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Anaesthetists' knowledge and personal experiences regarding the standard safety precautions and post exposure prophylaxis of HIV and hepatitis B virus

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Anaesthetists' knowledge and personal experiences regarding the standard safety precautions and post exposure prophylaxis of HIV and hepatitis B virus

Thembelihle Maphumulo

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg in partial fulfilment of the requirements for the degree of Master of Medicine in the branch of Anaesthesiology.

Johannesburg, 2020

Declaration

I, Thembelihle Maphumulo declare that this research report is my own unaided work. It is being submitted for the Degree of Master of Medicine in the branch of Anaesthesiology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

15 September 2020

Abstract

Background

Occupational exposure of health care workers (HCW) to viruses such as the human immune virus (HIV) and the hepatitis virus occurs through contact with infective fluids.

Objectives

The aim of this study was to describe the knowledge and personal experiences of anaesthetists in the Department of Anaesthesiology at Witwatersrand (Wits) regarding standard safety precautions and post exposure prophylaxis (PEP) regimens for HIV and the hepatitis B virus (HBV).

Methods

A prospective, contextual, descriptive research design with convenience sampling was followed. The availability of standard safety precautions and PEP regimens for HIV and HBV at Wits affiliated hospitals was confirmed. A previously published questionnaire was adapted and used to test knowledge. Adequate knowledge was considered as ≥80%.

Results

Of the 151 questionnaires distributed, 146 (96.7%) were returned. The mean (SD) overall knowledge for HIV and HBV score was 63% (12%) and for HIV and HBV PEP was 63.0% (13.2%) and 64% (20%) respectively. Only 12 anaesthetists scored 80% or more. No statistically significant difference was found between the knowledge of junior and senior anaesthetists (p=0.1984). A weak positive but non-significant correlation was found between anaesthetists' knowledge of HIV and HBV (r = 0.15, p= 0.0622). Of the anaesthetists 108 (73.9%) had been exposed to HIV and 10 (6.8%) had been exposed to HBV.

Conclusion

The level of knowledge of anaesthetists at Wits of HIV and HBV PEP was inadequate, which is concerning in a developing country with high occupational exposure. It is crucial that HCWs acquire more knowledge so as to minimise the risk of infection post exposure.

Acknowledgements

Much appreciation to the following people for all their continuous support and dedication that ensured I complete this task. Your support kept me hopeful throughout this long process.

- my supervisors, Helen Perrie, Juan Scribante and Kamal Gosai
- my family
- the Department of Anaesthesiology at Witswatersrand

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Abbreviations

ATV/r	Atazanavir/ritonavir
AZT	Zidovudine
CDC	Centre for Disease Control and Prevention
HBIG	Hepatitis B immunoglobulin
HBV	Hepatitis B virus
HCW	Health care worker
HIV	Human immunodeficiency virus
PEP	Post exposure prophylaxis
RAL	Raltegravir
TDF	Tenofovir
USA	United States of America
WHO	The World Health Organization
WITS	University of the Witwatersrand

Statement

The Research Report consists of a literature review, draft article, study proposal and appendices. The study proposal is included for background reference and is not for examination.

The formatting of this Research Report complies with the University of the Witwatersrand's Style Guide for Theses, Dissertations and Research Reports. The formatting of the draft article may differ from the rest of the Research Report in order to comply with the author guidelines of the Southern African Journal of HIV Medicine, the journal to which it is intended to be submitted.

Section 1: Review of the literature

1.1 Introduction

This literature review addresses the transmission of the human immunodeficiency virus (HIV) and hepatitis B virus (HBV), the incidence of occupational exposure, risk factors for transmission of disease and treatment after occupational exposure. This will be followed by a discussion of HIV and HBV PEP and the knowledge and experience thereof of healthcare workers (HCWs).

1.2 Transmission of HIV and HBV

HCWs are exposed to multiple body fluids while on duty, some of which are infective (1). The infective body fluids include blood, cerebrospinal fluid, pleural fluid, peritoneal fluid, vaginal secretions and semen (1) and amniotic fluid (2). These body fluids expose the HCW to different microbes such as viruses, the most common being HIV and hepatitis virus (1). This study will focus on HIV and HBV.

Occupational exposure can be in the form of a percutaneous injury, such as a needle-stick injury, contact with mucous membrane or non-intact skin such as chapped skin (1, 2). The risk of transmission of HIV to HCWs is approximately 0.3%, 0.09% and <0.09% following percutaneous, mucous membrane and non-intact skin exposures respectively (3). The risk of transmission of HBV after a single parenteral exposure ranges from 6%, in a source patient who is HBV “e” antigen negative, to as high as 40% in a source patient who is HBV “e” antigen positive (1).

