Knowledge and practices of health care workers at Medunsa Oral Health Centre regarding post exposure prophylaxis for blood-borne viruses

by

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DECLARATION

I, N R Nkambule, hereby declare that the work for this dissertation, unless where acknowledged, is my own. It is being submitted in partial fulfilment for the degree Master of Public Health, in the School of Health Care Sciences, University of Limpopo, Medunsa Campus.

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Signature **date**

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ABSTRACT

Background: Health care workers (HCWs) are prone to occupational exposures to blood-borne viruses (BBVs), which include hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). Post exposure prophylaxis (PEP) is available for both HBV and HIV, and if administered correctly can reduce the risk of HBV and HIV transmission by 80%. This study investigated the knowledge and practices of HCWs regarding PEP for BBVs at Medunsa Oral Health Care Centre (MOHC).

Methods: This was a cross sectional study conducted among 166 HCWs at the MOHC using a self-administered, anonymous questionnaire on knowledge and practices of HCWs regarding PEP for BBVs. Binary logistic regression method was used to determine factors associated with reporting an occupational exposure and uptake of PEP.

Results: The response rate was 67%. The mean age was 27yrs (*SD* =7.67yrs), and 68.7% of respondents were female. The overall knowledge regarding PEP among the HCWs was inadequate as 46.9% had poor knowledge. The majority (77.7% [128/166]) of HCWs experienced occupational exposures and amongst them 39.0% (50/128) experienced it twice or more. Almost two-thirds (60.9%) of HCWs experienced an occupational exposure while performing scaling and polishing. Only 28.9% (37/128) of those who were potentially exposed to a BBV reported the incident to the authorities. Out of those who reported, 37% (14/37) took PEP for HIV, and 32.4% (12/37) took PEP for HBV. Among those taking HIV PEP, 21.4% (3/14) indicated that they completed the course. HCWs who had five or more years of experience were less likely (OR=0.138, p=0.043) to report compared to those who had less than five years of experience.

Conclusion: Overall, participants' knowledge regarding PEP as well as reporting of an exposure was inadequate. The majority of HCWs experienced an occupational exposure while performing scaling and polishing.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS: Acquired immunodeficiency syndrome

BBF: Blood and body fluid

BBVs: Blood borne viruses

CDC: Centers for Disease Control and Prevention

HBV: Hepatitis B virus

HCV: Hepatitis C virus

HCW: Health care worker

HIV: Human immunodeficiency virus

DoH: Department of Health

NSI: Needle stick injury

WHO: World Health Organisation

FMOH: Federal Ministry of Health

HICPAC: Hospital Infection Control Practices Advisory Committee

UNAID: United Nation Programme on HIV and AIDS

CHAPTER 1: INTRODUCTION

1.1. BACKGROUND TO THE STUDY

Blood and body fluid (BBF) exposures are the most common safety problems among healthcare workers (HCWs) (Tarantola et al, 2005). HCWs are exposed to BBFs in the course of their work (World Health Organisation [WHO] 2003). Consequently, they are at risk of infection with bloodborne viruses (BBVs) including human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) (de Villiers et al, 2007). Occupational exposure to blood can occur through a percutaneous injury, such as a needle stick injury (NSI) or other sharps injury, or through a mucocutaneous incident (splash of blood or blood-containing fluids into the eyes, nose, or mouth), or blood contact with non-intact skin (Nemutandani, 2007; Jovic-Vranes et al, 2006). The risk of infection for HCWs depends on the prevalence of BBVs in the patient population which they are attending to and is exacerbated by the nature and frequency of exposures (WHO, 2003).

In addition to performing exposure-prone procedures, the overcrowding of hospitals may also contribute to HCWs in developing countries being more exposed to BBVs. The prevention of occupational exposure and patient-acquired nosocomial infections has been the focus of infection control since the discovery of the mechanism of disease transmission by Lister and others in the 1800s (Nemutandani, 2007). Transmission of BBVs has been reported from patient to patient, patient to HCWs, and rarely from health care worker to patient (Ramos-Gomez et al, 1997; McNamara & Bagramian, 1999; Stewardson et al, 2003; Dement et al, 2004). Among the 35 million HCWs worldwide, about 3 million experience percutaneous exposures to BBV's each year; two million of these to HBV, 0.9 million to HCV and 170 000 to HIV (WHO, 2003). These exposures may result in 15 000 HCV, 70 000 HBV and 1 000 HIV infections (WHO, 2003).

According to estimates from the Joint United Nations Programme on HIV/Acquired Immune Deficiency Syndrome (AIDS) (UNAIDS) and WHO, 33.4 million people were living with HIV/AIDS worldwide in 2008; the vast majority were in low- and middle-income countries (UNAIDS, 2008). Globally, more than two billion people alive today have been infected with HBV at some time in their lives (WHO, 2007). Of these, about 350 million have chronic infections and are carriers of HBV, and these chronic carriers are at risk of developing the life-threatening complications of cirrhosis, and hepatocellular carcinoma (HCC) (WHO, 2004). In addition, it is estimated that there are four million acute clinical HBV cases annually (WHO, 2007).

HIV, HBV, and HCV all have similar modes of transmission; however, HCV has low sexual transmission (Madhava et al, 2002). HCV infection is most efficiently transmitted by exposures that involve direct passage of blood through skin e.g. percutaneous especially injecting drugs and blood transfusion (Shepard et al 2005). A South African study found that 1.8% of HCWs in Johannesburg tested positive for HCV antibodies (Vardas et al, 2002) while in Britain, no seroconversions were reported among 142 occupational exposures to hepatitis C (Evans et al, 2000). HBV is transmitted in the same way as HIV: by contact with blood or body fluids of an infected person, including perinatal, sexual contact, mother-to-child transmission, unsafe injections, and transfusions (Centres for Disease Control [CDC], 2001). However, HBV is 50 to 100 times more infectious than HIV and 10 times more infectious than HCV (CDC, 2001).

In 1987 the CDC proposed a concept called “universal precautions" (UPs). UPs as defined by CDC, are a set of precautions designed to prevent transmission of BBVs such as HIV, HBV, and HCV during the provision of first aid or health care (CDC, 1987). In 1995 the CDC Hospital Infection Control Practices Advisory Committee (HICPAC) introduced the concept of standard precautions (SPs), which place all universal precautions and body substance isolation guidelines into a single set of precautions (Gunson et al, 2003). Under SPs, blood and certain body fluids of all patients are considered potentially infectious for BBVs because patients with BBVs can be asymptomatic or unaware that they are infected (Jochimsen et al, 1999; Parkin et al, 2000). Although it is documented that adherence to SPs can reduce the risk of exposures, the available data from developing countries show that adherence to such precautions is poor (Gounden et al, 2000; Chogle et al, 2002). To prevent transmission of BBVs, HCWs should adhere to recommended SPs and fundamental infection-control principles, including safe injection practices and appropriate aseptic techniques (CDC, 1987).

There is no vaccine for HCV and HIV but there is a highly efficacious vaccine that protects against HBV infection, and it is recommended by the South African Department of Health (DOH) that all HCWs should be vaccinated against HBV before being exposed to patients and should be tested for immunity thereafter (DOH, 2005). Hepatitis B immunization, and post exposure prophylaxis (PEP) for HBV and HIV are integral components of a complete program to prevent infection following BBV exposure and are important elements of workplace safety. There is no vaccine or PEP for HCV. All HCWs should report any occupational exposures in order to receive the right care and treatment. It is recommended that any workplace where workers are prone to blood or other body fluids exposures, must have a system in place for reporting and responding to an exposure (CDC, 2001). Because there is no PEP for HCV, this dissertation from here onwards will not refer to HCV, but only to HIV and HBV.

1.2 PROBLEM STATEMENT

Exposure to BBFs is a serious occupational concern for HCWs (Reda et al, 2009). It is estimated that approximately 3 million percutaneous exposures occur annually among 35 million HCWs globally, of which 90% occur in low-income countries (Pruss-Ustun et al, 2005). Sub-Saharan countries contribute 70% of all occupational exposures and only 4% of worldwide occupational exposures are reported from this region (Kermode, 2005). By contrast 4% of the global HIV-infected population lives in America or Western Europe, yet 90% of documented occupational HIV infections are reported in these areas (Gupta et al, 2008). Infections acquired through occupational exposure are largely preventable through strict infection control measures, application of SPs, the use of safe devices, proper waste disposal, immunization against HBV (pre-exposure prophylaxis) and prompt management of exposures including the use of PEP for HIV (estimated to reduce HIV seroconversion by 81%) (Gupta et al, 2008), and HBV (not evaluated in occupational exposures, but presumed to be as effective as PEP in the perinatal setting [CDC, 2001], i.e. 84-94% [Milne et al, 2002] when using vaccination alone). The use of this strategy is now the standard of care in most high-income nations and has reduced the risk of HIV and HBV transmission among HCWs (Gupta et al, 2008). However, a South African study done in Limpopo Province on dental assistants has found that a relatively large proportion

(24%) of occupational exposures had gone unreported (Nemutandani et al, 2007). Many global studies have been done on knowledge and practices of PEP amongst HCWs in general. However, very little is known about the knowledge and practices of dental HCWs in South Africa. Thus this study will focus on HCWs in a dental hospital in Pretoria, South Africa.

