In Sub-Saharan Africa, high rates of TB and HIV infection pose a serious threat to HCWs and by extension to health care systems that are already understaffed. Work-site transmission of *Mycobacterium tuberculosis*, documented through molecular genotyping, has been reported in high-income countries with fully functional infection control programmes, and is of even greater concern in resource limited settings where such programmes may not

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be in place. Studies in Africa and other parts of the world have indicated that hospital staff has an increased risk of *M. tuberculosis* infection and TB disease compared to the general population (Mulisa et al., 2014; Casas et al., 2013; Kehinde et al., 2011; Costa et al. 2011). Galgalo (2008) further reported that factors associated with nosocomial TB transmission included job designations involving care of TB patients, HIV infection and delay in diagnosing and treating patients with TB disease. Claaseens et al. (2013) indicated that 5% of HCWs in a study from Uganda reported having had TB and in Nigeria 3.3% of HCWs were acid fast bacilli positive. In South Africa the risk of contracting TB for HCWs is reported to be nearly four times that of the general population (Siegel et al., 2015).

Historically, in Botswana infection control was achieved by building TB wards which took advantage of natural air flow patterns and sunlight. Annual risk of infection surveys carried out in Botswana showed a decline from 5.8% in 1956 to 0.1% in 1989. TB notification rates were 506 per 100,000 and declined to 199 per 100 000 by 1989. With the emergence of HIV infection in the 1990s TB notification rate increased. However the enormous pressure to accommodate a growing patient population in the era of HIV and AIDS required structural modifications to health facilities, making them less suitable for TB patients. The HIV and AIDS epidemic have been responsible for the dramatic rise of TB cases in Botswana. The proportion of TB patients who are co-infected with HIV in Botswana ranges from 60% to 86% (Botswana Tuberculosis Infection Control Guidelines, 2009) & (Botswana National Tuberculosis Programme Manual, 2011).

In Botswana, the three important infection control measures that are used to minimise the risk of TB transmission in health facilities are the administrative, the environmental and the personal respiratory protection controls. The administrative controls are the policies and procedures that aim to reduce the generation of infectious droplets containing TB bacilli and

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the period of exposure to an infectious person, for example; early diagnosis of infectious TB patients and initiation of TB treatment and prompt separation of infectious TB patients or suspects from other patients. Environmental controls are the second line of defence whose aim is to reduce the concentration of infectious droplet nuclei in the air for example emphasis on natural ventilation by opening windows and doors and creating open waiting areas. Personal respiratory protection is the third line of protection used to augment and not replace administrative and environmental controls (BNTP Manual, 2011).

Respiratory protection refers to the use of a special mask called a respirator (N95) to protect HCW from inhaling *M.TB*. It is recommended that coughing TB patients use surgical masks not respirators. This is because surgical masks trap mucous which may contain large droplets (greater than 5 microns) containing M.TB thereby reducing their spread into the surrounding space (BTICG, 2009). Emerson et al. (2016) reported that though TB infection control practices are inadequate at facility level; there was a marked improvement after training of HCWs on TB infection control. In Botswana, the evaluation demonstrated an overall improvement in performance on the 32- indicator assessment tool from 27% at baseline to 80% at the 6-month follow-up visit.

These infection control measures are also used by other countries; for example The South African National Department of Health has adopted the infection control guidelines that reflect the best practices by the WHO and CDC namely; health system level controls, administrative controls, environmental and personal protection measures. It is further reported that despite the comprehensive infection control policies adopted by the South African National Department of Health, relatively few are well implemented. Failed administrative and environmental controls mean that personal protective measures, for

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example; N95 masks become the primary means of protection, leaving the burden of managing infection control to individual HCWs (Zelnick et al., 2013).

Smith et al. (2016) found out that although N95 respirators appeared to have a protective advantage over surgical masks in laboratory settings, their meta-analysis showed that there were insufficient data to determine definitively whether N95 respirators are superior to surgical masks in protecting health care workers against transmissible acute respiratory infections in clinical settings. Similarly, Centres for Disease Control and Prevention have recommended the use of respirators, (N95) but the challenge is that these masks have a high filtering efficiency thereby increasing the inspiratory resistance. This then result in increased difficulty in communication, dyspnoea and great face-seal leakage unless workers are properly trained and tested for fitting. The literature indicates that; delay in diagnosis, lack of space, shortage of beds, physical infrastructure design, poorly maintained equipment, poor procurement system were some of the challenges faced by hospital managers and HCWs caring for DR-TB patients (Zelnick et al., 2013; Naidoos et al., 2013; & Sissolak et al.,2010).

Although HCWs are at the frontline of National HIV Programmes, they often do not have adequate access to HIV services themselves and it has been recognized that loss of HCWs to HIV and TB requires urgent attention (WHO, ILO, IOM, 2010). HCWs infected with HIV are reported to be more susceptible to TB than those without HIV infection. In the absence of HIV infection, 10% of people infected with TB are expected to progress to active TB in their lifetime and concomitant HIV infection increases the risk of reactivation TB and increases an individual's risk of progressing to active TB from latent disease to about 10% per year (Arjun 2011; BNTP Manual, 2011). Similarly Zelnick, et al. (2013), observed that HIV infected HCWs chose to keep quiet (non disclosure) and hoped for

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the best. The psychological effort involved in concealing the illness to avoid further discrimination has been found to be detrimental though (Delft et al., 2014).

The transmission risk to HCWs is highest when patients have unrecognized TB or are receiving inappropriate treatment. WHO (2013) estimated that there were 3 million TB cases that go undiagnosed and untreated every year, perpetuating transmission. Naidoos et al. (2013) noted that from a total of 62 medical doctors who were diagnosed and treated for TB, 4 of them had MDR- TB. Similarly, Costa et al. (2011), reported that among the 6,112 HCWs evaluated, 62 cases of active TB were identified, and that physicians and nurses accounted for the highest numbers of cases. Studies by Delft et al. (2014) & Arjun (2011) found that HCWs were afraid of contracting TB from their patients in the crowded hospital wards and clinics as a result of poor implementation of infection control measures.

From the literature, some of the gaps identified are health care settings' lack of adequate or effective infection control measures or practices thereby predisposing HCWs to TB infection. Temesgen and Demissie (2011) reported that effective TB infection control in healthcare settings depends on early identification, isolating infected persons and rapidly and effectively treating persons with TB. A combination of control measures including administrative, engineering, environmental controls and personal protection measures have been recommended to reduce nosocomial TB risk. Emerson et al. (2016) study indicated that a scale-up of training for HCWs and continued monitoring and evaluation of TB infection control measures is essential to institutionalizing TB infection control at the facility level.

HCWs have been found to have poor health seeking behaviour hence poor access to TB/HIV treatment. Siegel et al. (2015) reported concerns regarding HIV and TB stigma prevalent among HCWs which are known to create a significant barrier for hospital staff to

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access and utilise HIV and TB services in general, whether at their workplace or at other facilities. Furthermore, HCWs who worked with people living with HIV experienced stigma and discrimination from colleagues based on fear of infection and association with improper or immoral behaviour. The study further reported that concerns of HIV and TB stigma, as well as fear of breach of confidentiality at the occupational health units were found to be high among HCWs. Delft et al. (2014) concur that HCWs diagnosed with TB sought treatment secretly as they feared backlash from their colleagues who themselves are afraid of contracting TB.

Statement of the Problem

The burden of TB in Botswana remains a public health emergency and is one of the most fatal opportunistic infections among people living with HIV. The Botswana National TB Control Programme surveillance data over the years has demonstrated a rising trend in drug resistance and MDR-TB in Botswana. Cumulatively, 517 MDR-TB cases were confirmed since 2007. About 78% of them were started on treatment while 9% of them died before treatment was initiated and 13% of them were lost to follow up or unaccounted for (TB, TB/HIV Training Manual for HCWs, 2012). Ten (10) confirmed cases of XDR-TB cases at the end of 2012 were reported (Botswana National HIV & TB Drug Resistance Strategic & Operational Plan, 2014-2017).

In Botswana, HCWs are exposed to DR-TB every day in their respective clinical settings due to the dual high burden of TB, HIV & AIDS. The Botswana AIDS Impact Survey IV (BIAS IV, 2013) estimated that the HIV prevalence for the general population (aged 18 months and over) to be 18.5%. In 2012, the BNTP rates of TB/HIV co-infection were estimated at 63% and testing rate for HIV in TB infected patients increased to 87% from 68%

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in 2008 (Botswana National HIV & TB Drug Resistance Strategic & Operational Plan, 2014-2017). Therefore there is need for a study that explores the experiences of health care workers caring for people afflicted with DR-TB.

In 2013, 10.3% of HCWs had DR-TB and their HIV status was not documented (MOH, 2013). Raesima et al. (2010) observed that of the 28 HCWs diagnosed with TB, 11 were HIV positive, marking a very high coinfection rate. Although there is limited data in Botswana regarding HCWs and TB, Baussano et al. (2011) observed that the effect of TB in HCWs on global TB incidence does not exceed 5% and is comparable across countries with different background TB incidence. Also, a systematic review of TB incidence in low and middle income countries estimated the annual risk of TB infection in HCWs to range from 3.9% to 14.3% (Deflt et al., 2014). Naidoos et al. (2013) noted that HCWs diagnosed with MDR-TB expressed concerns regarding negative attitudes of senior medical colleagues and administrators. These show that though there is limited data in the country, this is a huge issue. Therefore this may suggest there is a strong association between interaction of health care workers and the risk of being infected with DR-TB.

Arjun (2011) reported that there were times when patients were verbally and physically abusive to HCWs and it was during these times that they needed support but there was none. They therefore felt a lack of appreciation by management. Isaakidis et al. (2013) noted that HCWs expressed feelings of fear, hopelessness, anger, shock and powerlessness. In response to the increasing numbers of DR-TB cases; 5 MDR-TB treatment centres were established at Princess Marina Hospital, Nyangabwe Referral Hospital, Sekgoma Memorial Hospital, Ghanzi Primary Hospital, and Letsholathebe II Memorial Hospital. Patients

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confirmed or suspected to have DR-TB are referred for evaluation and initiation of treatment at the nearest centre.

Zelnick et al. (2013) also observed that HCWs expressed confusion over inconsistencies between policies and implementation of TB programme, for instance; they are encouraged to use N95 masks and at the same time constantly reminded about conserving them because of costs. In South Africa, nurses reported that although occupationally acquired TB is compensable, compensation was nearly impossible to get since exposure risks were common in the community and as such could not be isolated to the workplace (Wynne et al., 2014). Therefore this may signal the existence of unpleasant experiences health care workers undergo while caring for TB patients in general.

The infectious diseases care clinics (IDCCs), where HIV infected patients are initiated on antiretroviral therapy in Botswana carry a high density of TB patients and unfortunately these clinics have closed waiting areas thereby allowing the bacilli from coughing patients to remain in the air for a long time. Similarly, O'Donnell et al. (2010) reported that outbreaks of DR-TB amongst HCWs were observed in hospitals settings where patients with HIV and AIDS receive treatment and that MDR-TB hospitalisation was 64.8 per 100,000 HCWs compared to 11.9 per 100,000 in non HCWs in South Africa.

The health sector has a vital role to play in delivering prevention, diagnosis, treatment as well as care to the population it serves. To do so, health workers' own health rights and working conditions must be protected. Globally, there are 59.8 million health workers, two thirds of them (39.5 million) provide health services; the other one-third (19.8 million) are management and support workers. Without them, prevention and treatment of disease and advances in health care cannot reach those in need (WHO/ILO, 28 April 2010).

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In a review of TB rates among HCWs, the median annual incidence of occupationally acquired TB was 5.8% in low-income countries and 1.1% in high-income countries, while the attributable risk for TB disease in HCWs, compared to the risk in the general population, ranged from 25 to 5361 per 100 000 per year (Emerson et al., 2016). The World Health Organization (WHO) intends to include an indicator for monitoring of TB among HCWs, which is the ratio of TB notification rate (all forms) in HCW (all staff) over the TB notification rate in the general population, adjusted for age and sex, in the future Global TB reports (Tiemersma et al., (2016).