1.3 Incidence of occupational exposure

Approximately three million percutaneous exposures to bloodborne viruses occur annually amongst HCWs globally (4). A survey of more than 2400 HCWs in the United States of America (USA) showed that 50% of HCWs had suffered a percutaneous injury in their career (5). An Indian study reported an incidence of 11% for muco-cutaneous exposures and 30% for percutaneous exposures (6). Percutaneous exposures had been experienced by 57% of injection providers in Mongolia (7) and 55% of HCWs in Uganda (8). A study from three West African

countries showed that 45% of HCWs experienced an occupational exposure of which over 60% went unreported (9). In 2014, 91% of junior doctors at Tygerberg Hospital in Cape Town had needle-stick exposures (10).

1.4 Risk factors for transmission of disease post occupational exposure

The risk of transmission of disease post occupational exposure amongst HCWs is dependent on many factors namely:

- prevalence of infection amongst patients
- the number of activities that are able to transmit the infectious fluid
- form and efficacy of transmission of exposure, for example, percutaneous injury versus mucous membrane
- virus present in the infectious fluid
- availability of PEP (1).

According to Mabwe et al (11), the risk of occupational exposure for HCWs in low-income countries is aggravated by factors like low HCW to patient ratios, health facility overcrowding and poor awareness of the risks associated with infectious body fluids. Supply shortages of basic safety equipment, failure to implement universal safety precautions and the need to handle contaminated needles and other sharps that are processed for reuse, were also listed as factors increasing the risk of occupational exposure (11).

1.5 Treatment after occupational exposure

Varghese et al (1) state that wounds and exposed skin sites that have been in contact with infected fluid should be washed thoroughly with soap and water. Mucous membranes of eyes or mouth should be flushed with water. There is no evidence that squeezing the wound or using antiseptics for wound care will decrease the risk for transmission of HBV and HIV, but it is advised (1).

PEP is the use of medical treatment started after exposure to a pathogen such as a virus in order to prevent transmission of the disease (2). PEP includes counselling, laboratory tests, short term medication and follow up evaluation (12).

Occupational exposure must be reported, documented and managed appropriately for favourable outcomes to occur, such as prevention and subsequent compensation if required (2).

1.6 HIV PEP

The Southern African HIV Clinicians Society guidelines (2) are similar to the World Health Organization (WHO) PEP guidelines of 2014 (13). These guidelines make no distinction between occupational and non-occupational exposure. Most of the data on which PEP guidelines are based are from non-randomised control trials, except in the case of the prevention of mother-to-child transmission studies (2). The data relies on retrospective register analysis, extrapolation from animal data and individual clinical case studies (2). Systemic HIV infection does not occur immediately following exposure, allowing a “window of opportunity” during which HIV PEP can modify viral replication and potentially prevent transmission (14). When a person is exposed to HIV, infection of the dendritic cells in the skin and mucosa at the site of inoculation occurs during the first 24 hours. After 24 - 48 hours, the virus spreads to the regional lymph nodes (14). Commencement of PEP after exposure may prevent or inhibit systemic infection by limiting the proliferation of the virus in the dendritic cells or lymph nodes (14). The maximum benefit is attained by starting PEP within the first hour although it may be delayed to a maximum of 48 - 72 hours post-exposure (14).

While previous South African and WHO guidelines advised the administration of two or three drugs based on clinician assessment of risk, the updated WHO PEP guidelines advise a three-drug regimen in all exposures (2). Single or dual-drug regimens are effective and can be used as an alternative to encourage adherence when a three-drug regimen is not well tolerated (2). The addition of a third drug simplifies prescribing by removing the need to obtain information about the risk of drug resistance and also improves availability of drugs by promoting provision by non-specialist HCW thus decreasing time to initiation of PEP (13). The preferred nucleoside reverse transcriptase inhibitor is tenofovir (TDF) with lamivudine or emtricitabine, as a two-drug fixed-dose combination. The WHO PEP guidelines recommend alluvia or atazanavir/ritonavir (ATV/r) as the third drug as it is widely available in low and middle income countries (13). The preferred third drug by the

Southern African HIV Clinicians Society guidelines is raltegravir (RAL) (2). RAL is associated with tolerance and less side effects, though data concerning its use is limited and its availability in low and middle income countries remains limited due to its higher cost (13). ATV/r is the preferred alternative to RAL during pregnancy because of the lack of safety data regarding its use in pregnancy (2). Where TDF is contraindicated, stavudine should be used instead of zidovudine (AZT) as AZT is associated with significant side effects (2). All PEP must be given for 28 days (2). Administration for less than two weeks is related to minimal efficacy and administration for more than 28 days offers no added benefit (2).