1.3. PURPOSE OF THE STUDY

1.3.1. Research questions

The purpose of this study was to answer the following research questions:

- Do HCWs at Medunsa Oral Health Centre have sufficient knowledge about PEP?
- Do HCWs at Medunsa Oral Health Centre report occupational exposures?
- Do HCWs at Medunsa Oral Health Centre receive PEP after reporting an incident?
- What are the factors associated with increased reporting of occupational exposures at Medunsa Oral Health Centre?

1.3.2. Aim

This study aimed to investigate the knowledge and practices of HCWs regarding PEP at Medunsa Oral Health Centre.

1.3.3. Research objectives

The specific objectives of the study were:

- To determine the level of knowledge regarding PEP amongst HCWs at Medunsa Oral Health Centre
- To determine the proportion of HCWs at Medunsa Oral Health Centre reporting occupational exposure to BBFs
- To determine the proportion of HCWs at Medunsa Oral Health Centre that received PEP after exposure to BBFs
- To determine factors associated with increased reporting of occupational exposures.

CHAPTER 2: LITERATURE REVIEW

2.1 Definition of terms

2.1.1 Health-care workers (HCWs)

HCWs are defined as persons, including students and trainees, whose activities involve contact with patients or with blood or other body fluids from patients in a health-care setting (CDC, 1987). In this report, HCWs are defined as persons (e.g. students, dentists and dental assistants) who are involved in providing oral care to people consulting in a dental hospital.

2.1.2 Exposure

Exposure to blood, tissue, or other body fluids like semen, vaginal secretions, cerebrospinal, pleural, peritoneal, pericardial, synovial, and amniotic fluids have a potential risk of transmission of blood-borne pathogens to healthcare workers and therefore post-exposure prophylaxis should be considered (CDC, 1998). A percutaneous injury (for example, a needle stick or cut injury with a sharp object), contact with mucous membrane or non-intact skin (for example skin chapped or abraded or dermatitis, prolonged contact with intact skin or contact that involves extensive areas of skin (Varghese et al, 2003)

2.1.3 Post exposure prophylaxis

PEP for HIV

PEP is a special course of antiretroviral treatment that aims to prevent people who have been exposed to HIV from becoming infected with HIV. PEP should be started immediately after someone is exposed to HIV. The aim is to allow a person's immune system a chance to provide protection against the virus and to prevent HIV from becoming established in someone's body. In order for PEP to have a chance of working the medication needs to be taken as soon as possible and definitely within 72 hours of exposure to HIV. Left any longer and it is thought that the effectiveness of the treatment is severely diminished (Avert, 2010). PEP usually consists of a month long course of two or three different types of the antiretroviral drugs that are also prescribed as treatment for people with HIV. The most common drugs prescribed for PEP are

Zidovudine (Retrivir, AZT) and lamivudine (Epivir, 3TC). As with most antiretrovirals these can cause side effects such as diarrhoea, headaches, nausea/vomiting and fatigue (CDC, 2005**).** Some of these side effects can be quite severe and it is estimated that 1 in 5 people give up the treatment before completion (Avert, 2010).

PEP for HBV

Recommendations for HBV PEP management include initiation of the hepatitis B vaccine series to any susceptible, unvaccinated person who sustains an occupational blood or body fluid exposure (CDC, 2001). This is because the hepatitis B vaccine on its own has been shown to be effective in preventing HBV infection in neonates born to HBV-infected mothers (Andre and Zuckerman, 1994; Milne et al, 2002), and since hepatitis B immune globulin (HBIG) is very expensive and largely unavailable in many countries in sub-Saharan Africa, vaccination may be the only available option in these settings. Thus PEP with HBIG and/or hepatitis B vaccine series should be considered for occupational exposures after evaluation of the hepatitis B surface antigen status of the source and the vaccination and vaccine-response status of the exposed person (CDC, 2001). Regimens involving either multiple doses of HBIG alone or the hepatitis B vaccine series alone are 70% - 75% effective in preventing HBV infection (Beasley et al, 1983). For example, in the occupational setting, multiple doses of HBIG initiated within 1 week following percutaneous exposure to HBsAg-positive blood provide an estimated 75% protection from HBV infection (Grady et al, 1978; Seeff et al, 1977; Prince et al, 1975). Although the PEP efficacy of the combination of HBIG and the hepatitis B vaccine series has not been evaluated in the occupational setting, the increased efficacy of this regimen observed in the perinatal setting, compared with HBIG alone, is presumed to apply to the occupational setting as well (CDC, 2001). In addition, because persons requiring PEP in the occupational setting are generally at continued risk for HBV exposure, they should receive the hepatitis B vaccine series, which ideally they should have received before being exposed to patients (CDC, 2001).

2.1.4 Standard Precautions

Approaches to infection control have been designed to prevent transmission of bloodborne diseases, such as HIV and hepatitis B in health care settings. SPs were initially developed in 1987 by the (CDC) and in 1989 by the Bureau of Communicable Disease Epidemiology in Canada. The guidelines include specific recommendations for use of gloves and masks and protective eyewear when contact with blood or body secretions containing blood or blood elements is anticipated. The protocols are used to maintain an aseptic field and to prevent cross-contamination and cross-infection between health care providers, between health care providers and patients, and between patients. These include, but are not limited to, the sterilization of instruments; the isolation and disinfection of the immediate clinical environment; the use of sterile disposables; scrubbing, masking, gowning, and gloving; and the proper disposal of contaminated waste (CDC, 1988).

2.1.5 Standard Precautions for Dentistry

Blood, saliva, and gingival fluid from all dental patients should be considered infective. Special emphasis should be placed on the following precautions for preventing transmission of blood-borne pathogens in dental practice in both institutional and non-institutional settings.

- In addition to wearing gloves for contact with oral mucous membranes of all patients, all dental workers should wear surgical masks and protective eyewear or chin-length plastic face shields during dental procedures in which splashing or spattering of blood, saliva, or gingival fluids is likely. Rubber dams, high-speed evacuation and proper patient positioning, when appropriate, should be utilized to minimize generation of droplets and spatter (CDC, 1987).

- Handpieces should be sterilized after use with each patient, since blood, saliva, or gingival fluid of patients may be aspirated into the handpiece or waterline. Handpieces that cannot be sterilized should at least be flushed, the outside surface cleaned and wiped with a suitable chemical germicide, and then rinsed. Handpieces should be flushed at the beginning of the day and after use with each patient. Manufacturers' recommendations should be followed for use and maintenance of waterlines and check valves and for flushing of handpieces. The same precautions should be used for ultrasonic scalers and air/water syringes (CDC, 1987).

- Blood and saliva should be thoroughly and carefully cleaned from material that has been used in the mouth (e.g., impression materials, bite registration), especially before polishing and grinding intra-oral devices. Contaminated materials, impressions, and intra-oral devices should also be cleaned and disinfected before being handled in the dental laboratory and before they are placed in the patient's mouth. Because of the increasing variety of dental materials used intra-orally, dental workers should consult with manufacturers as to the stability of specific materials when using disinfection procedures (CDC, 1987).

- Dental equipment and surfaces that are difficult to disinfect (e.g., light handles or X-ray-unit heads) and that may become contaminated should be wrapped with impervious-backed paper, aluminum foil, or clear plastic wrap. The coverings should be removed and discarded, and clean coverings should be put in place after use with each patient (CDC, 1987).

2.2 Incidence of Occupational exposures

According to the World Health Report (2002), 2.5% of HIV cases among HCWs and 40% of Hepatitis B and C cases among HCWs worldwide are the result of occupational exposure. The form of exposure most likely to result in occupational BBV infection was needlestick injury (Ippolito et al, 1993; Hanrahan & Reutter, 1997). In the United States (US), out of 5.6 million HCWs, approximately 800,000 are estimated to suffer needlestick injuries each year (Hanrahan & Reutter, 1997). Exposure Prevention Information Network data suggested that at an average hospital, workers incurred approximately 30 needlestick injuries per 100 beds per year (Perry et al, 2004). A Nigerian study found that 27% of HCWs had experienced a NSI, and the majority were dentists as opposed to 31% nurses reported in India (Gupta et al, 2008). Another study from Taiwan found that 82.8% occupational exposures involving needlestick were reported (Hsien et al, 2006).

2.3 Risk factors leading to Occupational exposures

Occupational exposures to blood-borne diseases may occur from needlestick injuries and from other sharp objects such as scalpels and broken glass as well as from mucosal exposure after splashing of blood or other body fluids (de Villiers et al, 2007). Several studies reported that needlestick injuries were the commonest form of occupational exposure, ranging between 61.5% to 80% of all occupational exposures (de Villiers et al, 2007; Moghimi et al, 2007; Talaat et al, 2003). The circumstances leading to needle-stick injury depend on the type and design of the device and certain work practices. It is estimated that 10%-25% injuries occurred while recapping a used needle (Gurubacharya et al, 2003; Talaat et al, 2003). Despite evidence that failure to use UPs increases the risk of blood-borne infections, suboptimal adherence to UPs by HCWs has been reported extensively. For example, the use of sharps containers (even when there was a good supply) was very low (44.3%) in Ethiopia (Reda et al, 2009). Frequency of performing invasive procedures has also been associated with more frequent exposures, thus specific professions and types of work are risk factors. For example, at non-teaching hospitals in Mumbai, Malawi, Uganda and South Africa, nurses more commonly experienced occupational exposures, followed by intern doctors (Gupte et al, 2008). Intra venous (IV) line insertion was the most common activity during exposure. Since nurses are normally the ones inserting IV's, this may account for the increased exposure in nurses (Gupte et al, 2008). Another study from Taiwan found that 82.8% occupational exposures involved needlestick injuries (Hsieh et al, 2006).