The dearth of literature on health care workers' experiences caring for drug resistant tuberculosis patients calls for a study to explore this phenomenon among nurses and doctors in general and in particular, at Princess Marina Hospital.

General Objective

The main objective of this study is to explore experiences of HCWs caring for patients diagnosed with DR-TB at Princess Marina Hospital, Gaborone.

Specific Objectives

1. Explore challenges experienced by HCWs during service provision to DR-TB patients.
2. Assess factors that motivate HCWs in providing care to DR-TB patients.
3. Explore the factors that inhibit HCWs from proper management of DR- TB patients.
4. Assess the knowledge base of HCWs on TB infection control.

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Significance

The impact of TB on HCWs service delivery and staff wellbeing can no longer be ignored because of the increasing numbers of DR-TB which complicates the control and management of TB in general. The study findings will assist HCWs to develop or modify infection control practices to minimise or eliminate the risks of transmission of TB in health care settings. It is envisaged that this would ultimately improve care of HCWs and patients in general. The study will contribute to development of occupational health service units for HCWs.

The study will also contribute to the body of knowledge in developing the occupational health curriculum in health care training institutions. This pioneering work in Botswana might generate interest, new ideas as well as new research questions pertinent to occupational health. The findings of this study will contribute to the development of occupational health policy.

Conclusion

This chapter presented the background, statement of the problem, purpose, objectives, significance of the study and the definition of key concepts. The next chapter will present the literature review. The structure of the proposal is as follows:

Chapter 1: Introduction and Background to the study

Chapter 2: Literature Review

Chapter 3: Research Methodology

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Definition of Terms

The following concepts are operationally defined as applied in the context of this study as follows:

Case of pulmonary TB: A patient with TB disease involving the lung parenchyma (WHO, 2012).

Definite case of TB: A patient with *Mycobacterium tuberculosis* complex identified from a clinical specimen, either by culture or by a newer method such as molecular line probe assay (WHO, 2012).

Experience: Emotionally or physically pleasurable or painful situation or condition that one goes through at some stage in life (Hornby, 2011).

Extra-pulmonary case of TB: A patient with TB of organs other than the lungs e.g. pleura, lymph nodes, abdomen, genitourinary tract, skin, joints and bones, meninges (WHO, 2012).

Extensive drug resistance (XDR): resistance to any fluoroquinolone, and at least one of the three second-line injectable drugs (capreomycin, kanamycin and amikacin), in addition to multidrug resistance (WHO, 2014).

Health Care workers (HCWs):

All those in public and in private services, in the health sector and other sectors, whose main activities are aimed at improving health. They include health service providers; for example, doctors, nurses, pharmacists and laboratory technicians and health management and support workers (WHO, 2009). In this study it refers mainly to doctors and nurses.

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Mono-resistance: resistance to one first-line anti-TB drug only (WHO, 2014).

Multidrug resistance (MDR): resistance to at least both isoniazid and rifampicin (WHO, 2014).

Nvivo: A software that permits researchers to examine relationships between concepts, hierarchies of codes, diagram and create hyperlinks of codes to create non-hierarchical networks (Polit & Beck, 2012).

Poly-resistance: resistance to more than one first-line anti-TB drug, other than both isoniazid and rifampicin (WHO, 2014).

Rifampicin resistance (RR): resistance to rifampicin detected using phenotypic or genotypic methods, with or without resistance to other anti-TB drugs (WHO, 2014).

Retreatment case of TB: There are three types of retreatment cases: (i) a patient previously treated for TB who is started on a retreatment regimen after previous treatment has failed (treatment after failure); (ii) a patient previously treated for TB who returns to treatment having previously defaulted (treatment after default) and (iii) a patient who was previously declared cured or treatment completed and is diagnosed with bacteriologically-positive; sputum smear or culture (treatment after relapse) (WHO, 2012).

Smear-positive pulmonary case of TB: A patient with one or more initial sputum smear examinations (direct smear microscopy) AFB positive; or one sputum examination AFB-positive plus radiographic abnormalities consistent with active pulmonary TB as determined

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by a clinician. Smear-positive cases are the most infectious and thus of the highest priority from a public health perspective (WHO, 2012).

Smear-negative pulmonary case of TB: A patient with pulmonary TB with at least two AFB-negative sputum smear examinations; radiographic abnormalities consistent with active pulmonary TB; no response to a course of broad-spectrum antibiotics and a decision by a clinician to treat with a full course of anti-TB chemotherapy (WHO, 2012).

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Chapter 2

This chapter presents the literature review conducted on Tuberculosis (TB) and Drug Resistant (DR-TB) condition in relation to care giving experiences of HCWs. Most studies in health care have for a very long time focused on patients or recipients of health care and very few were done on the providers of health care especially in Botswana. The purpose of this study is to explore experiences of HCWs caring for patients diagnosed with drug resistant tuberculosis at Princess Marina hospital in Botswana. Jean Watson's theory of human caring will also be presented as a theoretical framework underpinning the proposed study.

Literature Review

The literature was reviewed globally, regionally and locally and in particular Botswana. The literature review was conducted using the following search engines or resources: Google Scholar, Ebscohost, SAGE, Open Access, CINAHL & Medline. Different sources were consulted including journal articles, MOH & Wellness and WHO policy documents and medical textbooks. The research journals that yielded studies most relevant include, Biomedical Central, Plos ONE, International Journal of TB and lung disease, Primary health care family medicine, Annals of Internal Medicine and South African medical journal.

Drug Resistant Tuberculosis

TB is one of the worst killers in the world and is communicable through the inhalation of airborne particles. This aspect of occupational risk is largely understudied and preventive measures are frequently not in place. TB is prevalent in low to middle income countries due to increased prevalence of TB and lack of effective control programmes (Jesudas & Thangakunam, 2013). The advent of antibiotics for treatment of tuberculosis represented a

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major breakthrough in the fight against the disease. However since its first use, antibiotic therapy has been associated with the emergence of resistance to drugs. The incorrect use of anti-tuberculosis drugs either due to prescription errors, low patients compliance or poor quality of drugs, led to the widespread emergence of mycobacterium tuberculosis strains with an expanding spectrum of resistance. The spread of MDR-TB strains has represented a major threat to TB control since the 1990s. In 2006, the first cases of MDR-TB strains with further resistance to fluoroquinolones and injectable drugs were described and named extensively drug resistant tuberculosis TB(XDR-TB) (Matteelli et al., 2014). Sheela et al. (2009) indicated that MDR-TB was identified decades ago but the prevalence was underestimated and the consequences underappreciated and XDR-TB now poses even a grave threat. Jesudas & Thangakunam (2013) asserted that, with the increasing incidence of MDR-TB and XDR-TB, this problem has been further compounded with the risk of HCWs contracting more severe forms of the disease which are difficult or sometimes impossible to treat successfully. Caminero (2010) posits that the risk factors for resistance are those facilitating the selection of resistance in the community and the specific conditions that appear to increase some patients vulnerability to resistance. The author further reported that treatment failures with first-line rifampicin-containing regimens and contacts of multidrug resistant tuberculosis cases have the highest rates of resistance.

Global Situation

Globally the WHO, reports an estimated prevalence of 3.6% and 20.2% among notified TB cases for primary and acquired MDR-TB respectively with significant country and regional variations (Lukoye et al., 2015). In 2015, over 10.4 million fell ill and about 1.8

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million people died of TB including 0.4 million among people with HIV. TB remains a major public health problem particularly to the most vulnerable populations all over the world. It is important to note that HCWs have become another vulnerable group to tuberculosis drug resistant strains. Development of active transmission of drug resistant strains of TB (MDR-TB and XDR-TB), add the challenge as these are especially difficult to detect and treat (WHO, 2017). Increased infections and deaths due to TB among HCWs not only raise concerns regarding the workplace risks but also the need to conduct a study on experiences of HCWs caring for such patients diagnosed with DR-TB.

WHO (2016) indicated that, in 2015, there was an estimated 480 000 new cases of MDR-TB, and an additional 100 000 people with Rifampicin resistant TB (RR-TB) who were eligible for MDR-TB treatment. Drug resistance surveillance data show that 3.9% of new and 21% of previously treated TB cases was estimated to have had MDR-TB in 2015. In 2014, MDR-TB accounted for 3.3% of new TB (never been treated) cases and 250 000 deaths in 2015. To date, 117 countries reported at least one XDR-TB case and only 52% of MDR-TB patients who were initiated on treatment in 2013 were successfully treated. About 17% died and 9% had treatment failure. However, the treatment success rate of XDR-TB patients was only 26%.

The London School of Medicine and Tropical Medicine-project report (2009-2010) indicated that the global prevalence of XDR-TB is 5.4%. A WHO analysis showed that about 40 000 cases of XDR-TB are emerging globally every year. The prevalence of XDR-TB has been reported to range from 0% in Rwanda and Tanzania to 12.8% in Baku and Azerbaijan, 15% in Donetsk and Ukraine and 23.7% in Estonia. The Republic of Korea has reported an overall prevalence of XDR-TB as 15.4%. Germany reported a prevalence of 10.3% while Italy reported a prevalence of 14.3%.

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Fong (2013) reported that XDR-TB management provides unique challenges because it is associated with high mortality and adverse reactions to drugs. The cost of hospitalisation for one XDR-TB therapy is approximately twice the cost of MDR-TB cases and in the United States; this averages US\$ 483,000 per patient. Even more alarming is the emergence of totally drug resistant TB which has been reported from Iran. The outcome of treatment for XDR-TB has been poor in both resource rich countries such as the United Kingdom (5 of 8 died in 3 years) and in poorer nations with high HIV coinfection, such as South Africa, with a mortality of 42% and with only 20% of patients achieving sputum culture conversion and even in countries with low HIV infection such as South Korea the mortality was 48%.

There was an estimated 43 million global health workforce in 2015. Based on a threshold of 4.45 skilled health professionals per 1000 population, it has been estimated that the needs-based shortage of health care workers globally would be about 17.4 million. The largest needs based shortage is in South East Asia and African regions. This report further indicated that if current trends continue, the global needs based shortage of health care workers is projected to be still over 14 million in 2030 (WHO, 2017). Therefore this highlights the magnitude of staff shortage on a global scale marking Africa amongst the worst regions which includes Botswana. In light of this it is important to note that staff shortage immensely affect the quality of TB care given to patients as HCW become overworked. This ultimately impacts negatively on the implementation of TB infection control as the staff fail to meet with demands of patients care.

In 2014, HIV-infected persons accounted for 1.2 million of the estimated 9.6 million people globally who developed TB. At the end of the same year, TB contributed to one third of the 1.2 million deaths from HIV and AIDS and was responsible for 25% of the 1.5 million

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TB deaths (Raviglione & Sulis, 2016). According to UNAIDS Global Report (2016); 36 million people worldwide currently live with HIV and AIDS, and as of June 2016, 18.2 million people living with HIV had access to antiretroviral therapy. Stratified pooled estimates for latent TB infection rate among HCWs worldwide for countries with low, intermediate and high TB incidence were 3.8%, 6.9%, and 8.4% respectively (WHO, 2014). Nasreen et al. (2016) estimated the prevalence of latent TB infection among HCWs in high burden countries to be 47%.

In a systematic review assessing incidence of latent TB infection (LTBI) among HCWs in low and medium income countries, based on 51 studies, the estimated annual risk of LTBI ranged from 0.5% to 14.3% and the annual risk of TB disease ranged from 69 to 580 per 100 000. Attributable risk for TB in HCWs, compared to the risk in the general population ranged from 25-5,361 per 100 000. Health care facilities in low and medium income countries had a median of 36 HCW per 100 TB patients treated at facility, which is much lower compared to high income countries which had a median of 6,450 HCW per 100 TB patients. Thus, HCWs in low income countries are likely to have significantly higher TB exposure (Jesudas & Thangakunam, 2013). Similarly, Casas et al. (2013) reported that in countries with low income, annual mean incidence of LTBI is 5.8% among health care workers and 1.1% in high income countries. According to WHO (2017), governments have an ethical responsibility to ensure that HCWs operate in a safe environment while HCWs have an ethical obligation to care for their patients even if doing so involves some degree of risk. However, HCWs should not be expected to assume risks that result from inadequate conditions to provide care. Governments and health care institutions must provide the necessary goods and services to allow for a safe working environment.