Providing the full 28 days course is convenient for the exposed HCW and it improves completion rates (2). They should also be informed about the side effects of the regimen and advised to seek medical assistance before the scheduled follow-up appointment should they have any adherence problems. The next appointments should be scheduled at two weeks, six weeks and three months post exposure, where appropriate examination and laboratory tests will be done (2).

1.7 Knowledge and experience of HIV PEP

Multiple studies have been conducted worldwide to describe the knowledge and practice of PEP amongst exposed HCWs (11, 12, 14, 15). A study done at St Thomas's Hospital in London showed that doctors in training had inadequate knowledge about HIV PEP. Of those who had heard of HIV PEP, only a few could name the recommended drugs (15).

Data from the United States National Surveillance System for hospital HCWs found that 6% of exposures were from HIV positive sources and 63% of these HCWs started PEP appropriately with 54% of them taking it for at least 20 days (4). Of the 14% of HCWs who had started PEP after being exposed to a source that was later found to be HIV negative, 3% of them took it for at least 20 days. Strategies such as rapid HIV testing of the source patient were suggested so as to minimise exposure to unnecessary PEP (16).

At a teaching hospital in Pune, India, a study showed that 15.7% of exposures were from HIV positive sources and similar to USA data, 65.9% of these workers

began an extended three-drug regimen, with 58.6% taking PEP for 20 days or more (4). Failure to complete the full course of medication was due to the gastro-intestinal side effects of AZT and to lack of knowledge about viral transmission. In Western India, the choice of a two or three-drug regimen is based on the severity of the exposure rather than administering the three-drug regimen to all HCW's exposed to HIV. AZT-based regimens were less well tolerated than TDF based regimens but the study showed that HIV PEP was well tolerated overall with few side effects (17).

A study done in Thailand by Hiransuthikul et al (3) showed that amongst HCWs who were exposed to infected material, more than 95% initiated PEP within 24 hours and more than 75% initiated PEP within two hours. Roughly 50% of these HCWs completed the full PEP course and 15% discontinued PEP prematurely because of side effects such as nausea and vomiting (3).

The available data from developing countries shows that adherence to the "standard precautions" and adequate documentation of occupational exposure is substandard, and the knowledge of PEP is poor (1). This is of concern because these countries have a high risk of occupational exposure and transmission (11).

In contrast, a study conducted amongst resident doctors in a tertiary hospital in Benin City, Nigeria showed that the workers had a good knowledge of the existence of HIV PEP but a poor uptake of PEP amongst exposed HCWs (18). The reasons given by the HCWs for the low uptake of PEP included uncertainty about confidentiality, fear of stigmatisation and the assumption that the exposure source was negative (18).

In Tanzania, a study showed that out of 25 healthcare facilities, five had copies of HIV PEP guidelines and none of them had means of reporting or recording mechanisms of occupational exposure (11). Despite a relatively high rate of 27% of occupational exposure, only 28.3% of exposed HCW had ever sought advice on PEP and out of those, only 11.7% had used PEP. Reasons for failure to use PEP included unavailability of services, especially in the rural facilities; distance and cost of transport to facilities where services were offered; poor knowledge on the

HIV risk and on PEP procedures and stigma related to disclosure and fear of testing positive as a result of having pre-existing HIV infection (11).

A study in Gauteng, South Africa found that HCW's feel stigmatized by their colleagues regarding a potential HIV diagnosis, which contributed to a lack of HIV testing and early treatment if needed (19).

In public and private healthcare facilities in the Free State, Mpumalanga, Kwazulu Natal and the North-West, 15.7% of HCWs are estimated to be infected with HIV (20). The occupational risk may correlate with HIV infection rates among patients, but it has been shown to vary in function with occupation, place of work, adherence to procedures for prevention and lack of adequate supplies of medical protective gear (20).