2.4 Risks of HIV and HBV transmission through occupational exposures

The risk of transmission of HBV to HCWs from patients is higher than that of HCWs to patients Viral Hepatitis Prevention Board (VHPB, 2005). It has been demonstrated that the risk of transmission varies greatly amongst different disciplines, with surgery, gynaecology, and orthopaedic services having the greatest risk (Moghimi et al, 2007). Needle stick injuries, especially those involving hollow needles, have been reported as the most common route of transmission (Alam, 2002; de Villiers et al, 2007). A study done in San Francisco, California (Gerberding, 1994) reported that the incidence of HBV was 55 times greater than that of HIV and 38 times greater than that of HCV. The same estimates were found by Jagger (2007) who reported that the risk of occupational infection with HIV, although alarming, has never reached the scale of hepatitis B. Van der Maate et al, (2010) reported that the chances of HCWs acquiring HIV through occupational injuries is greater in Malawi and sub-Saharan Africa as most hospitalised patients are HIV positive. HBV transmission was endemic in areas such as China, Southeast Asia, and Sub-Saharan Africa, including Nigeria, which had a carrier rate exceeding 8 percent (Olama Ponsiana Opio et al, 2005). Most of the infections in these areas started in childhood usually by perinatal transmission (in Southeast Asia) and by horizontal transmission among children (in sub-Saharan Africa) (Olama Ponsiana Opio et al, 2005). Other available data from sub-Saharan African countries showed that SPs to prevent occupational injuries were often poorly implemented, resulting in high incidences of occupational injuries (Pruss-Ustun et al, 2005). There was no data on the prevalence of HIV infection among dental staff in Nigeria, either occupationally acquired or otherwise; however the prevalence of HIV infection among the general population of Nigerians has been reported to be 3.9 percent (UNAIDS, 2006). Consequently, oral health personnel in Nigeria had substantial risk for occupational exposure to HIV due to the nature of dental treatment and prevalence of HIV infection among the general population (Sofola et al, 2007). In Egypt, the incidence of HBV infection from occupational exposures in HCWs had declined in recent years largely due to widespread immunization with the hepatitis B vaccine (Gurubacharya et al, 2003). Lack of access to hepatitis B prophylactic immunization and PEP for HIV and HBV for HCWs also increased their chances of occupational infections (Kermode et al, 2005). In South Africa, 91% of junior doctors reported sustaining a needlestick injury in a period of 12 months, and 55% of these injuries came from source patients who were HIV-positive (Rabbits, 2003). Another study conducted in Bloemfontein reported that out of 54.2% of HCWs who were exposed to BBVs, 48.3% occurred with HIV-positive patients and 4.3% with known HBV-positive patients (de Villiers et al, 2000). In Durban 13% of HCWs reported injuries with HIV positive patients (Gounden & Moodley, 2000).

2.5 PEP Practices

2.5.1 Reporting of occupational exposures and uptake of PEP

In the United States of America only one out of three needle stick injuries were reported while these injuries virtually go undocumented in many developing countries (Gurubacharya et al, 2003). For example, a survey assessing exposure to HIV among HCWs in South Africa showed that 13% of the staff reported accidental exposure when caring for HIV patients (Gounden & Moodley, 2000). Also, more than 30% of South African dental assistants felt that their occupational exposures did not require treatment and did not report these incidents (Nemutandani et al, 2007).

Underreporting may be associated with a perceived low risk of infection, workload pressure, time constraints, being unaware of the need to report, or not knowing where or how to report (Elimiyeh et al, 2004; Clarke et al, 2002; Norsayani et al, 2003). Lack of knowledge of UPs has been found to be a contributing factor for not reporting occupational exposures (Alam, 2002). For example, in a study conducted in Uganda, only 20.2% of HCWs reported that they have seen the guidelines of UPs (Alenyo et al, 2009). Similar reasons were reported in Taiwan (Hsieh et al, 2006).

2.5.2 Knowledge of PEP

Providing relevant information on PEP for the HCWs including managers would help to prevent the transmission of HIV and HBV, provide epidemiological data, identify unsafe practices, and reduce anxiety, and/or increase staff retention and pro-ductivity. However literature shows evidence that there is an information gap in the health care settings (Bosena et al, 2010). For instance a study done in Guy's and St Thomas's hospital in London in 2001, found that while 93% of junior doctors had heard of PEP, only 76% were aware that it reduced the rate of HIV transmission (Chen et al, 2001). Another study conducted in Ethiopia reported that the majority (83.9%) of the HCWs had inadequate knowledge about PEP for HIV exposure (Bosena & Chernet, 2010).

Another study done in Pakistan reported that only 10% of 282 HCWs were aware of PEP (Siddiqui et al, 2008). This was contrary to a study done at in Malaysia, where 96.5% of HCWs stated that they know about Universal precaution guidelines, however there were gaps in the knowledge and practice (Rampal et al 2010). The majority (91%) reported that needle stick and sharp injuries need to be reported, however, only 30.9% who had needle stick and sharp injuries reported the incident (Rampal et al, 2010). Wig, (2003) conducted a study amongst doctors in non-governmental hospitals and clinics across Delhi, and reported that many participants were not aware of PEP measures to be taken if there is an occupational exposure to the blood of HIV positive patient. The same study also reported lack of awareness regarding drugs for PEP, with only 36% knowing that they are to be started immediately.

A study done in Saudi Arabia, reported that of the 74% HCWs who had a history of needle stick injuries, 93% never reported the incident to a doctor to get post-exposure treatment because they were not aware of the importance of post-exposure prophylaxis (Alam, 2002). Parra-Ruiz et al, (2004) also reported inadequate knowledge of PEP among doctors in Spain.

2.5.3 PEP Practices in developed countries

Avoiding occupational blood and body fluid exposure is the primary way to prevent transmission of HIV and HBV in health-care settings (CDC, 1999). However, hepatitis B immunization and post-exposure management are integral components of a complete program to prevent infections following blood-borne exposures and are important elements of workplace safety (CDC, 2001).

Although infection control guidelines were more frequently available in developed countries, there was still a lack of compliance amongst HCWs (Kermode et al, 2005b). It was observed from a study in North America (UNAIDS, 2004) that compliance to PEP was strongly correlated with perceived organizational commitment to safety. Other confirmed determinants are conflict of interest between worker’s need to protect themselves and their need to provide medical care to patients, risk taking personality, perception of risk, knowledge regarding route of transmission and training in universal precautions (Shah et al, 2009).

An Italian based study showed that less than 30% of dentists had a written protocol to follow. Nevertheless there was a good understanding of cross infection measures and the use of personal protective equipment amongst all the dentists (Veronesi et al, 2004). A study from Houston Texas showed that physicians and other HCWs often do not follow specific recommended work practices for so many reasons such as pressure of work, exhaustion and other personal or institutional factors (Michalsen et al, 1997). A study in Australia reported that although 76 % of HCWs reported the exposures, out of those only 18 % had sought PEP within the hospital at some stage in their career. Of the 18 % who sought advice, 12 HCWS were offered PEP, 6 commenced PEP but only 2 completed the course (Chen et al, 2001). A study from USA found that among medical students, only 17% reported an exposure and among them, 70% of these cases were recommended PEP and accepted. No denial of PEP was reported (Birenbaum et al, 2002). A study was conducted on 492 US HCWs who had occupational exposures to HIV, were prescribed HIV PEP, and agreed to be enrolled in the registry by their healthcare providers. The PEP regimens prescribed for 63% of these HCWs consisted of at least three antiretroviral agents. Of the 91% HCWs for whom 6 week follow-up was available, 43% completed the PEP regimen as initially prescribed, while 44% discontinued all PEP drugs and did not complete the PEP regimen. Also, 13% discontinued more than 1 drug or modified drug dosage or added a drug but did complete a course of PEP. Among the 254 HCWs who modified or discontinued the PEP regimen, the two most common reasons for doing so were because of adverse effects (Wang et al, 2000).

2.5.4 PEP Practices in developing countries

HCW anxieties about contracting a BBV may mean that infected patients or those who may be considered at risk of having a BBV are not provided with optimal health care (Gold et al, 2004). The frequency of occupational injuries was found to be high among North African HCWs, but only an estimated 7% of them are reported (Faris et al, 1994). A study conducted in India reported that out of 81.1% exposures reported a start dose PEP was given to 72.0% HCWs, and among them 58.6% completed more than 20 days of PEP regimen. The same study also reported that among the high risk cases where source status was unknown, 36.4% initiated extended PEP and among them 38.3% completed more than 20 days and 23.4% stopped due to intolerance to PEP regimen (Gupta et al, 2008). Another study from India highlighted that only 50% of the affected individuals reported the occurrence to concerned hospital authorities and less than a quarter of the exposed persons underwent PEP against HIV, although the same was indicated in about 50% of the affected HCWs based on the HIV status of the source patient (Singru & Banerjee, 2007). A study conducted by the Federal Ministry of Health (FMOH) in Nigeria indicated that though PEP was prescribed in accordance with the FMOH protocol, 23.8% of HCWs did not complete the treatment due to side effects. These HCWs, however, reported for follow-up despite the refusal to accept to continue the drugs or change of drugs (FMOH, 2005). A Nigerian study found that self-assessed risk of becoming infected with HIV was low among surgical trainees (Adebamowo et al, 2002).