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The ILO estimates that 160 million people from the world's workforce suffer from work related diseases and mental health problems. Evidence shows that many of these diseases are preventable but problems like underreporting, poor surveillance and several other factors have been known to influence occupational health hazards. According to ILO, 4% of the world annual gross domestic product (GDP) is lost as a result of occupational hazards as employers are faced with loss of skilled staff, absenteeism, migration, early retirements and high insurance premiums due to exposure. This report indicates that occupational hazards at the workplaces are a neglected problem and exposure to TB infection is not an exception. Therefore this highlight the need to conduct studies that will influence the need for having occupational health and safety professionals who will help in case reporting and surveillance in general in health facilities enabling the enactment of health and safety measures in the clinics and hospitals.

Some of the identified global issues in the development of MDR-TB include: variable and inconsistent health care infrastructure, lack of reliable diagnostic and disease biomarkers, inadequate protection from BCG for lung disease, failure of treatment in many patients, inadequate development programs for new and novel therapy and the HIV pandemic (Fong, 2013). Jo et al. (2013) reported that a high prevalence of LTBI was found among South Korean HCWs. WHO (2013) reported that in high-income countries the implementation of infection control measures has successfully reduced the transmission of TB to HCW in health care facilities.

Regional Situation

Tuberculosis is the leading cause of death among HIV infected people in Africa, where 80% of HIV-positive tuberculosis cases and deaths occur (Verani et al., 2015). Musa

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et al. (2017) indicated that MDR-TB is an emergency public health problem in sub Saharan Africa and a pooled prevalence of MDR-TB in new cases was 2.1%. The emergence of MDR-TB is linked to weak TB control programs and suboptimal TB case management. This realisation is more pronounced in sub Saharan Africa due to its limited resources and dearth of trained TB health workforce. It is assumed that Africa had a TB incidence of 2,720/100 000 in 2015. By 2016, only 18 out of the sub Saharan countries reported ever conducting a national MDR-TB survey, a major constraint to proper planning and achieving the 'End TB' strategy targets. 'The END-TB strategy' is a WHO strategy that targets to reduce TB deaths by 95% by 2035, reduce TB incidence rate by 90% and to have no affected families facing catastrophic costs due to TB (WHO, 2015). Therefore, the low MDR-TB prevalence in new cases perhaps suggests a limitation in the number of reports of national MDR-TB survey in sub Saharan Africa.

Although sub-Saharan Africa experienced gains in major health indicators since the 1960s postcolonial era, the disparity between the population health of the region and the rest of the world has widened as gains were reversed by the HIV and AIDS epidemic. Sub-Saharan Africa remains the region most severely affected worldwide by HIV and AIDS. HIV and AIDS and other health conditions continue to put an enormous burden on low- and middle-income countries, straining the already-overstretched health systems. Grignon et al. (2014) asserted that a major strain on the systems is a health workforce shortage resulting from increased workloads in providing HIV care and treatment, health worker migration to the global market, and underinvestment in human resources because of cuts in public health expenditures. In sub-Saharan Africa, transmission of tuberculosis in health facilities (i.e. nosocomial transmission) has been identified as a major contributor to high tuberculosis

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rates. Although all health-care workers and patients are at risk of exposure to tuberculosis, those with an HIV infection are at a particularly high risk. Substantial nosocomial transmission of multidrug-resistant and extensively drug-resistant tuberculosis has also been documented in Africa and these forms of the disease are far more costly and difficult to treat (Verani et al., 2015).

Menzies et al. (2014) reported that while data on anti-tuberculosis drug resistance are now available for 70% of countries worldwide, data from Africa are limited, as drug susceptibility testing (DST) is not widely available and few African countries had conducted nationally representative drug resistance surveys before 2010-2013. Even fewer have trend data and few have data on second line drug resistance, including limited data on XDR-TB. Data about the trends of XDR-TB in Africa are scanty and according to WHO (2010) report, only 2 countries out of 46 in the WHO Afro region have provided data on the DR-TB with South Africa being the only country which conducts routine surveillance. Only three countries have been able to report the proportion for XDR-TB cases among the DR-TB and these countries are South Africa, Rwanda and Tanzania. There are sporadic cases of DR-TB reported from other African countries notably, Burkina Faso, Botswana and Lesotho. All these countries have reported fewer than 5 cases (London School of Medicine and Tropical Medicine-project report, 2009-2010). Naiker et al. (2009) indicated that WHO recommends a minimum of 2 physicians per 10 000 population, 29 of the 46 sub-Saharan countries are below this level and it is estimated that 80% of sub-Saharan African countries do not meet the WHO's minimum recommendations for the numbers of doctors and nurses. Africa has 2.3 health care workers per 1000 population compared with the Americas which have 24.8 health

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care workers per 1000 population. The 57 countries of Sub-Saharan Africa have a critical shortage of health care workers with a deficit amount of 2.4 million doctors and nurses.

Owie and Apanga (2016) recognise TB as a major public health problem and an occupational hazard affecting HCWs in developing countries. They reported that blood borne diseases, musculoskeletal problems, latex allergy, tuberculosis, violence and work related stress were common occupational hazards among health care workers and this was largely blamed on several health care systems. Similarly, Singh (2014) posits that South Africa has the third highest TB and the fifth highest MDR-TB burden in the world. The number of MDR-TB cases diagnosed has doubled from 7 386 recorded in 2010 to 15 400 in 2013. Grobler et al. (2016) indicated that the HIV infection rate among the South African health care workers is 11-20%. These HIV infected HCWs have an increased risk of acquiring TB as well as progressing from latent TB to active clinical disease.

According to Grobler et al. (2016), the success of any TB control programme is dependent on HCWs knowledge and application of appropriate policies and practices. In 2010 there were only 3.97 medical practitioner per 10 000 population and 18.97 professional nurses per 10 000 population in South Africa, reflecting scarcity of HCWs in an overcrowded health care system. TB infection amongst HCWs results in absenteeism and sometimes death or disability of HCWs. Tudor et al. (2014) reported that in South Africa 13% of the HCWs had drug-resistant TB, 93% had MDR-TB and 7% had XDR-TB. Of the 112 HCWs with TB, 21% were HIV-positive, 13% were HIV-negative, and 66% HIV status was not recorded, 12% of HCWs with TB died, 31% died of MDR-TB and 38% of drug-susceptible TB.

The regional problems cited in the development of MDR-TB include: poor public health sector in many regions, inadequate social and health infrastructure in resource poor

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countries, capricious manifestation of disease, delay for culture diagnosis, host variability to tests, environmental variability with disease severity, prolonged multidrug treatment resulting in default and poor compliance, low resources for DOTS, lack of highly effective drugs for drug resistance, HIV and TB burden in some regions (Fong, 2013). According to WHO (2010) countries with the lowest relative need actually have the greatest number of health workers and conversely, the African region has the greatest burden of disease (24%) with only 3% of the world 's health workers and 1% of the financial resources. The literature indicates a critical shortage of health care workers in most African countries despite the high disease burden (WHO 2010, 2017; Grignon et al., 2014; Naiker et al., 2013).

From the literature, the high TB/HIV disease burden contributed immensely to the increased workload and staff shortage. A report by UNISON (2017) indicated that the average number of patients per registered nurse varied significantly by the type of setting and ward. For example the average number of patients per registered nurse was 5.8 in acute inpatients and 61.9 in the community.

Local Situation

Despite tremendous economic growth and political stability, the TB burden in Botswana is one of the highest in the world. In Botswana, more than 10% of all institutional admissions and over 5% of outpatient department attendances are due to TB. It is one of the leading causes of death in adults and people living with HIV/AIDS (BNTP Manual, 2011). According to the Botswana Guidelines for the management of Drug Resistant TB Guidelines (2009), the incidence of drug resistant tuberculosis (DR-TB) has increased globally since the introduction of the first drug treatment for TB in 1943.

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In Botswana the drug resistance surveys indicated drug resistant TB as a growing problem. The prevalence of MDR-TB was 0.2% among new TB cases and 6.1% in re-treatment cases in the 1995-1996 survey, rising to 0.5% and 9.0% and to 0.8% and 10.4% respectively in 2002. The 2007-2008 survey indicated that the trend has continued to increase even further, with MDR-TB rates of 3.4% among new patients and 13.1% among retreatment (previously treated TB patients) cases (Menziés et al., 2014). The Botswana National HIV & TB Drug Resistance Strategic & Operational Plan 2014-2017 reported that cumulatively, 517 MDR-TB cases were confirmed since 2007 and that there were 10 confirmed cases of XDR-TB cases at the end of 2012. In 2015, Botswana the TB incidence was estimated at 356/100 000 and 60% of TB patients were HIV positive. HIV prevalence among 15-49 years was estimated to be 22.2%, and adults living with HIV and receiving antiretroviral treatment were 272, 972. An estimated AIDS related deaths among them were reported to be 2,900 (UNAIDS Global Report, 2016). In Botswana it is estimated that to successfully treat 1 MDR-TB patient; approximately half a million pula is needed (MOH & Wellness, 2015, personal communication, June 6).

In 2010, the country's health workforce was approximately 15, 500, with an estimated shortage of 10,000. Health workforce shortages in Botswana have created major gaps in the availability of quality healthcare. Shortage is attributed to factors such as increased workload (HIV and AIDS), migration and misdistribution of human resources, inadequate number of tertiary training institutions, and inadequate plans to attract and retain health workers (Grignon et al., 2014). Health care workers at the greatest risk of TB infection include; those who have frequent and direct contact with patients, have contact with undiagnosed TB

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patients, work in units with no or inadequate infection control measures and those working in high TB prevalence departments (Botswana Infection Control Guidelines, 2009).

Nkomazana et al. (2014) reported that shortage of human resources for health is blamed for the inability to provide high quality accessible health services. The densities of doctors and nurses per 10 000 population were 4 and 42 respectively, 3 and 26 for rural districts and 9 and 7 for urban districts. Therefore this variance of staff numbers impacts on how well the TB programme is implemented. Districts with adequate resources have better cure rates than those that are short staffed. HCWs are integral parts of a functioning health care system, especially in low and middle income countries where their numbers are often limited. Similarly health care systems cannot perform adequately without sufficient numbers of skilled, motivated and supported health care workers (WHO, 2013, 2010).

Risk Factors for TB/DR-TB

Personal Factors

Demographic determinants have increasingly been identified as major risk factors for XDR-TB development (Matteelli, Roggi & Carvalho, 2014). In most studies, old age and duration of employment in the health care facility was associated with higher prevalence of LTBI in HCWs (WHO, 2013). In Botswana, HCWs who stay longer in areas with high densities of DR-TB/TB patients like IDCCs, medical wards and TB wards are more exposed to TB patients therefore this increases their chances of getting TB infection. This is supported by (Porter & Kaplan, 2011; Workicho et al., 2017) who reported that health care workers who have worked for longer periods are at increased risk. Owie and Apanga (2016) reported that HCWs who were much older were at greater risk of acquiring TB compared to

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younger ones, and those who have worked for over ten years were at the greatest risk than their counterparts who worked for lesser years.