1.8 HBV PEP

There is no national policy in place for HBV vaccination in South Africa but the South African national Department of Health recommends vaccinating all HCWs (21). The vaccine which has been available since 1982, is a three dose regimen, with the second and third dose given at 1 and 6 months after the initial dose (22). International guidelines include post vaccination antibody testing to ensure that HCWs are protected with booster doses given to those who are not responding to the vaccine (21). Hepatitis B surface antibody should be tested at 6 - 8 weeks after the final dose of the primary course of vaccinations (22). The vaccine is safe and effective and produces immunity in more than 90% of those who use it (1).

If the source individual is Hepatitis B surface antigen positive and the HCW is not vaccinated or has an antibody level less than 10IU/ml, 0.6ml/kg Hepatitis B immunoglobulin (HBIG) should be administered along with the vaccine series within 24 hours of an occupational exposure (2). The effectiveness of the administration of HBIG seven days after exposure is unknown (1, 23). No treatment is necessary for the exposed HCW if they were vaccinated before and if their antibody response is more than 10IU/ml. The vaccine series should also be administered if the source patient's hepatitis status is unknown and if the exposed HCW has never been vaccinated (2).

1.9 Knowledge and experience of HBV PEP

Although HBV is much more infectious than HIV, HCWs worry more about HIV infection and rarely test for HBV post occupational exposure (21).

Europe and the USA have national policies aimed at preventing occupational exposure to HBV (21). These policies are credited for the increase of HBV vaccination from 64.5% in 1996 to 85.3% in 2006 among Italian HCWs (24).

In Mangalore, India, a study showed that a lack of knowledge was one of the reasons for the incorrect practice of HBV PEP (22). In the study, 93.1% had taken one dose of hepatitis B vaccine but only 57.1% completed the primary series of three doses and 26.4% had taken booster doses. The authors further state that the majority of the HCWs in the study resorted to local measures post exposure, which were incorrect according to international guidelines but similar to the incorrect local measures practiced by HCWs in Lebanon and Egypt (22).

HBV PEP is more expensive than that of HIV (23). A study done in South Korea confirmed that the cost of HBV PEP is a considerable economic burden in the country, but it was not the cause of the poor adherence of 54.6% of exposed individuals to HBV PEP (23). The authors also found that of the costs for HBV PEP, 34.9% was for HBIG and 31.4% was for HBV vaccination. A study done in Western India showed that it may not be possible to administer HBIG as recommended by the WHO and the Centre for Disease Control and Prevention due to the lack of availability and high cost in a resource limited country (17).

The common reasons for non-uptake of HBV vaccine in sub-Sahara African region are cost, lack of awareness of vaccine availability, and inadequate information concerning the vaccine (25).

A study done in Gauteng, South Africa showed that 67.9% of HCWs received one vaccine dose, which is better than a previous study done in 2002 which showed that 21.2% of HCWs could remember ever being vaccinated (21). The study further showed that 32.1% of HCW were not vaccinated at all and 29.5% completed the full vaccination course. The authors state that this is lower than most countries. For example in Pakistan, 75% of nursing students received one

dose, but only 37.2% received all three doses (26), in Sweden, 79.4% of HCWs received one dose, but only 39.8% received all doses (27) and in Turkey, 55.8% of HCWs received all three doses (28).

1.10 Summary

In this literature review the transmission of the HIV and HBV, the incidence of occupational exposure, risk factors for transmission of disease and treatment after occupational exposure were addressed. This was followed by a discussion of HIV and HBV PEP and the knowledge and experience thereof of HCWs.

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Section 2: Author's guidelines

Southern African Journal of HIV Medicine

Cover Letter

The format of the compulsory cover letter forms part of your submission. Kindly download and complete, in English, the provided **cover letter**.

Anyone that has made a significant contribution to the research and the paper must be listed as an author in your cover letter. Contributions that fall short of meeting the criteria as stipulated in our policy should rather be mentioned in the 'Acknowledgements' section of the manuscript. Read our **authorship** guidelines and **author contribution** statement policies.

ORIGINAL RESEARCH ARTICLE FULL STRUCTURE

Title

The article's full title should contain a maximum of 95 characters (including spaces).

Abstract

The abstract, written in English, should be no longer than 250 words and must be written in the past tense. The abstract should give a succinct account of the objectives, methods, results and significance of the matter. The structured abstract for an Original Research article should consist of five paragraphs labelled Background, Objectives, Method, Results and Conclusion.