A study conducted in Thailand reported that, amongst 306 exposed HCWs, 63.5% HCWs initiated PEP. Of those who initiated PEP, 56% completed a four week course but the remainder discontinued PEP prematurely due to side effects, or after negative results from the source, or following informed risk reassessment or on their own accord (Hiransuthikul et al, 2007). Another study in Thailand reported that 15% of HCWs reported exposure to HIV and 64% were prescribed HIV PEP, but 50% did not complete the PEP regimen as initially prescribed (Kiertiburanakul et al, 2006).

In contrast, a study conducted in Brazil reported that PEP for HIV was initiated for 64% of exposed HCWs (Rapparini et al, 2007). A study in Uganda reported that 82.9% of HCWs had been exposed to potentially infectious fluids, while 21% sought some sort of advice for PEP and did not follow it up (Alenyo et al, 2009). In Malawi out of 29 HCWs who sought advice after an occupational injury, PEP was started in 66% (19/29) of cases, but 10.5% (2/19) stopped the next day after the source person was tested HIV negative (Van Oosterhout et al, 2007). A Kenyan study reported that of those staff that had had a NSI, 85% had taken appropriate first aid measures but only 14 % reported the injury in the workplace; and 2.3% had taken PEP in the previous twelve months at their own expense (Taegtmeyer et al, 2008*)*. The largest study from the West African countries documented that 45% of HCWs had sustained at least one accidental blood exposure, over 60% of which were unreported (Tarantola et al, 2005). In a study done in Saudi Arabia, 74% had experienced a NSI, and of those 8% reported the injuries to get PEP and 92% did not report the incident (Alam, 2002).

2.5.5 PEP Practices in South Africa

Data from the southern African region regarding PEP are poor (Andrews, 2008). In 2001, 69% of interns at Chris Hani Baragwanath Hospital in Johannesburg had sustained at least one percutaneous injury, 45% had sustained a mucocutaneous blood risk exposure, and 60% did not report the exposures (Kastedt & Pantanowitz, 2001). In contrast, 91% of junior doctors reported needle stick exposures in a study at Tygerberg Hospital in Cape Town (Marais & Cotton, 2002). de Villiers et al, (2007) reported in a study done at Bloemfontein, South Africa that 40.2% of junior doctors reported the exposure, took the ARV's when they were exposed to a confirmed HIV-positive patient. A study conducted at University of Western Cape showed that of 116 dental healthcare workers who experienced occupational exposures, 60% were aware of PEP but 50% students did not officially report the exposure (Siddiqui et al, 2006). Another study conducted in Durban, amongst 256 HCWs reported that 82.9% HCWs with occupational exposures to HIV took PEP. Although 82.9% initiated PEP, 48% discontinued treatment due to side effects of the drugs (Gounden & Moodley, 2000).

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research Design

A quantitative cross sectional descriptive survey was used for the study.

3.2 Study Setting

Medunsa Oral Health Centre is an academic institution located in the Gauteng Province, Pretoria. It provides different oral health care services i.e. cleaning, filling, extraction of teeth and placement of orthodontic wires to the community living around Pretoria and other neighbouring communities. The institution trains students to become dentists and oral hygienists, and is divided into six departments namely: department of Maxillofacial and Oral surgery, Operative dentistry, Periodontics, Community Dentistry, Prosthodontics and Orthodontics. There are approximately 60 new incoming patients on a daily basis and about 250 patients coming in for reviews and follow up appointments.

3.3 Study Population

A total of 246 dental HCWs were working in the hospital at the time that the study was conducted. This included all dental students who were in their 3rd, 4th and 5th year of study, all 2nd and 3rd year oral hygiene and dental therapist students, dentists, dental assistants, and oral hygienists at Medunsa Oral Health Centre. The 1st year dental therapist and oral hygiene students were present in the hospital but they were not involved with patient care and were thus not considered as HCWs for this study. At their level they only did practical work in phantom heads.

3.4 Sampling Method

No sampling was required as all 246 dental HCWs were included in the study.

3.5 Inclusion criteria

Dental students in their 3rd, 4th and fifth year of study, 2nd and 3rd year dental therapist and Oral hygienist students, dental assistants, dentists and dental surgeons were all included.

3.6. Exclusion criteria

1st year Oral Hygienists and dental therapists students, and 1st and 2nd year dental students because they were either not in contact with patients care, or they don't use sharp objects or perform invasive procedures.

3.7 Data collection

Data collection tool

A self-administered questionnaire with closed-ended questions was used to collect data (Annexure A). The first part of the questionnaire dealt with demographics (race, age, gender, job category and duration as health care worker) to provide a profile of the participating HCWs. The second part dealt with the knowledge of HCWs about HBV, HIV and PEP. Lastly the third part dealt with occupational exposures to BBVs and the utilization of PEP.

Recruitment of student participants

The researcher visited the institution a week before the collection of the data and requested permission from the heads of relevant departments. Once the permission was granted then the researcher explained the research objectives to the different lecturers and asked them to give 20 min of their lecture times for data collection. The researcher was given different times by the different lecturers for different lecture periods for data collection. According to the schedule made by the lecturers, the researcher went to the specific lecture room and attended the lecture. Once the lecturer finished his/her lecture, the lecturer introduced the researcher to the class. The researcher then explained the purpose of the study and need for consent was explained to the potential respondents.

Administration of questionnaire to students

The questionnaires for all the dental students who volunteered to participate were then distributed, and the researcher was present in the lecture room while the students filled in the questionnaires to ensure they do not get answers from each other, and completed questionnaires were collected immediately afterwards.

Recruitment of staff members and administration of questionnaires to staff members

For the dental assistants, the purpose of the study was explained and questionnaires were distributed during their morning meeting and questionnaires were collected during tea time. Questionnaires' to dentist and dental surgeons was given in groups in different departments in the morning and collected during lunch time. Data were collected from the 27 July 2010 until the 2nd August 2010.

3.8 Data analysis

Data were entered into a Microsoft Excel spreadsheet (Microsoft Office, 2003) which was imported to SPSS version 17 for analysis. The analysis results of participant's demographic variables, and knowledge and practice scores was summarized using descriptive summary measures: expressed as mean (standard deviation) or median (minimum-maximum) for continuous variables (age and scores) and percent for categorical variables (other demographic information and continuous variables collapsed into categories such and "poor" (a score below 50%), "average" (a score from 50-70%), and "excellent" (a score above 70%). The chi-square test was used to find an association between categorical variables and Pearson's correlation test was used for continuous variables. All statistical tests were performed using two-sided tests at a 0.05 level of significance. P-values was reported to three decimal places with values less than 0.001 as < 0.001 and values less than 0.05 were considered statistically significant.

3. 9 Validity

Before piloting the researcher received inputs from dental experts to improve content validity on the instrument i.e. to see if the questions were clear and gave valid information. Questions that raised disagreement among experts were improved upon. The questionnaire were then pre-tested on 10 HCWs from an institution (Pretoria Oral and dental hospital) where the actual study did not take place to make sure that the questions asked would give an understanding that is anticipated or expected before the study would be conducted. The feedback from these 10 HCWs reflected clear understanding of the questionnaires.

3.10 Reliability

Reliability was assessed using the test-retest method to determine the consistency of the tool. The tool was retested on the same population upon which it was piloted. Reliability of data capturing was ensured by double data capturing and analysis of the two separate data sets.

3.11 Bias

This study was subject to volunteer bias. The questionnaires were kept anonymous to increase the response rate and minimize this bias. Anonymity was ensured by asking respondents to not write their names on the questionnaire. The study also suffered from information bias, more specifically recall bias, since respondents are required to recall past events. The errors introduced by both types of bias were minimized by not sampling, and including all dental HCWs who consented to take part in the study.

3.12 Ethical considerations

Ethical approval was obtained from Medunsa Research Ethics Committee prior to the execution of the study (Annexure B). The researcher also obtained permission to conduct the study from the Senior Management and Heads of Department of the Medunsa Oral Centre (Annexure B). The details of the study were explained to the respondents before they were handed the questionnaire. Only those who wished to participate were handed the questionnaire. Informed consent was obtained from the respondents by including a statement at the top of the questionnaire, that by completing the questionnaire, the respondent is giving informed consent. The HCWs were informed in writing that their participation was voluntary and emphasised for the students that their participation would not jeopardise their studies.

The names of the respondents were not written on the questionnaires to ensure anonymity. Respondents were also informed that they could withdraw from the study at any time. The respondents who declined to participate or withdraw were assured that they would not be penalized in any way.

CHAPTER 4: RESULTS

This chapter will show the response rate, demographic characteristics and the results addressing the objectives of the study.

4.1 Response rate

A total of 246 questionnaires were distributed to HCWs at Medunsa Oral Health Centre. Only 166 were returned, giving a response rate of 67%. All 166 were analysed for demographics and the first objective. The respondents who experienced occupational exposures in the past 12 months (77% [128/166]) were further analysed for objectives two, three and four.

4.2 Demographic characteristics

The demographic information is summarized in figures 4.1 to 4.5. Five participants did not give their age. The mean age was 27yrs (*SD* =7.67yrs). The majority of them were: 35 years old or below (88.8% [143/161]) (figure 4.1); African (86% [143/166]) (figure 4.2); female (68.7% [114/166]); dental students (80.6% [96/166]) (figure 4.3); with less than 5 years work experience (71% [118/166]) (figure 4.4).