Health care workers in Botswana who are HIV afflicted, had previous TB disease and other immune-compromising conditions such as diabetes mellitus, therapies like tumor necrosis factor inhibitors and corticosteroids (Porter & Kaplan , 2011); Zungu & Malotle, 2011) are more likely to be infected with TB if constantly exposed. Also due to the high TB/HIV co infection rate they are also exposed to the risk of HIV infection due to needle pricks and other invasive procedures. HIV is reported to be the strongest risk factor for TB (Raviglione & Sulis., 2016; Galgalo, 2008 & Sheuol et al., 2009). This is because HIV infection impairs cell mediated immunity which is essential for defense against TB (Porter & Kaplan , 2011). Again not having or having poor diagnostic methods for DR-TB means health care workers are not tested or screened on time leading to delay in treatment initiation and at the same time increasing chances of transmission of the TB bacilli.

In Botswana, Modongo et al. (2014) reported that of the 437 MDR-TB patients they studied, 288 were HIV infected. In the United States and Europe, an association between HIV and MDR-TB has been reported, often related to nosocomial transmission. Studies (Porter & Kaplan,2011; Zungu & Malotle, 2011, Naidoos et al., 2013, Mattelli et al.,2014) in all countries have shown that previously treated patients have a much higher risk of harbouring MDR bacilli (or any resistance) than new patients and the prevalence of MDR-TB is <3% among new patients and >15% for previously treated patients. Nasreen et al. (2016) found no clear association between HIV and MDR-TB across time and geographic locations but the results suggested that HIV infection is associated with primary MDR-TB. The author further reported that a national survey using random sampling in Botswana found similar MDR-TB

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prevalence rates among 107 HIV co-infected (0.9%) and 119 HIV negative patients, (0.8%) and no information was provided on baseline characteristics by HIV infection status. Mala, Mekonneu and Yimer et al. (2015) reported that previous TB treatment failure, having cavitations on chest –rays, contact with MDR-TB patients were the major predictors for MDR-TB.

TB training through workshops (TB case management, TB infection control and DR-TB management etc.) is conducted for HCWs in Botswana. Wynne et al. (2014) indicated that HCWs (clinicians and clinical officers) caring for TB patients identified the need for more training because current training strategies were insufficient. Passive training strategies such as providing books or printed resources were ineffective because the busy, overworked staff is not interested in reading books. In addition, Mehtar et al. (2010) reported improper use of respirators by HCWs and lack of use of surgical masks by patients contributing to infections due to lack of training on the proper use of respirators and that nurses were more likely to use personal protective equipment compared to doctors. The authors further reported that formal training on TB infection prevention was conducted annually but attendance of such sessions was usually scant. Malanga and Adebajo (2015) observed that the levels of knowledge about MDR-TB amongst health care workers was not at an acceptable level. Unsafe practices such as not wearing protective mask and not referring to the treatment guidelines were found to be associated with an insufficient level of knowledge about MDR-TB. In overall, only less than half (47.3%) of the participants had a good level of knowledge about MDR-TB.

In Botswana, TB patients who abuse alcohol end up missing their treatment and those who smoke end up taking long on treatment due to delayed healing process. These patients

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create problems for health care workers because the same patients keep on coming back either as treatment defaulters, relapses and failures. Also most of them are from the low socio economic status background so they end up exhausting resources and constantly exposing health care workers caring for them to TB infection. This is supported by Workicho et al. (2017) who indicated that age of respondents, living in a house with only one room and alcohol use were risk factors of MDR-TB (in this study referring to TB patients). Alcohol abuse and smoking were identified as risk factors for resistance of second line drugs in all the countries surveyed (Matteelli, Roggi & Carvalho, 2014);WHO,2014).

Furthermore, Louwagie and Ayo-Yusuf (2014) indicated that smokers were more likely to have poorer intermediate clinical end-points (delayed sputum conversion and treatment interruption) and higher failure and recurrence rates. This is because tobacco smoke causes alterations in cellular and humoral immunity, and impairs lung defence mechanisms through suppression of the protective functions of the airway epithelium, all of which may explain higher recurrence rates in smokers. However their study did not find any association between smoking and retreatment tuberculosis. On the other hand, Zhang et al. (2017) found out that ever-smokers were more likely to be Quanti FERON-TB Gold in- Tube (QFT) positive than never smokers. A total of 21,008 participants from 4 rural sites were included in the analysis. Furthermore, Imtiaz et al. (2017) found out that tuberculosis risk rose as ethanol intake increased, with evidence of a threshold effect and that alcohol consumption caused 22.02 incident cases and 2.35 deaths per 100000 people from tuberculosis in 2014. Alcohol-attributable tuberculosis incidence and mortality rates in 2014 were estimated for the 196 member states of the WHO.

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Environmental Factors

In Botswana health care workers in IDCCs are exposed to a high density of TB patients due to the high TB/HIV coinfection rate of > 70% (BNTP, 2011). The structures are mainly port cabins commonly called caravans with small windows thereby limiting natural ventilation. Those in the outpatient departments, medical wards and accident and emergency departments often care for undiagnosed TB patients before a TB diagnosis is confirmed making it possible for nosocomial infections to occur. In patient care predisposes health care workers to TB infection mainly because there is congestion, poor ventilation and in some cases poor lights.

Anecdotal evidence indicates that in Botswana health care workers are afraid to contract TB infection from their TB patients because some of their colleagues have been diagnosed and some died of TB. Also this is because in most cases when health care workers are diagnosed with DR-TB or any TB there is little to no support from the workplace or management. In addition, issues regarding where and how the health care worker got infected is usually blamed to their social habits, lifestyle and are not associated with their exposure at the workplace. The N95 masks provided for protection while caring for TB patients are not fit tested to ensure that they wear the right size to fully protect them, thereby predisposing them despite using the masks. Therefore this compromise the care rendered to TB patients due to fear of infection. Also most of the health facilities if not all are never fumigated therefore this makes infection control practices generally problematic or a neglected issue. According to Bryns and Faller (2011), fumigation of hospital rooms with high concentrations of toxic chemicals has been proposed to reduce microbial agents on hospital surfaces and to control infection.

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Environmental factors play a huge role in the progression of TB infection to disease. The probability that a HCW who is exposed to TB will become infected depends primarily on the concentration of droplet nuclei in the air and the duration of exposure to infectious droplet nuclei (Zungu & Malotle, 2011). Small, dark, crowded spaces without adequate ventilation increase the spread of TB (BICG, 2009). Hashemi et al. (2014) reported tuberculin conversion rates as high as 50% among HCWs working in the HIV wards. Similarly Tudor et al. (2014) concur that a greater proportion of HCWs who work in TB wards had TB compared with those working in non- TB ward. Porter & Kaplan (2011) asserted that transmission is enhanced by frequent or prolonged exposure to a patient who is dispersing large numbers of tubercle bacilli in overcrowded, enclosed and poorly ventilated spaces.

Galgalo (2008) also observed that working in a high-risk location was independently associated with TB, after controlling for HIV infection and living situation. Patients with undiagnosed pulmonary TB not yet isolated or immediately started on treatment are said to be a source of transmission in crowded waiting areas or medical wards. He also observed lack of infection control guidelines at HCWs work stations. Similarly, Owie and Apanga (2016) asserted that health care workers working in health facilities with a high ratio of TB patients were at an increased risk of latent TB infection. Health care workers working in laboratories, TB inpatient wards, general medicine and emergency units were at increased risk of acquiring TB than their peers in the administrative section.

Hospital managers reported that infection control programs faced challenges such as distrust of infection control efforts among health care workers and disproportionate focus on individual level personal protections and that infection prevention control management was inadequate (Zelnick et al., 2013; Mehtar, Kallon & Aucump, 2010). Sissolak, Marais and

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Mehtar (2011) also noted that there is lack of isolation facilities in the wards; closed ventilation system without access to natural environment and no equipment for preventing TB transmission. The high TB infection prevalence among HCWs is attributed to inadequate infection control measures (Tiemersma et al., 2016); Naidoos, et al., (2013). In a study by Arjun (2011), the physical environment of care was deemed unsuitable because the internal layout of the ward was considered to have high bacteria concentration especially in the mornings, therefore exposing HCWs. In Botswana, nurses and doctors spend a lot of time with patients rendering direct care either through consultations, blood collection and sputum collections, DOTS and injections, performing procedures like gastric aspiration, lumbar punctures, and sputum induction, hence high exposure rate.

Galgalo et al., (2008) reported that staff face increasing risk for TB disease for every additional hour per day that they spend in a room with patients. Tudor et al. (2014) also observed that among HCWs diagnosed with TB, the largest category were clinical staff (48%) and support staff (33%). Hashemi et al. (2014) noted that, the rate of TB infection among HCWs is 2-10 times higher than the general population and that nurses have the highest risk, 2-3 times more than that of the physicians.

Diagnosis and Treatment Factors

According to WHO (2014), poorly functioning general health systems contribute to poor diagnosis and treatment outcomes that may lead to the development and spread of drug resistant TB. For example; inappropriate treatment guidelines, poor training, financial disincentives, poor patient education, lack of treatment monitoring and support and poorly organized or funded TB control programmes. For drugs; inadequate supply or quality, unavailability of certain medicines, poor storage conditions, wrong dose or combinations and poor regulation of medicines. For patients: inadequate drug intake; lack of information,

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adverse effects, and social barriers, under nutrition, malabsorption, and psychiatric conditions.

In Botswana the turn-around time for the sputum results varies (24-72 hours) depending on the sputum tests ordered, the location of the health care setting and microbiology laboratory. It is important to note that, the turn-around time for urban areas and remote areas varies greatly due to transport and communication challenges. For remote areas the results take long to be delivered at the health facility thereby delaying initiation of treatment while in urban areas especially with hospitals the results are reported faster. Also, health care workers who are TB suspects and TB patients with history of previous TB treatment are required to have culture and drug susceptibility testing done. These results in most cases take long to be delivered and in some instances the sputum is collected more than once despite follow ups. This leads to delay in treatment initiation and also allowing for further transmission of TB among colleagues and the community. Naidoos et al. (2013) reported that amongst the health care workers who were diagnosed with TB, 52.5% of them had a 3 weeks delay of TB diagnosis.

In Botswana drug stocks outs do occur at times and TB patients might miss their treatment or temporarily switched from fixed dose combinations to single dose combinations. It is during these times that dosage miscalculations adjusted for weight occur and potentiating the breeding of acquired drug resistance due to suboptimal dosages (Caminero, 2013). Acquired drug resistance is a result of inadequate, incomplete or poor treatment quality that allows the selection of mutant resistant strains. If a drug-susceptible TB is treated with a regimen exclusively based on a single effective TB drug, there is a risk that bacteria with drug-resistant mutations will be selected and multiply further during the course of treatment,

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eventually becoming the dominant strain (WHO, 2014). Similarly, other studies reported that incorrect TB treatment is the main risk factor for the development of resistance among TB cases and it is usually associated with intermittent drug use, errors in medical prescriptions, poor patient adherence and low quality of drugs (Matteelli, Roggi & Carvalho, 2014; Fong, 2013). In addition, Lukoye et al. (2015) noted that the prevalence of any type of DR-TB and MDR-TB were higher among patients who had been previously treated for TB.

Fear of Contracting DR-TB and HIV

In Botswana health care workers are afraid of contracting TB infection from DR-TB patients. The diagnosis of DR-TB among some health care workers has brought fear to staff. This is also due to the fact that, 1.5 million people still lose their lives to TB every year (Delft et al., 2014). TB screening (cough, fever, weight loss, night sweats) is usually done by asking the four cardinal questions amongst HCWs even though there are no occupational health and safety staff to make proper follow-ups. Due to the perceived association of TB and HIV co – infection, health care workers diagnosed with TB are usually stigmatised or suspected to be also afflicted with HIV, they experience more negative experiences during the course of treatment (Arjun, 2011).