- Background: Why do we care about the problem? State the context and purpose of the study. (What practical, scientific or theoretical gap is your research filling?)
- Objectives: What problem are you trying to solve? What is the scope of your work (e.g. is it a generalised approach or for a specific situation)? Be careful not to use too much jargon.
- Method: How did you go about solving or making progress on the problem? State how the study was performed and which statistical tests were used.

(What did you actually do to get the results?) Clearly express the basic design of the study; name or briefly describe the basic methodology used without going into excessive detail. Be sure to indicate the key techniques used.

- Results: What is the answer? Present the main findings (that is, as a result of completing the procedure or study, state what you have learnt, invented or created). Identify trends, relative change or differences on answers to questions.
- Conclusion: What are the implications of your answer? Briefly summarise any potential implications. (What are the larger implications of your findings, especially for the problem or gap identified in your motivation?)

Do not cite references and do not use abbreviations excessively in the abstract.

Introduction

The introduction must contain your argument for the social and scientific value of the study, as well as the aim and objectives:

- Social value: The first part of the introduction should make a clear and logical argument for the importance or relevance of the study. Your argument should be supported by use of evidence from the literature.
- Scientific value: The second part of the introduction should make a clear and logical argument for the originality of the study. This should include a summary of what is already known about the research question or specific topic, and should clarify the knowledge gap that this study will address. Your argument should be supported by use of evidence from the literature.
- Conceptual framework: In some research articles it will also be important to describe the underlying theoretical basis for the research and how these theories are linked together in a conceptual framework. The theoretical evidence used to construct the conceptual framework should be referenced from the literature.
- Aim and objectives: The introduction should conclude with a clear summary of the aim and objectives of this study.

Research methods and design

This must address the following:

- Study design: An outline of the type of study design.
- Setting: A description of the setting for the study; for example, the type of community from which the participants came or the nature of the health system and services in which the study is conducted.
- Study population and sampling strategy: Describe the study population and any inclusion or exclusion criteria. Describe the intended sample size and your sample size calculation or justification. Describe the sampling strategy used. Describe in practical terms how this was implemented.
- Intervention (if appropriate): If there were intervention and comparison groups, describe the intervention in detail and what happened to the comparison groups.
- Data collection: Define the data collection tools that were used and their validity. Describe in practical terms how data were collected and any key issues involved, e.g. language barriers.
- Data analysis: Describe how data were captured, checked and cleaned. Describe the analysis process, for example, the statistical tests used orsteps followed in qualitative data analysis.
- Ethical considerations: Approval must have been obtained for all studies from the author's institution or other relevant ethics committee and the institution’s name and permit numbers should be stated here.

Results

Present the results of your study in a logical sequence that addresses the aim and objectives of your study. Use tables and figures as required to present your findings. Use quotations as required to establish your interpretation of qualitative data. All units should conform to the **SI convention** and be abbreviated

accordingly. Metric units and their international symbols are used throughout, as is the decimal point (not the decimal comma).

Discussion

The discussion section should address the following four elements:

- Key findings: Summarise the key findings without reiterating details of the results.
- Discussion of key findings: Explain how the key findings relate to previous research or to existing knowledge, practice or policy.
- Strengths and limitations: Describe the strengths and limitations of your methods and what the reader should take into account when interpreting your results.
- Implications or recommendations: State the implications of your study or recommendations for future research (questions that remain unanswered), policy or practice. Make sure that the recommendations flow directly from your findings.

Conclusion

Provide a brief conclusion that summarises the results and their meaning or significance in relation to each objective of the study.

Acknowledgements

Those who contributed to the work but do not meet our authorship criteria should be listed in the Acknowledgments with a description of the contribution. Authors are responsible for ensuring that anyone named in the Acknowledgments agrees to be named.

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Section 3: Draft article

Anaesthetists' knowledge and personal experiences regarding the standard safety precautions and post exposure prophylaxis of HIV and hepatitis B virus

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Abstract

Background

Occupational exposure of health care workers (HCW) to viruses such as the human immune virus (HIV) and the hepatitis virus occurs through contact with infective fluids.

Objectives

The aim of this study was to describe the knowledge and personal experiences of anaesthetists in the Department of Anaesthesiology at Witwatersrand regarding standard safety precautions and PEP regimens for HIV and the hepatitis B virus (HBV).

Methods

A prospective, contextual, descriptive research design with convenience sampling was followed. The availability of standard safety precautions and PEP regimens for HIV and HBV at the affiliated hospitals was confirmed. A previously published questionnaire was adapted and used to test knowledge. Adequate knowledge was considered as ≥80%.