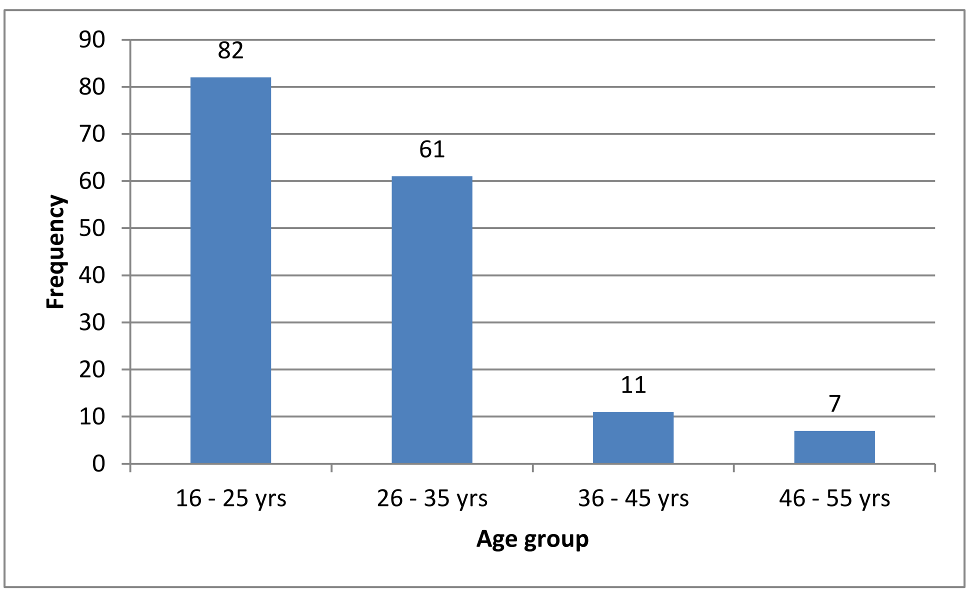

Figure 4.1: Age group distribution of the participants (n=161)

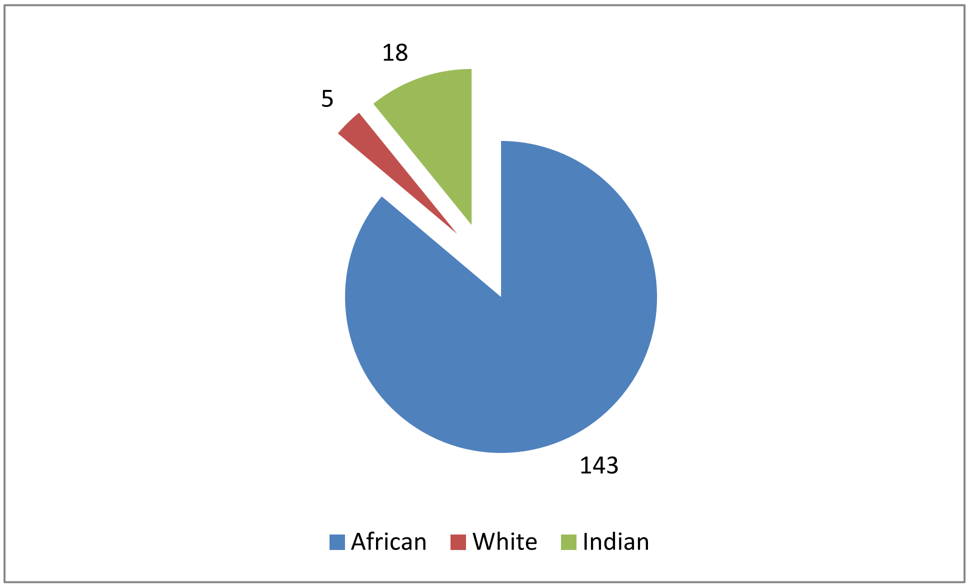

Figure 4.2: Race distribution of the HCWs (n=166)

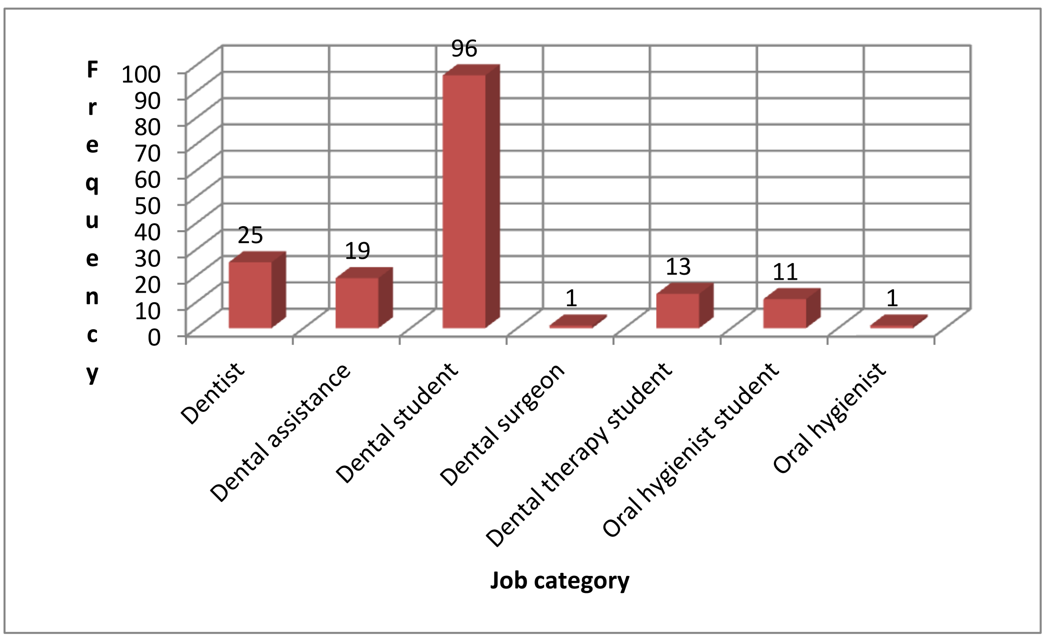

Figure 4.3: Job category distribution of the HCWs (n=166)

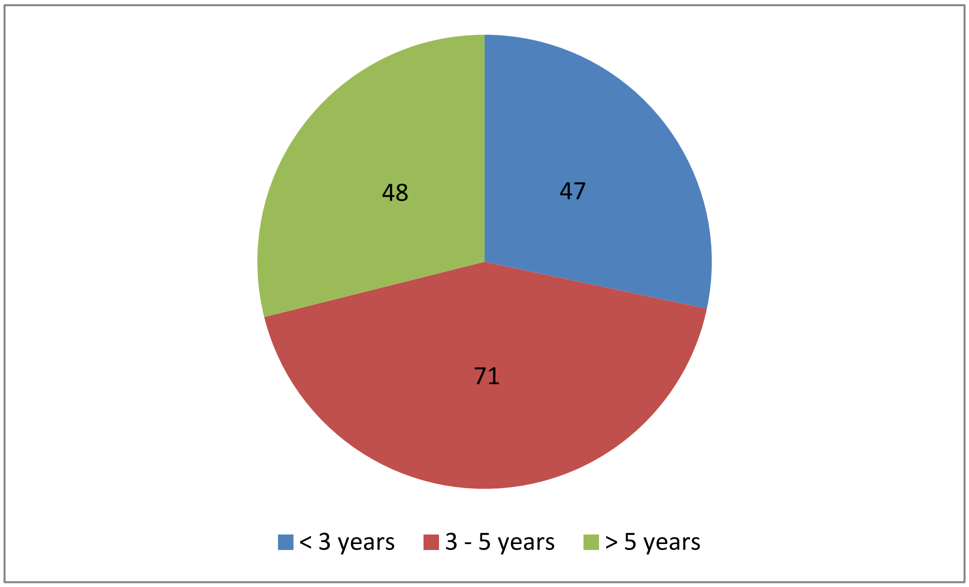

Figure 4.4: Distribution of clinical work experience among the HCWs (n=166)

4.3 Objective 1: Knowledge about PEP

The first research objective in this study was to determine the level of knowledge of HCWs about PEP against BBVs. There were thirteen multiple choice questions on general knowledge about PEP. Two questions had two correct answers and HCWs were scored 2 points for answering both questions correctly (max 2x2 = 4) and one point for answering one correctly, and the other question had four correct answers. HCWs were scored two points for answering three to four correctly, one point for answering one or two correctly (max = 2). The rest of the questionnaire had one correct answer for each question (max 10 x 1 = 10) maximum 16. Participants scored 1(one) point for each correct answer and zero (0) for incorrect answers. Poor knowledge was defined as a score of 7 or less, average as 8 to 11 as and excellent more than 12. The possible range was 0 to 16. The mean score was 9.9 (*SD* = 2.3), and the median was 10.0. None of the respondents answered all thirteen questions correctly. More than half 60% (101/166) of them had average knowledge, while 15% (26/166) had poor knowledge and 23.5% (39/166) had excellent knowledge (Table 4.1).

The distribution of answers to the knowledge questions are shown in Table 4.2.