The literature indicates that more than 50% of HCWs worldwide have latent TB infection, even though the burden of active TB disease among HCWs is less documented. The overwhelming majority of cases of TB among HCWs occur in low- and middle-income countries (Tudor et al., 2014; Temesgen & Demissie, 2014; Jo et al., 2013). In Botswana, HIV testing among health care workers infected with TB is mainly voluntary and usually the testing rates are low. Jarand et al. (2010) observed that out of the 10 HCWs with XDR-TB, 80% were HIV negative and 40% of them died despite treatment. Similarly, Max et al. (2010)

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noted that a high percentage of HCWs hospitalised for multi-drug resistant tuberculosis were on antiretroviral therapy. Kanjee et al. (2011) reported that 49.1% of staff felt that the hospital did not care about them and/or was not working to prevent staff TB infections, and 42.9% were less willing to continue as a health care worker because of staff TB/DR-TB deaths.

Szep et al. (2013) indicated that the rate of tuberculin skin test conversion among the health care workers was 4.2% out of the 96 subjects who participated in the study. The tuberculin skin test is an important test in identifying individuals with latent tuberculosis since in most individuals tuberculosis is initially contained by the host defences and infection remains latent. Identification and treatment of latent tuberculosis reduces the risk of developing active tuberculosis by as much as 90 percent among immune suppressed individuals. Screening for latent tuberculosis should be performed in health care workers who have been in contact with patients with active tuberculosis.

Similarly, Moustafa et al. (2010) reported a prevalence of latent TB among physicians to be 14.9% and 12.9% among nurses. Malangu and Legothoane (2013) indicated that out of a total number of 56 infectious diseases diagnosed among HCWs 47 of them were tuberculosis, 6 for cholera and 3 for chicken pox. Again, Mehtar, Kallon, Aucump (2010) observed that drug resistant TB was found in all staff cadres working in different units showing that the risk of exposure is everywhere and that occupationally acquired TB, was highest among ancillary workers and this category also had the highest HIV infection. In addition, Ukpe et al. (2009) reported that a total of 9 health care workers in the hospital were diagnosed with TB, 7 of which were diagnosed with pulmonary TB and 2 with extra pulmonary TB.

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Administrative Control Challenges

In Botswana the duration of DR-TB treatment depends on culture conversion, it is prescribed for at least 18 months after culture conversion and can be extended to 24 months for some patients with extensive pulmonary damage (BNTP Manual, 2011). This directly means that these patients spend a long time being taken care of in the health facility thereby increasing the workload and the interaction with the health care workers increasing their duration of exposure. Shortage of staff, lack of transport and drug stock outs are among the main issues that affect the TB programme generally and this greatly contribute to the failure to provide total patient care to DR-TB patients by health care workers in most districts.

Several studies found that health care workers identified challenges such as high TB/HIV burden, staff shortage, inadequate infrastructure and infection control and staff burnout (Wynne, et al., 2014; Zelnick et al., 2013, Naidoos et al., 2013; Sissolak et al., 2010). HCWs are often frustrated by supporting patients and their families through lengthy treatment especially when patients were lost to follow up or their families failed to provide emotional support (Isaakidis et al., 2013). Similarly, Arjun (2011) reported that caring for drug resistant tuberculosis patients was very difficult at times, as patients are frustrated by prolonged hospitalisation and some consume alcohol and smoke cigarettes while on treatment, some skip their medication or even abscond from hospital afraid of daily injections. Drug side effects such as hearing loss and depression also makes it difficult for health care workers to assist patients due to communication barriers and behavioural changes.

In Botswana congestion in medical wards and outpatient departments predisposes patients and health care workers to TB infection. Similarly, Delft et al. (2014) posits that health care workers have expressed concerns about the lack of and inadequate infrastructure and resources that made it difficult to prevent transmission. Also, Wynne et al. (2014)

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reported that HCWs expressed frustration at not being able to manage patients using DOTS because of lack of resources. Again, managers of health care facilities struggled to comply with policies as they lack resources to implement in circumstances where the burden of workplace safety is placed on inadequately trained and supported health care workers (Zelnick et al., 2013). Owie & Apanga (2016) observed that implementing infection control measures in developing countries is too expensive as a result of limited resources coupled with the lack of sufficient evidence of its efficacy in countries with high prevalence of TB.

Although there has been discussions in the literature about tuberculosis infection rates among HCWs in different countries and the growing numbers of DR-TB cases, in Botswana, HCWs were rarely asked about their experiences. Study findings from resource limited and developed countries on the same topics such as latent TB infection in HCWs vary because the quality of drugs used and the diagnostic methods used which consequently affect the treatment outcomes differ. The similarity noted in the studies is that there is documented evidence about tuberculosis infections among health care workers in almost all the continents.

Some of the gaps identified from the literature reviewed include; the aspect of scarcity and variance of DR-TB information at a global level (WHO, 2014). Again, most of the studies identified reported on the prevalence and incidence among HCWs either of latent TB and active TB disease without clear distinction whether it was drug susceptible or drug resistant cases. Furthermore, no study has been identified that measured neither the prevalence nor the incidence of DR-TB in health care workers on a global, regional and local level. In addition, most studies conducted generalised HCWs but this study will target nurses and doctors so as to help target priority or high risk groups among HCWs. Finally, no study

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was identified that explored the experiences of health care workers caring for drug resistant tuberculosis patients in Botswana.

Application of Jean Watson's Theory of Human Caring

The theoretical framework underpinning the proposed study is Jean Watson's theory of human caring. According to Suliman(2009), Watson's theory addresses caring relationships among humans and the deep experiences of life itself. According to Watson (2008) the major conceptual elements of the original (and emergent) theory are the ten carative factors (transposed to ten caritas processes), transpersonal caring moment and a caring consciousness/moment. The theorist believes that; it is when we include caring and love in our work and in our life that we discover and affirm that nursing, like teaching, is more than just a job; it is also a life-giving and life- receiving career for a lifetime of growth and learning. Such maturity and integration of past with present and future now require transforming self and those we serve, including our institutions and our profession.

This theory provides us with a chance to assess, critique and see where or how we may locate ourselves within a framework of caring science/ caritas as a basis of professional caring practice (Watson, 1979). The central concepts of this theory are the carative factors, transpersonal caring and a caring moment (Watson 1979, 1985, 2008).

Carative Factors

The carative factors are the factors that the health care worker uses in the delivery of health care to the patient or client. These factors aim at the caring process that helps the person attain or maintain health or die a peaceful death (Watson, 1985). In this study the two factors that will be addressed are the development of a helping-trust relationship and

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provision of a supportive, protective and or corrective, mental, physical, socio cultural and spiritual environment.

Development of a Helping and Trusting Relationship

According to Watson (1985, 1979), this is a basic element of high quality care and to develop that, HCWs must know their patient's self, life space and phenomenological view of his or her world. The author asserts that some of the attitudinal processes a HCW must bring to their interaction with patients are congruence and non-possessive warmth.

(i) Congruence: This is when the HCW is being what she or he seems to be, that is; genuine and without a 'front' or professional 'character armour'. It involves an openness with the feelings and attitudes that are within at a given moment. Congruence can be equated with genuineness which refers to being real, honest and authentic.

(ii) Non Possessive Warmth: This is an interpersonal condition in a helping-trust relationship that along with congruence and empathy promotes growth in another person. An effective HCW is able to provide a non-threatening, safe, trusting or secure atmosphere through acceptance, positive regard, love valuing or non-possessive warmth (Watson, 1985, 1979). Constructive change and growth is more likely to occur in the context of warmth and non-judgemental acceptance. Important attributes suggested by (Watson, 1985,1979) of nonverbal warmth are; HCWs could maintain eye contact, use low voices, lean toward their patients and have a facial expression that is congruent with the other patient's emotional state. For example in this study, nurses and doctors could maintain eye contact during administration of medications and health education for DR-TB patients, using low voices when speaking to patients and leaning toward the DR-TB patient while writing in the patient's card. When

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practising this carative factor, HCWs must view the other person as a separate thinking and feeling human being. Such a view is emphasised because HCWs often look at patients as objects of their care e.g. room 303 needs a shot' or its time to logroll patient so and so.

Several studies (Thomas et al., 2016; Vasquez., 2015; Morris et al., 2013), indicated that drug resistant tuberculosis patients experience depression, social isolation, stigma, fear, shock, denial and anger due to the limited treatment options, long duration of treatment and associated toxicity.

Provision of a supportive, protective and or corrective, mental, physical, socio cultural and spiritual environment.

According Watson (1985, 1979) the interdependence of external and internal environments is known to strongly influence health and illness. Comfort, privacy and safety are some of the vital components in this factor.

(i) Comfort: This is an external variable that a nurse or doctor caring for a DR-TB patient can control. In this study the HCW's way of comforting should help the DR-TB patient to function as effectively and efficiently as possible, for example, provision of hearing aids to patients experiencing hearing loss as a result of medication side-effects to enhance effective communication. Watson (1979) purports stress related to hospitalisation of patient's environment is critical for their mental and physical wellbeing. Strategies to improve their physical comfort should be employed like removal of bright lights and provision of adequate heat and ventilation.

(ii) Privacy: According to Watson (1985, 1979) privacy concerns include; the right to exclude others from certain knowledge about one's self and it serves to maintain the patient's dignity

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and integrity. Its consideration must include physiological and physical exposure as well as the confidentiality of limited and protected communication. Nurses and doctors providing care to DR-TB patients may limit the information they share with their families unless the patients permit them to do so.

(iii) Safety: The nurse or doctor caring for DR-TB patients must be alert of the safety factors that predict or cause safety threats (Watson, 1985, 1979). The HCW should eliminate existing and potential hazards by arranging a safe environment and explain safety precautions to both the DR-TB patient and their family.

Transpersonal caring relationship

According to (Watson, 2008) transpersonal caring seeks to connect with and embrace the spirit or soul of the other through the processes of caring and healing and being in an authentic relation in the moment. Some of the assumptions of transpersonal caring relationships are moral commitment, intentionality and caritas consciousness which enhances and potentiates human dignity, wholeness and healing.

According to Clark (2016) applying Watson's theory through transpersonal human caring using the caritas processes offers nurses and patients the opportunity to increase satisfaction in meaningful ways. In this study health care worker's ability to connect with their patients' transpersonal spirit to spirit level can be translated through positive gestures, facial expressions and verbal expressions. In a transpersonal caring relationship, a health care worker's own life history, previous experiences, are valuable teachers for this work. For example; a nurse or a doctor who has been successfully treated for DR-TB can motivate a patient through their testimony or having cared for other patients with similar or worse

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conditions can encourage the newly diagnosed DR-TB patients using the outcomes of their cured patients. Watson (2013) describes a transpersonal health care worker as one who has the ability to centre consciousness and intentionality on caring, healing and wholeness rather than on disease, illness and pathology. Transpersonal caring focuses on helping patients achieve a more complete sense of harmony within the mind, body and spirit through the use of caring transactions. Clark (2016) indicates that to be in a transpersonal caring experience a nurse and a patient recognise and experience the reality of the interconnectedness and that the capacity to reach out to others may be considered to support knowledge of self and other as knowledge of common humanity

A Caring Moment

This occurs when a nurse or a doctor come together in a human-to-human transaction which is meaningful, authentic and intentional with patients or clients. This expands each person's worldview and spirit leading to new discovery of self and other and new life possibilities (Watson,2008). A caring moment is an uninterrupted time spent with a patient to make a human to human connection (Adventist Hinsdale hospital, 2013).It occurs whenever a nurse and a patient come together with their unique life histories and phenomenal fields in a human-to-human transaction. This caring moment involves an action and choice by both the health care worker and the patient (Watson, 2008).

Watson's theory of human caring has been applied mainly on patients as recipients of health care (Suliman, 2009; Thibodeau, 2016). In this study, it will be utilised to examine experiences of HCWs caring for DR-TB patients. It was chosen because it stresses the importance of the lived experiences not only of the client, but also of the health care worker.

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Description of Watson's theory of caring

Figure 1 illustrates how the central concepts of Watson's theory are applied to examine experiences of HCWs caring for DR-TB patients. It also demonstrates the relationship of these concepts to each other and the outcome.