Results

Of the 151 questionnaires distributed, 146 (96.7%) were returned. The mean (SD) overall knowledge for HIV and HBV score was 63% (12%) and for HIV and HBV PEP was 63.0% (13.2%) and 64% (20%) respectively. Only 12 anaesthetists scored 80% or more. No statistically significant difference was found between the knowledge of junior and senior anaesthetists (p=0.1984). A weak positive but non-significant correlation was found between anaesthetists' knowledge of HIV and HBV (r = 0.15, p= 0.0622). Of the anaesthetists, 108 (73.9%) had been exposed to HIV and 10 (6.8%) had been exposed to HBV.

Conclusion

The level of knowledge of HIV and HBV PEP was inadequate, which is concerning in a developing country with high occupational exposure. It is essential that HCWs acquire more knowledge so as to minimise the risk of infection post exposure.

Introduction

Occupational exposure is defined as “skin, mucous membrane or parenteral contact with blood, bodily fluids, or other potentially infectious material that may result from the performance of one’s professional duties” (1). Occupational exposure can result in the transmission of, amongst others, multiple viruses, and the subsequent consequences such as anxiety, chronic illness and premature death for the involved healthcare worker (HCW), as well as those effects on family, colleagues and the provision of health services (2).

The risk of transmission of disease after occupational exposure amongst HCWs is dependent on many factors, such as the prevalence of infection amongst patients, the number of activities where transmission of infectious fluid is possible, the form and efficacy of transmission following exposure (for example, percutaneous injury versus exposure to mucous membranes), virus present in the infectious fluid and availability of post exposure prophylaxis (PEP) (3). The risk of occupational exposure in developing countries is further aggravated by factors such as low ratios of HCWs to patients, health facility overcrowding, inadequate supplies of basic safety equipment and the need to handle contaminated needles and other sharp objects that are processed for reuse (4).

Exposure to infected fluids can be in the form of a percutaneous injury, such as a needle stick injury, or contact with a mucous membrane or non-intact skin (3). Varghese et al (3) state that the most common occupationally transmitted viruses are the human immunodeficiency virus (HIV) and the hepatitis virus. The transmission risk of HIV to HCW is approximately 0.3%, 0.09% and <0.09% following percutaneous, mucous membrane and non-intact skin exposures, respectively (5). There is a 6% risk of hepatitis B virus (HBV) transmission after a single parenteral exposure in a source patient who is HBV “e” antigen negative, to as high as 40% in a patient who is HBV “e” antigen positive (3). Moorhouse et al (6) state that occupational exposure must be reported, documented and managed appropriately for favourable outcomes and subsequent compensation if required.

PEP includes counselling, laboratory tests, short term medication and follow up evaluation (7). Post exposure management is initially the same for all types of

occupational exposures to potentially infectious material, except for the type and timing of medication used, as well as the laboratory tests required which are more specific (6).

In 2008, the Southern African HIV Clinicians Society (6) published guidelines on HIV PEP that were in contrast to all other international guidelines at the time. The guidelines made no distinction between occupational and non-occupational exposure and they advised a three-drug regimen for all exposures. The current World Health Organization (WHO) PEP guidelines (8) have a similar approach to the Southern African HIV Clinicians Society guidelines. The Southern African HIV Clinicians Society guidelines (6) were updated in 2015 and include HBV guidelines.

Unlike HIV, HBV PEP includes hepatitis B vaccines, which are the core of all prevention and control strategies used to decrease the risk of HBV occupational transmission (6)

HCWs are continuously at high risk of occupational exposure, especially in developing countries, where there is a high incidence of bloodborne diseases (3). Studies show that occupational transmission can be reduced by following standard safety precautions and taking appropriate PEP (2, 6, 9-11). The risk of occupational transmission in developed countries is well documented, but limited information is available from developing countries (12). The limited available information shows poor adherence to standard safety precautions, sub-optimal documentation of occupational exposure and poor knowledge about HIV PEP amongst HCW (3, 13). The aim of this study is to describe the knowledge and personal experiences of anaesthetists in the Department of Anaesthesiology at Wits regarding the standard safety precautions and PEP regimens for HIV and HBV.

Methods

Approval to conduct the study was obtained from the Human Research Ethics Committee (Medical) and other relevant authorities. A cross-sectional, contextual, research design was followed in this study.