Table 4.1: Frequency distribution of knowledge scores (n=166)

Knowledge score	Frequency	Percent
2	2	1.2
3	1	0.6
6	6	3.6
7	17	10.2
8	13	7.8
9	27	16.3
10	33	19.9
11	28	16.9
12	18	10.8
13	12	7.2
14	6	3.6
15	3	1.8
Total	166	100.0

Table 4.2: Distribution of answers to knowledge questions

Variables	Correct answer	Correct n (%)
After an occupational exposure to hazardous body fluids, a HCW can take post-exposure prophylaxis to prevent	HIV and HBV	33 (19.8)
What are the routes of transmission of hepatitis B virus?	Blood and blood products, needles or sharps and sexual intercourse.	51 (30.7)
Can hepatitis B virus be transmitted as a nosocomial infection?	Yes	93 (56.0)
Can a health worker infect patients with hepatitis B infection?	Yes	151 (90.9)
Is there a vaccine to prevent hepatitis C infection?	No	49 (29.5)
Is there a vaccine to prevent hepatitis B infection?	Yes	156 (93.9)
Is HIV more infectious than hepatitis B virus?	No	126 (75.9)
Is there a vaccine to prevent HIV infection?	No	147 (88.5)
When should PEP for HIV be started?	Within 24hrs	45(27.1)
How long should you take Post Exposure Prophylaxis for HIV?	4 weeks	82 (49.3)
What is the dosage for Post Exposure Prophylaxis for HIV?	Zidovudine & Lamivudine	18 (10.8)

Do you have to restart the PEP every time you get injured if the patient is HIV positive even though you are taking PEP for HIV?	No	92 (55.4)
What are the side effects of taking PEP for HIV?	Nausea, vomiting, dizziness, headache	53 (31.9)

4.4 Objective 2: Occupational Exposure to BBVs

The second objective was to determine the proportion of HCWs at MOHC who experienced occupational exposure to BBVs. Table 4.3, Table 4.4, and table 4.5 respectively summarises participants experience of exposures, procedure performed when experiencing an exposure, and protective measure taken during procedures. The majority (77.7% [128/166]) of HCWs experienced occupational exposures. Tables 4.3 to 4.6 summarise the results for this objective. Of those who experienced occupational exposure, 39.0% (50/128) experienced it twice or more (Table 4.6).

Table 4.3: Distribution of types of exposure (n=128*)

Type of exposure	Frequency	Percentage
Splashing in the mouth	22	17.1
Needle or sharps injuries	65	50.7
Splashing in the eyes	101	78.9

***Frequencies add up to more than 100% since some HCWs experienced more than 1 type of exposure**

Table 4.4 Procedure performed when experiencing an exposure among those who reported an exposure (n=128)

Procedure	Frequency	Percentage
Washing of instruments	14	10.9
Injecting a patient	36	28.1
Scaling and polishing	78	60.9
Extraction	20	15.6
Needle recapping	19	14.8
Used needle incinerator	58	49.7

*** Total is > 100% because multiple exposures could be reported**

Table 4.5 Protective measures taken while performing the procedure that lead to an exposure (n=128)

Protective measures	Frequency	Percentage
Wearing protective glasses	46	35.9
Wearing gloves	115	89.8
Wearing mask	115	89.8

Table 4.6 Number of times experienced an exposure

Time of exposure	Frequency	Percentage
Once	78	60.9
2-5 times	34	26.5
> 5 times	16	12.5
Total	128	100

4.5 Objective 3: Uptake of PEP in those reporting occupational exposures

The third objective was to determine the proportion of HCWs at MOHC that received PEP after exposure to BBVs**.** Only 28.9% (37/128) of those who were potentially exposed to a BBV reported the incident to the authorities. Reasons for not reporting are indicated in Table 4.7. Out of those who reported, 37% (14/37) took PEP for HIV, and 32.4% (12/37) took PEP for HBV. Two participants did not answer why they did not take PEP for HBV and nine participants did not answer why they did not take PEP for HIV. Among those participants who gave reasons for not taking PEP for HIV and HBV are summarised in Tables 4.8 and 4.9. Only 37.8% (14/37) of the participants who had reported occupational exposures answered the question on completion of PEP for HIV. Among them, 21.4% (3/14) indicated that they completed the course. The reasons for not completing the HIV PEP course are summarised in Table 4.10.

Table 4.7: Reasons for not reporting an exposure to authorities

Reasons for not reporting	Frequency	Percentage
Fear of being stigmatised for being HIV positive	10	10.9
Absence of routes of reporting	7	7.6
No facility for reporting	1	1.1
Did not know I should report	9	9.8
Not necessary to report	37	40.6

Table 4.8 Reasons for not taking PEP for HIV (n=6)

Reason for not taking PEP for HIV	Frequency	Percentage
Fear of side effects	4	66.6
The source person tested HIV negative	1	16.7
I don’t wish to know my HIV status	1	16.7

Table 4.9 Reasons for not taking PEP for HBV

Reason	Frequency	Percentage
I was previously vaccinated and tested and am protected	1	12.5
I was previously vaccinated, and although I have not been tested I presume I am protected	2	25.0
I did not know I had to take PEP for HBV	5	62.5

Table 4.10 Reasons for not completing the course for HIV among those who took PEP

Reasons	Frequency	Percentage
Experiencing side effects	7	63.6
The source person tested HIV negative	3	27.2
Not compulsory to complete the course	1	9.1

4.6 Objective 4: Factors associated with increased reporting to the authorities

The fourth objective was to determine factors associated with increased reporting of occupational exposures to the authorities. Gender, profession and years of experience were not significantly associated with reporting of occupational exposure (p>0.05) (table 4.11). There was a statistically significant association between reporting and experiencing an exposure while injecting a patient, and between reporting and experienced OE while performing scaling and polishing (Table 4.12).

Binary logistic regression modelling was carried out to find significant predictors for reporting of an exposure. The study found that dentists were statistically significantly more likely to report an exposure compared to dental students. There were 2 statistically significant barriers against reporting: being in service for >5 years, and being exposed while scaling and polishing. No other variables were found to be a risk factor for reporting an exposure to the authorities. See Table 4.13 for details.

Table 4.11 Association between demographic variables and reporting an exposure to authorities

Variable		Exposure reported		Pearson Chi-square	P- value
		Yes	**No**		
Gender	Female	23	65	1.051	0.305
	Male	14	27		
Profession	Dentists	19	4	4.597	0.100
	Dental assistants	4	5		
	Dental students (including Oral hygiene & Dental therapy students)	68	28		
Years of experience	< 3	11	25	0.425	0.809
	3-5	16	38		
	>5	9	28		

Table 4.12 Association between procedures performed during an exposure and reporting to the authorities

Variables		Exposure reported		Pearson Chi-square	p - value
		Yes	**No**		
Injecting a patient	No	21	68	4.009	**0.045**
	Yes	16	23		
Scaling and polishing	No	22	24	12.507	**0.001**
	Yes	15	67		
Extracting	No	29	77	0.719	0.397
	Yes	8	14		
Needle recapping	No	30	80	1.016	0.314
	Yes	7	11		

Statistically significant results in bold

Table 4.13 Logistic regression output of predictors for / barriers against reporting an exposure to the authority

Variables	Odds Ratio (OR)	p value	95% C.I. for OR	
			Lower	Upper
Age (>26 yrs)	.672	.555	.179	2.521
*Race		.339		
Indian	2.631	.297	.427	16.230
White	2.187	.196	.667	7.166
**Profession		.057		
Dentist	**24.990**	**.022**	**1.587**	**393.464**
Dental assistants	1.775	.555	.264	11.925
***Years of experience		.126		
3-5 yrs	.535	.379	.133	2.157
> 5 yrs	**.138**	**.043**	**.020**	**.941**
Knowledge score	1.199	.629	.573	2.510
Splashing in the mouth	.383	.247	.076	1.942
Needle or sharp injuries	1.644	.464	.435	6.212
Splashing in the eyes	.642	.482	.186	2.211
Reaction to latex gloves	.472	.255	.130	1.720
Washing instruments	2.793	.253	.480	16.265
Injecting a patient	1.448	.587	.380	5.517
Scaling & polishing	**.182**	**.017**	**.045**	**.734**
Extracting	.652	.555	.158	2.693
Needle recapping	4.046	.098	.772	21.203
Wearing protective glasses	.578	.344	.186	1.798
Use needle incinerator	.785	.706	.223	2.759
Wearing gloves	1.893	.668	.102	35.054
Wearing masks	8.310	.198	.331	208.842
Other precautions	1.847	.349	.511	6.674
Constant	.036	.077		

*African as reference group, **Dental student as reference group, ***< 3 years as reference group

CHAPTER 5: DISCUSSION

This chapter discusses the major findings of this study which are compared to the available literature. Conclusions are drawn and recommendations are made.

5.1.1 RESPONSE RATE

An overall response rate of 67% was achieved in this study which was comparable to the response rate obtained by other studies conducted among surgical staff members in Uganda and US. In the Ugandan study, the response rate was 68% and the American study achieved response rate of 63% (Alenyo et al, 2009; Wang et al, 2000).

5.1.2 Knowledge about PEP for HBV and HIV

Overall, the majority (93%) of the participants had poor or average knowledge about PEP for HBV and HIV. Although the topic of PEP is a vitally important one, there is paucity of the literature on the topic, particularly when it comes to the knowledge base of dentists, dental students and dental assistants. It was of concern that only 10.8% of participants knew the basic drug regimen of HIV PEP. This was similar (8%) to findings from a similar study conducted in the UK amongst junior doctors (Chen et al, 2001). In another study done at San Cecilio university hospital in Spain, less than 30% of the doctors were able to name any drug used for HIV PEP (Parra-Ruiz et al, 2004).