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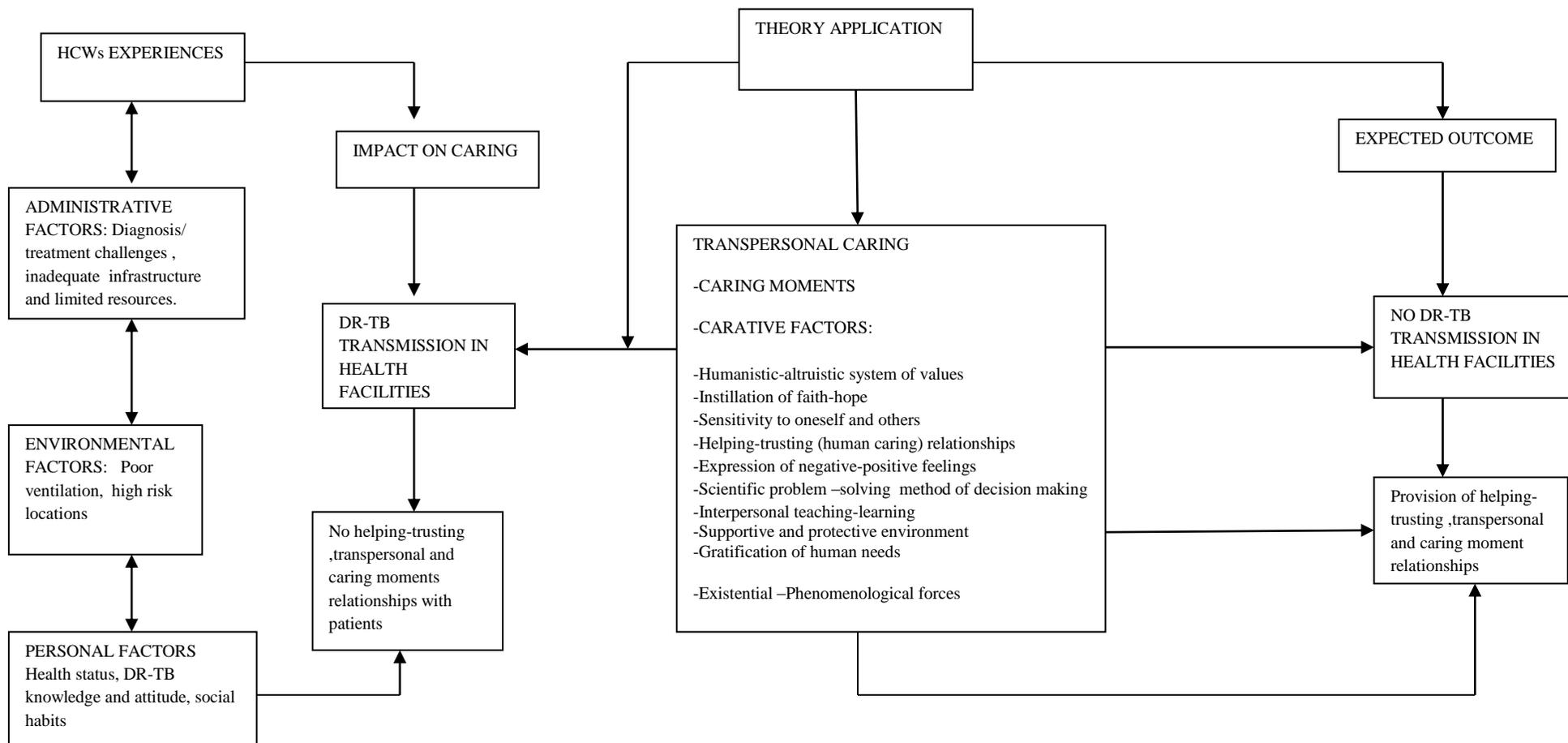


Figure 1: Application of Jean Watson theory of caring to Drug Resistant TB care

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Conclusion

This chapter presented a literature review of TB and DR-TB both globally, regionally and locally. The risk factors for health care workers at the workplace as well as their experiences were discussed. The theoretical framework to be used was also presented.

Chapter 3

The chapter presents the methodology under the subheadings: study design, study population and sampling, ethical considerations, data collection instrument, pilot testing, data collection, rigor establishment and data analysis.

Study Design

The study will utilise a descriptive phenomenological qualitative research design. Phenomenology was chosen to explore experiences of the HCWs providing care to DR-TB patients at PMH MDR-TB treatment centre. Phenomenology seeks to describe lived experiences, researchers strive to bracket out preconceived views and to intuit the essence of the phenomenon by remaining open to meanings attributed to it by those who have experienced it (Polit & Beck, 2012). Also it develops understanding of human experiences which is important for health professionals who focus on caring, communication and interaction (Rees & Holland, 2010).

Study Setting

The study will be conducted at the Princess Marina Hospital MDR-TB treatment centre in Extension 12, Gaborone. Princess Marina Hospital was chosen because it is the biggest referral hospital in the country and has the highest number of HCWs diagnosed with TB. According to the MOH (2013) risk assessment, HCWs diagnosed with both drug sensitive and drug resistant tuberculosis in the area (Gaborone District) were 8 in total and 6 of them including 1 MDR-TB case were from Princess Marina hospital while 2 were from Block 8 clinic. Other Districts with high statistics included Boteti sub-district with 9 cases (1 MDR-TB) and Lobatse with 7 cases plus 1 MDR-TB.

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Sampling

A non-probability purposive sampling will be used as it entails selection of cases that will most benefit the study. The researcher will also use snow balling in which participants identified will be asked to refer other participants whom they feel will provide more information on HCWs caring for DR-TB patients (Polit & Beck, 2012).

Study population

In qualitative research, the researcher does not predetermine the sample size rather the data is adequate when saturation of information is achieved. Glaser and Strauss (1967) described saturation as that time of a research when the researcher really thinks everything is complete. Therefore in this study the researcher will stop the interviews when data saturation is reached.

Inclusion criteria

- All nurses and doctors who directly provide care to patients infected with TB.
- Nurses and doctors who have worked for at least 6 months at the MDR-TB treatment centre(Princess Marina Hospital)
- Nurses and doctors who have given consent will be included.

Exclusion criteria

- Non nurses and doctors.
- Nurses and doctors who have cared for DR-TB patients for less than 6 months will be excluded.

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Recruitment of Participants

According to Polit and Beck (2012), recruiting people to participate in a study involves identifying eligible candidates and persuading them to participate. Flyers in both Setswana and English languages will be placed on notice boards at Princess Marina hospital MDR-TB treatment centre and at the Princess Marina Hospital notice boards for prospective participants to read. Assistance will be solicited from the health care workers working at the treatment centre and the hospital to helping recruit eligible participants. Also the researcher will address the prospective participants in a meeting and let them know she is interested in conducting a study regarding their experiences on caring for patients diagnosed with DR-TB.

Ethical Considerations

Ethical approval and permission to conduct the proposed study will be sought from the Institutional Review Board (IRB) of the University of Botswana, the Health Research Development Committee (HRDC) of Ministry of Health and Wellness and Princess Marina and Hospital IRB. A letter requesting for permission (Appendix C) will be sent to all the three IRB offices.

The Princess Marina Hospital, MDR-TB treatment centre will be informed through formal communication (telephoning and a letter), stating the purpose of the study and the required assistance from the hospital management. Informed consent will be sought from the individual participants. Before the interviews the participants will be fully informed about the study and its purpose. Once they agree to participate they will be issued with the consent forms to sign in duplicate. The other copy the researcher will keep it while the participant keeps their own. Participation will be voluntary and those who choose to withdraw and/or refuse to answer questions are free to do so. To ensure confidentiality information will be

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kept under lock and key and a password protected computer. Anonymity will be ensured by using codes instead of names to deidentify the data. The field notes and audio tapes will be stored safely and will only be released upon a formal request. Privacy will be ensured by interviewing the participants in a private space with as few distractions as possible.

Data Collection Instrument

The researcher will develop an interview guide or data collection tool with two sections. Section A: Demographic characteristics (5 item questions); Section B: Experience of health care workers (11 item questions). Probes will be used using the major concepts of Watson's theory of human caring of transpersonal caring, a caring moment and the carative factors. The carative factors that will be addressed are establishment of a helping-trusting relationship with DR-TB patients and provision of a supportive and healing environment. Data will be collected using English and Setswana interview guides. See evidence tools attached as Appendix A and Appendix B. These will be given to my supervisor who is an expert and experienced in qualitative research to check for validation and relevance to objectives of the study.

The participants will be asked to fill in the demographic data and then respond to the open ended questions. The open ended questions will require participants to describe their challenges, state factors that motivate them, predisposing factors to TB infection and strategies to help to prevent nosocomial infections and discuss their DR-TB knowledge. At the end of the interview participants will be asked to share any important information they feel might have been left out. During the interview, caring behaviours of transpersonal relationship, caring moment and carative/caritas processes of Jean Watson's theory of human

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caring will be assessed indirectly as participants respond to the questions regarding their care to DR-TB patients.

Pilot Testing

A pilot study will be conducted at Sekgoma Memorial hospital (MDR-TB treatment centre) with three participants. This will be done to ensure that data collection instrument measures what it is intended comprehensively. A pilot study also helps to determine appropriate usage of language and check for ambiguity. The results of a pilot test helps with refinement and modification of the instrument.

Data Collection

Data will be collected at the PMH MDR-TB treatment centre. Participants will be interviewed at a time and place convenient to them. Data will be collected using face to face in-depth individual interviews as they allow flexibility and the researcher can follow the interests and thoughts of informants (Holloway & Wheeler, 1996). Prior to the interview introductions and explanation of the study will be done and participants will be allowed to ask questions for clarity to allow them to express themselves freely. A tape recorder will be used to capture information from the interview. The interviews will last for 45 minutes - 2 hours. During the interview field notes will be taken. Interviews will be conducted in either Setswana language or English language depending on the participant's language preference.

Establishment of Rigor

Trustworthiness is the degree of confidence qualitative researchers has in their data (Polit & Beck, 2012). Lincoln and Guba, (1985) suggested four criteria for developing the

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trustworthiness of a qualitative inquiry; credibility, dependability, confirmability and transferability.

Credibility

Credibility is a criterion for evaluating integrity and quality in qualitative studies, referring to confidence in the truth of the data (Polit & Beck, 2012). In this study techniques that will be used to make it more likely that credible findings and interpretations will be produced are prolonged engagement and member checking (Lincoln & Guba, 1985).

Prolonged engagement: The researcher will invest sufficient time with the participants by collecting data herself from the participants. This will allow the researcher to learn the participant's culture and build trust (Lincoln & Guba, 1985).

Member checking: Also to establish credibility, member checking will be carried out by the researcher. The researcher will return to the participants and give them a summary of their responses and then ask them to confirm if what they said is what was captured. The participants will validate and verify if the conclusions reflected their experiences. Doing this will also provide participants an opportunity to correct errors of fact and volunteer any additional information (Lincoln & Guba, 1985).

Dependability

The second criterion in the Lincoln and Guba framework is dependability, which refers to the stability (reliability) of data over time and conditions (Polit & Beck 2012). A technique that will be used for establishing dependability in this study is inquiry audit (Lincoln & Guba, 1985). The researcher will consult the supervisor as she has more expertise on research to scrutinise the data and the supporting documents to help to check for consistencies between the interpretations and the data (Polit and Beck, 2012). The research

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supervisor will examine the data, findings, interpretations, recommendations and attest to the dependability of the inquiry (Lincoln & Guba, 1985).

Confirmability

Confirmability refers to the potential for congruence between two or more independent people about the data's accuracy, relevance or meaning. This criterion is concerned with establishing that the data represent the information participants provided and that the interpretations of those data are not invented by the inquirer. For this criterion to be achieved, findings must reflect the participant's voice and the conditions of the inquiry, not the researcher's biases, motivations or perspectives (Polit & Beck 2012). The major technique for establishing confirmability is the confirmability audit, including the audit trail. The research supervisor will be involved in the audit of raw data from the interview transcripts, field notes, member checks notes and data analysis materials (Lincoln and Guba, 1985). The researcher will also keep a reflexive diary and the interviews will be started by interviewing the researcher first in order to reveal the researchers experiences and prejudices since she has been involved in caring for DR-TB patients.