The study population consisted of all 240 anaesthetists working in the Department of Anaesthesiology at Wits. A convenience sampling method was used. The sample size was determined by the response rate. Questionnaires were distributed to the entire accessible population. A minimum response rate of 60% (144) was considered acceptable (14). Anaesthetists involved in the adaptation of the questionnaire were excluded. Junior anaesthetists were interns, medical officers and registrars with three years or less of training. Senior anaesthetists were registrars with more than three years of training and consultants.

One author (TM) visited five of the Wits affiliated hospitals (Hospital A, B, C, D, E) and confirmed the availability of standard safety precautions and PEP regimens for HIV and HBV.

A published questionnaire by Mathewos et al (7) was identified as appropriate for this study. Permission was obtained from the corresponding author to use and adapt the questionnaire to the Wits context. This draft questionnaire was given to three senior anaesthesiologists to review and the feedback was incorporated, thereby ensuring content and face validity. The final questionnaire consisted of the following sections: demographics, knowledge and experience of HIV and HBV safety precautions and PEP.

Data were collected at departmental academic meetings. The questionnaires were numbered to monitor the response rate. One author (TM) was present to answer any questions and to prevent data contamination. The participants put the folded completed questionnaires in a sealed collection box.

Due to the importance of having knowledge regarding standard safety precautions and PEP, adequate knowledge (pass mark) was considered as 80% or more as is required for basic life support training (15). Questionnaires returned blank were excluded from the study and questions not answered were considered incorrect. Some questions had more than one correct answer and each correct answer received a score of one. Data were captured onto a Microsoft Excel spreadsheet and analysed in consultation with a biostatistician using STATA (StataCorp,USA) version 13. Categorical variables were described using frequencies and percentages. The scores were reported using means and standard deviations. The

comparisons were done using unpaired t-tests and chi-square tests. A correlation was done using Pearson's correlation. A p value of < 0.05 was considered statistically significant.

Results

Standard safety precaution protocols for HIV and HBV are readily available at all Wits affiliated hospitals. At the time of data collection, April 2018, Hospital B did not use the updated Southern African HIV Clinicians Society guidelines (6) and still administered the outdated 2006 two drug regimen, zidovudine (AZT) and lamivudine (3TC).The availability and use of the Southern African HIV Clinicians Society guidelines (6) and the drugs used in the remaining hospitals are shown in Table 1. Where raltegravir (RAL) was not available, the alternative drug used is shown.

Table 1 Availability of the Southern African HIV Clinicians Society guidelines and drugs used

Hospital	**A**	**C**	**D**	**E**
Guidelines	Aware, not fully implemented	Aware, not fully implemented	Aware, not fully implemented	Yes
Tenofovir	Yes	Yes	Yes	Yes
Emtricitabine	Yes	Yes	Yes	Yes
Third drug	Alluvia	Dolutergravir	Alluvia	RAL

All Wits affiliated hospitals follow the Southern African HIV Clinicians Society guidelines (6) concerning HBV PEP, although prescription for hepatitis B immunoglobulin (HBIG) is subject to hospital stock availability.

All available anaesthetists were invited to participate in the study. Of the 151 questionnaires distributed, 146 (96.7%) were returned. This represents 60.8% of anaesthetists in the department. The demographics of the anaesthetists are shown in Table 2.

Table 2 Demographics of anaesthetists

Demographic	Number	Percentage
Sex		
Male	72	49.3
Female	74	50.7
Age		
25 – 30	33	22.6
31 – 35	69	47.2
36 – 40	24	16.4
41 – 45	6	4.1
46 – 50	3	2.1
>50	11	7.5
Profession		
Intern	19	13.0
Medical officer	17	11.6
Registrar 1 – 3 years	46	31.5
Registrar ≥4 years	25	17.1
Consultant	39	26.7

The mean (SD) overall knowledge score for HIV and HBV was 63.0% (12%), with a minimum score of 30% and a maximum of 89%, with 12 (8.2%) anaesthetists scoring 80% or more. From the 12 (8.2%) anaesthetists who passed, 7 (4.8%) were juniors and 5 (3.4%) were seniors with no statistical difference between the two (p=0.99). Of the 146 anaesthetists, 105 (71.9%) were familiar with the Southern African HIV Clinicians Society guidelines (6). The mean (SD) score obtained by anaesthetists for knowledge of HIV PEP was 63.0% (13.2%) with a minimum score of 27.8% and a maximum of 88.9%. Anaesthetists' knowledge of HIV PEP is shown in Table 3.