In an ideal situation, PEP should be commenced preferably within one hour after exposure and certainly within 24hrs for HBV and no more than 36hrs for HIV, to stand a chance of preventing an infection (CDC, 2005). Timely PEP to high risk body fluids exposures has been proven to reduce the risk of sero-conversion to HIV (Alenyo et al, 2009). Unfortunately only just over a quarter (27.1%) of the participants in this study knew the exact time when PEP should be started. Similar results were reported from Spain (22.3%) and Uganda (30%) (

Parra-Ruiz et al, 2004; Alenyo et al, 2009). The possible reason could be that HCWs were not interested in knowing the timing of starting PEP. Alternatively, it may be that most HCWs had never taken PEP or they may have forgotten the names of the drugs. On the question whether HIV was more infectious than HBV, the majority (75.9%) of respondents in this study knew that

HBV was more infectious than HIV. This was consistent with findings from a similar study done in Ireland, where 82% of nurses knew that HBV was 100 times more infectious than HIV (McGrane et al, 2003). In another study done in Ekurhuleni metro, Gauteng province of (S.A), 67.7% of HCWs knew that HBV was more infectious than HIV (Africa, 2010). Blood is indeed the body fluid which carries the highest level of HBV and is the most important transmission vehicle in the healthcare setting (Goldmann, 2002; CDC, 2003; Samaranayake, 2002).

Regarding vaccination, the majority (94%) of the participants in this study knew that there is a vaccine to prevent HBV infection. This finding is similar to a study conducted in Gauteng province of S.A where 87.6% knew that there is an effective vaccine to protect against HBV (Africa, 2010).

In this study, half (50.6%) of the respondents knew that the course for PEP for HIV is four weeks. This finding is contrary to a study done among doctors at San Cecilio university hospital in Spain, where no one knew the duration of a course of PEP for HIV (Parra-Ruiz et al, 2004).

5.1.3 Experience of occupational exposure

This study demonstrated that HCWs in various job categories are at substantial risk of occupational exposure to BBFs. The majority (77.7%) of HCWs experienced an exposure. This is similar to studies conducted amongst HCWs in Nepal and Saudi Arabia, where 74% of HCWs experienced an exposure in both countries (Gurubacharya et al, 2003; Alam, 2002). The findings showed that 39% of HCWs who participated in this study had two or more exposures in the previous year prior to the study. This finding is lower than the 67% found in a study conducted in Saudi Arabia (Alam et al, 2002). In another South African study it was found that 91% of intern doctors sustained one occupational exposure per year on average (Rabbitts, 2003). The possible reason for these differences might be different types of HCWs as intern doctors were not experienced as compared to surgeons. Similar reasons were mentioned in several studies done amongst HCWs from Greece, Denmark and Egypt, where the exposure rates based on job categories were different (Pedersen, 1996; Pournaras et al 1999; Talaat et al, 2003).

5.2 Reporting of occupational exposures and reasons for underreporting

Underreporting of occupational blood and body fluid exposure has been a widespread public health problem (Kessier et al, 2011). The most striking finding of this study was that only 29% of the HCWs who experienced an occupational exposure reported the incident. This finding is comparable to studies done at Mulago hospital, Uganda where 28% reported the incidents (Alenyo et al, 2009). Another study conducted among HCWs in Srilanka found that 21% of HCWs reported the incidents (Gurubachara et al, 2003). However, the finding from this study is much higher than those from studies conducted in Saudi Arabia (7%) and Chicago (17.1%) (Alam et al 2002; Kessler et al, 2011). Variation with underreporting of occupational exposures was found to range from as low as 3% to as high as 93 % (Alam, 2002; Wilburn & Eijkemans, 2004; Ganczak et al, 2006).

Regarding reasons for non-reporting of an occupational exposure, 7.6% indicated absence of routes for reporting the incident which is similar to the study conducted amongst junior doctors in UK, where 5% of the doctors did not know where to report (Chen et al, 2001). In this study setting, there is no room where a register for all reported occupational exposures is kept, and the person in charge is also not known to HCWs. In contrast, a study done among nurses at a university in Gauteng province, found that 7.3% gave a reason for not reporting the incident as fear of an HIV test (Zungu et al, 2008). Also, a Ugandan study found that 21% HCWs gave a reason of fear of being stigmatised (Alenyo et al, 2009).

5.3 PEP uptake

CDC (2001) guidelines recommend PEP for HIV as a valuable tool for preventing occupationally acquired HIV infection. In this study, among those who reported the incident, 32.4% took PEP for HBV and 37% took PEP for HIV. The same was consistent with findings from a similar study conducted in Bloemfontein, (S.A) amongst doctors, which reported 40.2% of all the exposed respondents took PEP for HIV (De Villiers et al, 2007). In contrast the low rate of PEP uptake in the current study might be that HCWs considered the protection provided by PEP not absolute, despite encouraging data regarding its benefits (Parra-Ruiz et al, 2004). Alternatively it might be due to uncertainty about the use of prophylaxis considering that many that did not report the exposure also thought it was not necessary to report. This could also be related to the fact that people have seen others (or been told by others) suffer side effects. This is supported by the finding that side effects are the main reason for not completing PEP for HIV. In contrast, studies conducted among HCWs in India and USA found 63% of exposed HCWs took PEP for HIV (Gupta et al, 2008; Wang et al, 2000).

Regarding completion of PEP for HIV, this study found that only 21.4% of those who started completed the course for HIV PEP. 0ur results were lower than those reported in other studies from SA. Studies conducted among HCWs from Bloemfontein and Durban found that 67.4% and 51.7% respectively completed the one month course of PEP for HIV (De Villiers et al, 2007; Gounden & Moodley, 2000). An Indian study found 49.5% completed the course for PEP for HIV (Gupta et al 2008).

5.4 Factors associated with increased reporting of occupational exposure

Occupational exposures to BBVs are very common. Even though the risk of occupational HIV transmissions is much less compared to HBV transmissions, HCWs perceive the risks of getting HIV to be much worse than HBV (Zenner et al, 2009). HCW profession was a significant predictor for reporting an occupational exposure as dentists were 25 times more likely to report compared to dental students (OR=24.99, p=0.022). This difference in reporting of occupational exposures across occupation categories may be due to differential risk perceptions or other underlying factors. Differences in risk perception was similarly suggested as an explanation for why doctors were significantly more likely to start PEP for HIV than nurses in a study conducted in UK amongst HCWs (Zenner et al, 2009). The most prominent reason given by HCWs in this study was that they felt it was not necessary to report. Similar reasons were reported from a study conducted in Iran, where 82% of injuries were unreported (Bahadori & Sadigh, 2010).

Additional findings from this study was that HCWs who had more than five years of experience were less likely to report compared to their younger counterparts (OR=0.138, p=0.043). This may be due to a substantial underestimation of the magnitude of the injury or risk. A study done in US also showed that HCWs with more than five years of experience become desensitized with each event or may be embarrassed to report it (Makary et al, 2007). A similar reason was found in a study done in US, where the strongest predictor for reporting, was related to the presence of an attending physician who most often knew of trainees' injuries (Makary et al, 2007). Another possible reason may be that in a training institution like this one, students always work under supervision, thus any exposure that they may experience is likely to be reported because the senior HCW could be present to witness the injury. On the other hand, senior HCWs work without supervision, and use their own discretion about whether to report or not.

Knowledge was not a significant predictor for reporting an occupational exposure (OR=1.199, p=0.629). The finding that knowledge was not significantly associated with reporting exposures contrasts with findings from a similar study done in UK where PEP-uptake was associated with knowing transmission risk factors, suggesting awareness of current guidelines (Zenner et al, 2009).

5.5. Conclusion

Overall, participants' knowledge regarding PEP was inadequate. The majority of HCWs experienced an occupational exposure while performing scaling and polishing. Unfortunately, in this study reporting of occupational exposures was low. Many HCWs at MOHC did not deem it necessary to report or were unsure about where to report an occupational exposure and the steps to follow after incurring an occupational injury. Less than half of HCWs who reported the incident took PEP for HIV and only three HCWs completed the PEP course for HIV. This shows lack of compliance and underestimation of BBV infection.

5.6 Recommendations

HCWs should be made aware of risks of infection they may acquire from occupational exposure to BBVs by educating them. Targeted efforts should be made to increase preventive measures before HCWs are exposed to patients. Compulsory hepatitis B vaccination should be encouraged for HCWs while they are still students in their first year of study and not be given hepatitis B vaccination and awareness about occupational exposures when they are about to start treating patients amongst HCWs. Additional education about PEP for HIV and HBV should be given through regular training workshops Wearing of protective glasses should be emphasized when performing a procedure at all times but particularly when performing scaling and polishing, which was the most frequently performed procedure when exposures occurred. Written policies and procedures should be developed and made easily accessible to all workers by placing them in the clinic walls and in every work station, to facilitate prompt reporting and management of all occupational exposures. Method of reporting should be well publicized, not time consuming, non judgemental and should lead to appropriate outcomes. Medical management of occupational exposures to blood is complex and rapidly changing. Continuous updating of protocols is of outmost importance. Monitoring, evaluating and ensuring quality control of PEP administration and compliance with treatment of occupational exposures is needed. Relevant healthcare authorities who evaluate exposed workers should be aware of the most recent guidelines. Emphasis on completion of PEP for HIV and HBV should be made to HCWs as new medication is approved and drug resistance increases. In particular, there is a need to provide continuous support to all those that have started the medication until the end of the course so as to keep them motivated to continue even when they experience side effects.

5.7. Limitations

The findings from this study could not be generalised and applied in any health care settings due to the following reason:

- In the second part of the questionnaire that dealt with the knowledge of HCWs about HBV, HIV and PEP, HCWs were asked about the name of the drug and dose used for PEP for HIV without following the current updated guidelines used in SA. Some HCWs would have known about the name of the drug but not the dosage and the two combination drugs hence HCWs knowledge to this question was very low.