Transferability

Transferability refers to the potential for extrapolation that is the extent to which findings can be transferred to other settings or groups (Polit & Beck 2012). Thick description is a technique for establishing transferability (Lincoln & Guba, 1985). The researcher will use in-depth interviews to obtain a detailed data and tape recording the data will ensure that participant's information is reported in its original form. The researcher will engage in purposive sampling in order to enable information rich participants to provide detailed descriptions of the caring experiences. This will enable the researcher to provide thick and contextualised descriptions of the research context, the people who participated in the study,

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the experiences and the processes observed during the study. This will enable the reader interested in making a transfer to reach a conclusion about whether transfer can be contemplated as a possibility (Lincoln & Guba, 1985). Therefore the researcher will enhance the transferability by providing thick descriptions of the phenomenon under study. However in this study the researcher hopes that the findings will be transferable to other similar settings, being the MDR-TB treatment centres.

Data Analysis

The purpose of data analysis is to organise, provide structure to and elicit meaning from the data. Phenomenological analysis involves a search for common patterns and themes. The basic outcome is the description of the meaning of an experience. The researcher will analyse the data simultaneously with data collection using Colaizzi (1978) phenomenological analytic method. Generally, the researcher will search for common patterns regarding caring experiences from the participant's verbal transcriptions (Polit & Beck, 2012).

Data analysis will begin by listening to the participants' transcripts verbal descriptions. This will be followed by reading and re-reading the verbatim transcriptions in order to note the participant's experiences with DR-TB care. The researcher will extract significant statements from the transcriptions that revealed the meaning of DR-TB caring experiences. The researcher will then analyse each transcript to mark statements that represent each individual participants' narration of their caring experiences. The researcher will then formulate meanings from the significant statements and organise formulated meanings into themes of clusters (Polit & Beck, 2012). The statements will then be marked and then entered into the computer. NVivo version 12 qualitative software will be used to analyse data. This permits researchers to examine relationships between concepts, hierarchies

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of codes, diagram and create hyperlinks of codes to create non-hierarchical networks (Polit & Beck, 2012).

Conclusion

This chapter described the research methods that will be applied to undertake the proposed study. The methodology was presented under the subheadings; research design, study population and sampling, ethical considerations, data collection process, rigor establishment, data analysis, and pilot testing.

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Appendix A. Interview Guide (English Version)

Instructions: Tick one answer only

Section A: Demographic Data (English)

Participant Code.....

Age: < 25{ } 25-30{ } 31-35{ } 36-40{ } 41-45{ } 46-55{ } > 55{ }

Sex: Male { } Female { } Other { }

Marital Status: Single { } Married { } Divorced { } Widowed { } Cohabiting { } Other { }

Profession: Nurse { } Doctor{ }

Religion: Christianity { } Muslim { } Islamic { } others { }

Section B: Questions on experiences of health care workers caring for patients diagnosed with DR-TB.

1. How long have you been working as a nurse or doctor? i.e. date of first appointment.....

2. How long have you been working in the Princess Marina Hospital MDR-TB treatment centre?

3. Tell me about your experiences regarding caring for patients diagnosed with drug resistant tuberculosis.....

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.....
.....
.....
.....

4. Could you please describe your feelings with regard to caring for patients diagnosed with drug resistant tuberculosis? How do you feel caring for these patients as compared to other patients with different conditions e.g. Hypertension, Diabetes Mellitus?.....

.....

5. What challenges do you face concerning caring for patients diagnosed with drug resistant tuberculosis?.....

.....

.....

6. What factors motivate you to continue caring for patients diagnosed with drug resistant tuberculosis despite the challenges you mentioned earlier?

.....

.....

.....

.....

7. What factors inhibit you from proper management of patients diagnosed with drug resistant tuberculosis?.....

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.....
.....

8. How much do you know or how do you rate yourself in terms of the knowledge base or understanding of DR-TB infection prevention and control in general?

.....
.....
.....
.....

9. What do you consider to be the risk factors that enhance the spread of TB including DR-TB among health care workers?

.....
.....
.....

10. Is there anything that you believe can be done to protect health care workers in contracting TB including DR-TB?

.....
.....
.....

11. Is there anything else you would like to share with me regarding your experiences while caring for drug resistant tuberculosis patients?

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CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

Appendix A: Kaedi ya Potsolotso (Setswana Version)

Taolo: Tshwaya karabo e le nngwe e o dumalanang le yone.

Dintlha tsa mo tsa karolo:

Nomere ya sephiri ya mo tsa karolo.....

Dingwaga tsa mo tsa karolo: <25{ } 25-30{ } 31-35{ } 36-40{ } 41-45{ } 46-50{ }51-55{ }
>55{ }

Bong: Monna :{} Mosadi:{} Tse dingwe{}

Seemo sa tseo/lenyalo:

Ga ke a nyalwa{ } Ke nyetswe{ } Ke moswagadi/motlholagadi{ }Ke nna le mokapelo mo
ntlung{ } Mo gongwe{ }

Ke dira ke le: ngaka{} mooki{}

Tumelo: sekeresete{} Tse dingwe{}

Karolo ya bobedi: Dipotso tse di itebangantseng le go tlhokomela balwetsi ba ba nang le
kgotlholo e tona e e ganang le melemo (DR-TB).

1.O na le sebaka se se kae o bereka o le ngaka kgotsa
mooki?.....

2.O na le sebaka se se kae o berekela mo kokelwaneng kgotsa sepatlela se se itebangantseng le
balwetsi ba kgotlholo e tona ee ganang le melemo ya Princess
Marina?.....

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3.Ke kopa o ntlhalosetse ka maitemogelo a gago ka tiro e ya go tlhokomela balwetsi ba ba nang le kgotlholo e tona ee gananang le melemo?

.....
.....
.....

4.Ke kopa o ntlhalosetse maikutlo a gago mabapi le go tlhokomela balwetsi ba ba nang le kgotlholo e tona e e gananang le melemo (DR-TB); o ikutlwa jang fa o ba bapisa kgotsa o ba tshwantshanya le ba malwetsi a mangwe jaaka sukiri kana madi a matona?

.....
.....
.....

5. Dikgwetlho tse o kopanang le tsone ke dife fa o tlhokometse kana o thusa balwetsi ba ba nang le kgotlholo e tona ee gananang le melemo?

.....
.....
.....

6.O kgotlhadiwa ke eng gore o tswelele o thusa balwetsi ba ba nang le kgotlholo e tona ee gananang le melemo le ntswa go na le dikgwetlho tse o setseng o di tlhalositse kgotsa o di nankotse?.....

.....

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

7.Ke eng se se go paledisang go tlhokomela kana go thusa balwetsi ba kgotlholo e tona e e gananang le melemo ka fa go tshwanetseng ka teng ?

.....
.....
.....

8.O itse go le kae ka thibelo kgotsa go laola go anama ga mogare wa kgotlholo e tona e e gananang le melemo ka kakaretso?

.....
.....
.....

9. Ke eng se o bonang se baya badiredi ba botsogo mo diphatseng tsa go ka tsenwa ke mogare wa kgotlholo e tona;bogolo jang e e gananang le melemo?

.....
.....
.....

10. A go na le sengwe se o bonang kgotsa o dumelang gore se ka dirwa go sireletsa badiredi kgotsa go kganela kanamo ya mogare wa kgotlholo e tona go ba tsena?

.....
.....
.....

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

11.A go na le sengwe gape se o eletsang go ka se bua mabapi le go tlhokomela balwetsi ba ba nang le kgotlholo e tona e e gananang le melemo se ke sa botsang ka sone?

.....

.....

.....

.....

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

Appendix B: Self Introductory Form (English Version)

I am Nkgadimang Stegling, a nursing officer working at Tlokweng Main clinic and presently a student at University of Botswana doing a Masters degree programme. I am doing research as a requirement for this programme. My research topic is 'experiences of health care workers caring for drug resistant tuberculosis patients'. I would like to interview health care workers (nurses and doctors) who work at the MDR-TB treatment center taking one or two people per day.

This study is not part of the services offered at the this centre therefore people are free to participate or not participate. This study may help in identification of challenges associated with service provision to patients therefore can help improve the service provision to patients and staff welfare.

Each person who volunteers to partipate will be interviewed individually in a private room after finishing helping patients or between duties. Each interview will take 45 minutes to 2 hours. If you agree to participate you will be requested to sign a consent form before the interview is started. Your identity will be kept confindential by not writing your name on the interview guide, but numbering will be used. I will be using an audio tape to record your responses to the questions during the interview processs.

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

Appendix B: Matseno: Setswana Version

Ke bidiwa Nkgadimang Stegling ke moithuiti wa ngwaga wa bofelo ko mmadikolo (University of Botswana). Ke dira dipatlisiso ka tlhokomelo ya balwetsi ba ba nang le kgotlholo e tona e e gananang le melemo. Setlhogo ke 'Maitemogelo a badiredi ba botsogo mabapi le tlhokomelo ya balwetsi ba kgotlholo e tona ee gananang le melemo mo Princess Marina Hospital'.

Ke tla kopa go botsolosa baoki le dingaka mapabi le tlhokomelo ya balwetsi ba kgotlholo e tona ee gananang le melemo. Ke tla bo ke buisanya le baoki kgotsa dingaka a le mongwe kgotsa ba le babedi ka letsatsi.

Dipatlisiso tse ga se bontlha bongwe jwa ditirelo tse di fiwang balwetsi mo kokelong e, ka jalo badiredi ba itlhophela go tsaya karolo kgotsa go sa tsaya karolo. Maduo a dipatlisiso tse a ka thusa go lemoga dikgwetlho tse bodiredi le balwetsi ba kopanang le tsone, jalo he go thuse ka tsela nngwe go tloka fatsa tlhokomelo ya balwetsi le badiredi jwa botsogo.

Mongwe le mongwe yo o dumetseng to tsaya karolo o tla botsolotswa mo kamoreng ya sephiri a le nosi a se na go thusa balwetsi ba gagwe kana a ntse a tswelletse a le mo tirong. Go tla tsaya sebaka sa metsotso e le masome a mane le botlhanano go ya go dioura tse pedi.

Motsaya karolo o tlamega go saena mokwalo wa tumalano pele ga sepe se ka dirwa. Maina a gago a tla seke a kwalwe gope kana sepe se se ka supang gore o mang mo dipampiring tsa dipatlisiso mme dinomoro di tla dirisiwa go farologanya ba tsaya karolo. Ke tla bo ke dirisa sekapamantswe fa re ntse re tswelletse gore ke kape dikarabo tsa gago fa puisanyo e ntse e tswelletse.

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

Appendix C

LETTERS ASKING PERMISSION TO CARRY OUT THE STUDY

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

School of Graduate studies

University of Botswana

School of Nursing

P/Bag 0012

Gaborone

15/01/2018

Chairperson

Ethics Committee

Sekgoma Memorial Hospital, (MDR-TB) Treatment Centre

P.O.Box 120

Serowe

Dear sir/madam

RE: PERMISSION TO CARRY OUT A PILOT STUDY

This letter serves to seek permission to undertake a pilot study in Sekgoma Memorial hospital (MDR-TB Treatment centre). This is in preparation for the main study that I am required to undertake in partial fulfilment of the Master of Nursing Science (MNSc) programme. The purpose of the study is to explore the experiences of health care workers caring for patients diagnosed with drug resistant tuberculosis.

I am a third year Master of Nursing Science student at the University of Botswana school of Nursing and have enclosed my research proposal.

Yours faithfully

.....

Nkgadimang Stegling

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

School of Graduate Studies

University of Botswana

Department of Nursing

P/bag 0022

Gaborone

15/01/2018

The Chairperson

Research and Ethics Committee

Ministry of Health

P.O.Box 0038

Gaborone

Dear Sir/Madam

RE:PERMISSION TO CONDUCT A RESEARCH STUDY

This letter seeks permission to undertake a study at the Princess Marina Hospital,MDR-TB treatment centre. I am a nursing officer at Tlokweng Main clinic under the Ministry of Health presently pursuing a Master of Nursing Science Degree (MNSc) in Community Health Science. In partial fulfilment of the MNSc program, I am required to conduct a research study. My research topic is 'Experiences of health care workers caring for DR-TB patients

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diagnosed with DR-TB. My target population will be nurses and doctors caring for DR-TB patients at the Princess Marina MDR-TB treatment centre. The research will be carried out between January 2018 and December 2018. Accompanying this letter is a copy of the research proposal for review by the committee,with an informed consent form.

Thanking you in advance

Yours faithfully

Nkgadimang Stegling

Supervisor: Professor Phaladze

Cc:Medical Superintendent ;Princess Marina Hospital

Principal Nursing Officer

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

School of Graduate studies

Department of Nursing Science

P/bag 0022

Gaborone

15/01/2018

The Chairperson

Health Research Committee

Princess Marina Hospital(MDR-TB Treatment Centre)

P.O.Box 258

Gaborone

Dear Sir/Madam

RE:PERMISSION TO CONDUCT A RESEARCH STUDY

This letter seeks permission to undertake a study at the Princess Marina Hospital, MDR-TB treatment centre. I am a nursing officer at Tlokweng Main Clinic under the Ministry of Health presently pursuing a Master of Nursing Science Degree (MNSc) in Community Health Science. In partial fulfilment of the MNSc program, I am required to conduct a research study. My research topic is 'Experiences of health care workers caring for patients diagnosed with DR-TB'. My target population will be nurses and doctors caring for DR-TB patients at

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

the Princess Marina MDR-TB treatment centre. The research will be carried out between January 2018 and June 2018. Accompanying this letter is a copy of the research proposal for review by the committee, with an informed consent form.

Thanking you in advance

Yours faithfully

Nkgadimang Stegling

Supervisor: Professor Phaladze

Cc: Medical Superintendent Princess Marina Hospital

Principal Nursing Officer

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

Appendix D

Informed consent form : English version

Research Study Title: Experiences of Health Care Workers Caring for Drug Resistant Tuberculosis Patients in Princess Marina Hospital

Investigator:

My name is Nkgadimang Stegling and I am a post graduate student in the Faculty of Health Sciences at the University of Botswana.

I am inviting you to participate in a research study. Involvement in the study is voluntary, so you may choose to participate or not.

The purpose of the study is to explore the experiences of health care workers who care for drug resistant tuberculosis patients in Princess Marina Hospital. The study is undertaken towards the fulfilment of the award of a Masters Degree in Nursing Science.

I am now going to explain the study to you. Please feel free to ask any questions that you may have about the research; I will be happy to explain anything in greater detail.

I am interested in learning more about the experiences of health care workers caring for drug resistant tuberculosis patients in Princess Marina Hospital.

You will be asked to share with me your experiences including your observations. I will use an audiotape to record your responses to the questions during the interview process. This will take approximately 45 minutes to 2 hours of your time.

All the information collected will be handled with utmost confidentiality and your participation will remain anonymous.

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

I will assign a number to your responses, and only I will have the key to indicate which number belongs to which participant to enhance confidentiality. In any articles I write or any presentations that I make, I will use a made-up name for you, and I will not reveal details or any personal information about you, and so forth.

The benefit of this research is that you will be helping us to understand the experiences of health care workers be it negative or positive while caring for drug resistant tuberculosis patients. This information should help with identification of challenges associated with service provision to these patients therefore can help improve service provision to patients and staff welfare.

The risks to you for participating in this study are anxiety related to the sharing of negative encounters you had while caring for these patients which might disturb you psychologically.

These risks will be minimized by allowing you enough time to relax and only share with me what you are comfortable with during the interview.

If you do not wish to continue, you have the right to withdraw from the study, without penalty, at any time.

Participant: All of my questions and concerns about this study have been addressed. I choose, voluntarily, to participate in this research project. I certify that I am at least 18 years of age.

Print name of participant

Signature of participant

Date

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

Print name of investigator

Signature of investigator

Date

Contact details of the investigator:

Cell phone: 74220245

Work: 3928220/3928563

Source: The above consent form format was downloaded from internet using IRB consent form, APP09.C and modified to suit the proposed study. Downloaded 09/05/2014.

Appendix D: Tumulano ya Potsoloso (Setswana Version)

Setlhogo: Maitemogelo a bodiredi jwa botsogo ka tlhokomelo ya balwetsi ba kgotlholo e tona ee ganang le melemo mo sepatlela sa Princess Marina.

Mmatlisisi:

Ke bidiwa Nkgadimang Stegling ke moithuti mo Mmadikolo mo lephateng la ithutelo booki le bongaka.

Ke go laletsa go tsaya karolo mo dipatlitsisong tse, mme go tsaya karolo ga go patlelediwe ka jalo o ka ikgethela go tsaya karolo kgotsa nnyaya.

Maikaelelo a dipatlisiso tse ke go batla go itse mo go tseneletseng ka maitemogelo a bodiredi jwa botsogo mabapi le go tlhokomela balwetsi ba ba amilweng ke bolwetsi jwa kgotlholo e tona ee ganang le melemo mo sepatlela sa Princess Marina. Dipatlisiso tse ke bontlhabongwe jwa tse di batliwang go fetsa sekolo.

Jaanong ke tsile go go botsa dipotso mme ke kopa o phuthuloge go botsa dipotso mme ke ka itumela go araba dipotso tsa gago ka botlalo.

Ke na le keletso ya go itse mo go tseneletseng mabapi le maitemogelo a gago ka tlhokomelo ya balwetsi ba kgotlholo e tona ee ganang le melemo mo Princess Marina.

Ke tla kopa gore o kgaogane le nna maitemogelo a gago le tse dingwe tse o di ithutileng fa o tlhokometse balwetsi ba. Ke tla bo ke dirisa sekapamantswe fa re ntse re tswelletse gore ke kape dikarabo tsa gago fa puisanyo e ntse e tswelletse. Puisanyo ya rona e tla tsaya metsotso e e masome a mane le botlhanano go ya goya go dioura tsa nako ya gago.

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Dikarabo tsotlhe di tla bewa sentle di babalesegile mme e bile di sa supe gore di arabilwe ke mang ka go sa di amanya le sepe se se kayang maina a mo motsaya karolo.

Ke tla fa dikarabo tsa gago nomore gore e nne nna felake lemogang gore nomore ke ya dikarabo tsa ga mang go babalela sephiri sa dikarabo tse. Fa maduo a dipatlisiso a begwa ke tla dirisa leina la maitirelo e le tsela nngwe ya go sireletsa dikarabo tsa gago.

Mosola wa go dira dipatlisiso tse ke go thusa gore re tlhaloganye dikgwetlho tse lo berekang mo go tsone mabapi le go tlhokomela balwetsi ba motlhale o, di ka tswa e le tse di siameng kgotsa tse di sa siamang. Maduo a a ka thusa go tlokafatsa ditirelo tse di fiwang balwetsi ba ba amilweng ke kgotlholo e tona ee gananang le melemo le go tlhokomela botsogo jwa bodiredi.

Bodiphatsa jwa go tsaya karolo mo dipatlisisong ke dikakanyo kgotsa go gakologelwa maitemogolo a a utlwisang botlhoko fa o tlhokomela balwetsi ba mme seo se ka go tshwenya mo maikutlong le mo tlhaloganyong.

Se se tla elwa tlhoko ka go go letlelela nako ee lekanyeng go ka bua le gore o bue fela ka maitemogelo a o eletsang go bua ka one.

Fa o na le keletso ya go ikgogela morago mo dipatlisisong, o na le tshwanelo ya go ikgogela morago, mme o ka se tseelwe dikgatlo dipe.

Mo tsaya Karolo: Dipotso tsa me tsotlhe le sepe fela se se amanang le dipatlisiso tse di tlhalositwe ka botlalo ka jalo ke dumalana le go tsaya karolo mo dipatlisisong tse. Ke rurifatsa gore ke dingwaga tse di fetang lesome le bofera bobedi.

Leina ka botlalo

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Monwana wa motsaya karolo

Letsatsi

Leina la Mmatlisisi

Monwana wa mmatlisisi

Letsatsi

Megala ya Mmatlisisi

Cell phone: 74220245

Work: 3928220/3928563

Source: The above consent form format was downloaded from internet using IRB consent form, APP09.C and modified to suit the proposed study. Downloaded 09/05/2014.

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

Appendix E

Research Budget

Stationery and supplies	Quantity	Total Amount
4 reams A4 paper (all plain) @ P100.00 each	4	P400.00
1 Toner (Black cartridge)	1	P500.00
2 Pencil erasers at P6.00 each	2	P12.00
4 Pencils @ P6.00 each	4	P24.00
4 pens @ P10.00 each	4	P40.00
1 Removable USB Electronic Disk at P100.00 each	2	P200.00
Tape Recorder and Acceseries at P450.00	1	P450.00
Field Diary at P20.00 each	2	P40.00
Correction fluid at P20.00 each	1	P20.00
Laptop at P3500.00 each	1	P3500.00
2. Typing, Printing and Binding		
Research proposal 60 pages at P2.00 per page x4 copies	4	P480.00
Interview guide 3 pages at P 2.00 / page for approximately 12 people (setswana and english version).	12x2	P144.00
Informed Consent forms 3 pages at P2.00 each for 12 people (Setswana and English version)	12x2	P144.00
Recruitment Posters x 10@ P2.00 each (Setswana and English Version	10	P20.00
Self introductory forms 3 copies at P 2.00 each (Setswana version and English version).	6	P36.00
Letters asking for permission x 4 copies at P2.00 each	4	P8.00
Binding at P30.00 x 4 copies	4	P120.00
3.Miscellaneous		

CLINICAL EXPERIENCES OF HEALTH CARE WORKERS

Transport from Tlokweng to Gaborone P50.00 daily for two weeks		P700.00
Around city for Two weeks		P700.00
Meals-P150.00/day x 14 Days		P2100
TOTAL		P9638.00

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Appendix F

Study Recruitment Poster (English version)

A researcher from the University of Botswana, school of nursing is conducting a study on experiences of health care workers caring for drug resistant tuberculosis patients. Your assistance will be highly appreciated if you choose to participate in the study. The following requirements are needed;

- A nurse working at the Princess Marina Hospital MDR-TB treatment centre.
- A doctor working at the Princess Marina Hospital MDR-TB treatment centre.
- You have cared for DR-TB patients for at least 6 months.

If you would like to participate and you meet all the above mentioned requirements; please contact me at:

Email address:snkgadimang@yahoo.com

Cell phone numbers: 73053084/74220245

Appendix F

Papatso ya go ngoka batsenelela dipatlisiso (Setswana version)

Mmatlisisi go tswa ko sekolong se setona sa Mmadikolo (University of Botswana) mo Gaborone, mo lephateng la ithutelo booki o na le maikaelelo a go batlisisa ka maitemogelo a badiredi ba botsogo mabapi le tlhokomelo ya balwetsi ba kgotlholo e tona e e gananang le melemo.

Go ka lebosega thata fa o ka nna mo tsaya karolo fa o na le tse di latelang;

- O mooki yo o direlang mo Princess Marina Hospital MDR-TB treatment centre.
- O ngaka yo o direlang mo Princess Marina Hospital MDR-TB treatment centre.
- O tlhokometse balwetsi ba ba nang le kgotlholo e tona ee gananang le melemo mo lebakeng la dikgwedi tse thataro le go feta.

Fa o na le keletso ya go tsaya karolo mo dipatlisisong tse mme e bile o na le tsotlhe tse di nankotsweng fa godimo o ka itshwaraganya le nna mo megaleng kgotsa dinomoro tse di latelang;

Email address:snkgadimang@yahoo.com

Megala: 74220245/73053084