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APPENDICES

Annexure A: Data collection tool

Questionnaire on Knowledge and Practices Regarding Post Exposure Prophylaxis amongst Health Care Workers at Medunsa Oral Health Centre

The aim and objectives of the study have been sufficiently explained to me. I have not been pressurized to participate in any way. I understand that participation in this study is completely voluntary and that I may withdraw from it at any time and without any adverse consequences.

I know that this study has been approved by the Research, Ethics and Publications Committee of the University of Limpopo, Medunsa Campus, and permission to carry out the study has been given by the Medunsa Oral Health Centre. I am fully aware that the results of this study will be used for scientific purposes and may be published. I agree to this, provided my privacy is guaranteed.

By completing the questionnaire, I give consent to participate in this Study.

<u>Please circle the appropriate answer.</u>

Section A. Demographic characteristics of health care workers

1) Age _______________ (in years)

2) Race

    1) African 2) Coloured 3) White 4) Indian

3) Gender

    1) Female 2) Male

4) Which category do you fall in as a health care worker?

    1) Dentist 2) Dental Assistant 3) Dental Student

    4) Dental Surgeon

5) Duration as a health care worker in the above occupation

1) < 3 years 2) between 3- 5 years 3) more than 5 years

Section B. Knowledge about HBV, HIV and PEP

6) After an occupational exposure to hazardous body fluids, a HCW can take post-exposure prophylaxis to prevent

1) HIV 2) hepatitis B virus infection 3) hepatitis C virus infection

7) What are the routes of transmission of hepatitis B virus?

1) Blood and blood products 2) Needles and sharps

3) Sexual intercourse 4) Faeco-oral 5) Don't know

8) Can hepatitis B virus be transmitted as a nosocomial infection?

a) Yes b) No c) Don't know

9) Can a health worker infect patients with hepatitis B infection?

1) Yes 2) No 3) Don't know

10) Is there a vaccine to prevent hepatitis C infection?

1) Yes 2) No 3) Don't know

11) Is there a vaccine to prevent hepatitis B infection?

1) Yes 2) No 3) Don't know

12) Is HIV more infectious than hepatitis B virus?

1) Yes 2) No 3) Don't know

13) Is there a vaccine to prevent HIV infection?

1) Yes 2) No 3) Don't know

14) When should Post Exposure Prophylaxis for HBV be started?

1) Within 24hrs after exposure		2) Within 2hrs after exposure

3) Within 1hr after exposure		4) Don't know

15) When should Post Exposure Prophylaxis for HIV be started?

1) Within 24hrs after exposure		2) Within 2hrs after exposure

3) Within 1hr after exposure		4) Don't know

16) How long should you take Post Exposure Prophylaxis for HIV?

1) 1 week		2) 2 weeks		3) 3 weeks

4) 4 weeks		5) 6 weeks		6) Don't know

17) What is the drug regimen and dose used for Post Exposure Prophylaxis for HIV?

1) Zidovudine 250mg/300mg twice daily		2) Nelfivar 400mg once daily

3) Lamivudine 600mg daily		4) Don't know

18) Do you have to restart the Post Exposure Prophylaxis every time you get injured if the patient is HIV positive even though you are taking Post Exposure Prophylaxis for HIV?

1) Yes		2) No		3) Don't know

19) What are the side effects of taking Post Exposure Prophylaxis? **(You may choose more than one**)

1) Nausea & Vomiting		2) Dizziness		3) Diarrhoea

4) Headache		5) Dry mouth		6) Skin rash

7) Other (Specify)_____________________

Section C Exposure to occupational hazards and utilization of PEP

20) Did you ever experience the followings?

1) Splashing in the mouth i) Yes ii) No

2) Needle or sharp injuries i) Yes ii) No

3) Splashing in the eyes i) Yes ii) No

4) Reaction to latex gloves i) Yes ii) No

Only answer the following questions if you answered "yes" to any of the options under Q19

21) What procedures were you performing when you experienced the last exposure to blood?

1) Washing instruments 2) Injecting a patient 3) Scaling and polishing

4) Extracting 5) Needle recapping

22) During the procedure, were you....

1) Wearing protective glasses? i) Yes ii) No

2) Use the needle incinerator? i) Yes ii) No

3) Wearing gloves? i) Yes ii) No

4) Wearing a mask? i) Yes ii) No

5) Taking other precautions? i) Yes (specify) ii) No

23) How many times have you experienced an occupational exposure to body fluid within the last 12 months?

1) Once 2) between 2 – 5 times 3) More than 5 times

24) Were all the exposure(s) reported?

1) Yes (go to question 25) 2) No c) can't remember

25) **<u>If NO to question 23,</u>** then why did you not report every exposure? (**you may choose more than one answer**)

1) Fear of being stigmatized for being HIV positive

2) Absence of routes for reporting 3) No facility to report

4) Did not know I should report 5) Not necessary to report

26) Did you take Post Exposure Prophylaxis for HBV after the exposure?

1) Yes (go to question 29) 2) No (go to question 28)

27) Did you take Post Exposure Prophylaxis for HIV after the exposure?

1) Yes (go to question 29) 2) No (go to question 27)

28) **<u>If NO to question 26,</u>** then why did you not take Post Exposure Prophylaxis for HIV? (**you may choose more than one answer**)

1) Fear of side effects

2) The source person tested HIV negative

3) I don't wish to know my HIV status

4) I am HIV positive and taking PEP will cause drug-resistance

5) No facility available in the institution

6) Other reasons (Specify) ____

29) **<u>If NO to question 25 for HBV,</u>** then why did you not take Post Exposure Prophylaxis for HBV? (**you may choose more than one answer**)

1) I was previously vaccinated and tested and am protected

2) I was previously vaccinated, and although I have not been tested I presume I am protected

3) I was not vaccinated but tested for anti-HBs and am protected

4) I am positive for HBV antigen

5) Did not know I had to take PEP for HBV

6) Other reason (specify) ________________________

30) **<u>If YES to question 26,</u>** did you complete the Post Exposure Prophylaxis course?

1) Yes (don't proceed to the next question) 2) No

31) **<u>If NO to question 29,</u>** then why didn't you complete the Post Exposure Prophylaxis course? (**you may choose more than one answer**)

1) Experienced side effects of the drugs

2) The source person tested HIV negative

3) Lost interest in taking pills for a long time

4) I felt better after a few days

5) Not compulsory to complete the course

6) I found out during PEP that I am HIV positive and taking PEP will cause drug-resistance

7) Other reason (specify) __________________________

Thank you for your participation

Annexure B: Clearance Certificate

UNIVERSITY OF LIMPOPO
Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

P O Medunsa
Medunsa
0204
SOUTH AFRICA

Tel: 012 - 521 4000
Fax: 012 - 560 0086

MEETING: **04/2010**

PROJECT NUMBER: **MREC/H/66/2010: PG**

PROJECT :

Title:	Knowledge and practices of health care workers at Medunsa Oral Health Centre regarding post exposure prophylaxis to blood borne viruses.
Researcher:	Dr N Nkambule
Supervisor:	Mr ME Hoque
Co-supervisor:	Ms R Burnett
Department:	Public Health
School:	Health Care Sciences
Degree:	MPH

DECISION OF THE COMMITTEE:

MREC approved the new title.

DATE: 09 June 2010

PROF N EBRAHIM
DEPUTY CHAIRPERSON MREC

Note:

i) **Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.**

ii) **The budget for the research will be considered separately from the protocol.**
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

African Excellence - Global Leadership

Annexure C: Permission letter requesting to conduct a study

P. O. Box 1533

Rosslyn

0200

22 June 2010

The CEO: Prof T Gugushe

Medunsa Oral Health Centre

Pretoria

Dear Prof Gugushe

Re: Permission to conduct a study in the Hospital

I am studying for a Master of Public Health at the National School of Public Health, University of Limpopo (Medunsa Campus) in Pretoria.

I am required to submit a research report as part of the course. I would like to conduct a research study on the **Knowledge and Practices of Health Care Workers regarding Post Exposure Prophylaxis to blood-borne viruses**, in a representative sample from your institution.

Participation of the HCWs in this study is voluntary. Consent will be obtained from the participants. The questionnaire used will be anonymous. Confidentiality of all the records obtained whilst in this study will be maintained.

Results of the research study may be published, but names will not be used. If you have any questions concerning the research study, please call me at 082 7725135.

I would be grateful to be given the opportunity to conduct this study in the hospital.

Yours sincerely

Dr NR Nkambule

Annexure D:Permission letter approved

P O Box D12
Medunsa
0204
Tel: (012) 521 4800
Fax: (012) 521 4102
Email: tgugushe@ul.ac.za

Dr N R Nkambule
P O BOX 1533
Rosslyn
0200

Re: PERMISSION TO CARRY OUT A RESEARCH

1. Your correspondence dated 22 June 2010 by e-mail:
Zodwa.Nkambule@up.ac.za

In which you have requested permission to carry out a research titled: Knowledge and Practices of Health Care Workers at Medunsa Oral Health Centre regarding Post Exposure Prophylaxis to Blood-borne Viruses referes.

2. In my capacity as CEO of the MEDUNSA Oral Health Centre (MOHC) I hereby grant you permission to collect data as noted that ethical approval has been received from the University MREC.

Wishing you well with you research.

Yours sincerely

29 June 2010