Table 3 Knowledge of HIV PEP

Question description	Correct answer	
	Number	Percentage
Infectious fluids		
Vaginal secretions	137	93.8
Penile pre-ejaculate and semen	137	93.8
Urine	115	78.7
Cerebrospinal fluid	98	67.1
Amniotic fluid	89	60.9
Asciticl fluid	77	52.7
Saliva and sputum	76	52.1
Indication for HIV PEP		
Known HIV^{+} source patient	132	93.1
Unknown HIV status for source patient	124	84.9
High risk source patient	53	36.3
After needle stick injury	38	26.0
After mucous membrane splash	38	26.0
Best time to start HIV PEP	99	67.8
Time between exposure and treatment	58	39.7
Efficacy of HIV PEP within 24 hours	102	69.8
HIV PEP course duration	132	90.4
Differentiation between low and high risk exposure	78	53.4
Occupational exposure assistance	80	54.7

Of the 146 anaesthetists, 55 (37.6%) were familiar with the Southern African HIV Clinicians Society guidelines concerning the HBV PEP regimen. The mean (SD) score obtained by anaesthetists for knowledge of HBV PEP was 64.0% (20.0%) with a minimum score of 0% and a maximum of 100%. Anaesthetists' knowledge of HBV PEP is shown in Table 4.

Table 4 Knowledge of HBV PEP

Question description	Correct answer	
	Number	Percentage
Risk of HIV compared to HBV	130	89.0
Hepatitis B vaccine		
Hepatitis B surface antibody level should be tested 5 months after last vaccine dose	111	76.0
Given as a set of 2 injections over 6 months	97	66.4
Should be given to all HCW	94	64.3
Booster doses for all HCW	38	26.0
Indication for hepatitis B immunoglobulin		
Unvaccinated HCW, source patient is hepatitis B surface antigen positive	106	72.6
All occupational exposure	97	66.4
Previously vaccinated HCW, hepatitis B surface antibody level <15 iu/ml	97	66.4
Previously vaccinated HCW, hepatitis B surface antibody level <10 iu/ml	65	45.2

No statistically significant differences were found between the knowledge of junior and senior anaesthetist, as shown in Table 5. A weak positive correlation was found between anaesthetists knowledge of HIV and HBV ($r = 0.15$), which was not statistically significant ($p = 0.0622$).

Table 5 Knowledge difference between junior and senior anaesthetists

Knowledge	Mean (SD)	95% CI	P value
HIV and HBV junior	17.4 (3.1)	16.7 – 18.0	0.1984
HIV and HBV senior	16.7 (3.4)	15.8 – 17.5	
HIV junior	11.5 (2.2)	11.0 – 12.0	0.3117
HIV senior	11.1 (2.6)	10.5 – 11.7	
HBV junior	5.9 (1.8)	5.5 – 6.2	0.3456
HBV senior	5.6 (1.9)	5.1 – 6.0	

Anaesthetists' personal experience with HIV and HBV PEP regimens is shown in Table 6.

Table 6 Anaesthetists experience with HIV and HBV PEP regimen

Question description	HIV	HBV
	n (%)	n (%)
Occupational exposure	108 (73.9)	10 (6.8)
PEP usage	93 (86.1)	6 (60.0)
PEP easily available	74 (79.5)	5 (83.3)
Satisfaction with regimen	51 (54.8)	
Initiation of PEP		
Within 1 hour	28 (30.1)	
Within 2 – 6 hours	61 (65.5)	
Within 7 – 12 hours	4 (4.3)	
Within 13 – 72 hours	1 (1.0)	
Completion of course	62 (66.6)	5 (83.3)
Reason for discontinuation		
Adverse effects	26 (83.3)	
HIV negative source patient	7 (22.5)	
Correct time to discontinue	2 (6.4)	
Other	1 (3.2)	
Availability of more than 1 regimen	37 (39.7)	

Discussion

The five Wits affiliated hospitals readily avail standard safety precaution protocols. At the time of data collection, April 2018, hospital B offered the old HIV PEP regimen, which consisted of AZT and 3TC for low risk exposure, with the addition of efavirenz for high risk exposure. Hospital A and D are aware of the recommended Southern African HIV Clinicians Society guidelines (6) for HIV PEP but are financially unable to administer it. HCWs are offered the three-drug regimen but are given alluvia instead of RAL as the third drug because alluvia is much more affordable. The HCWs are offered a script to purchase RAL at a private pharmacy. The WHO PEP guidelines recommend alluvia as the third drug as it is widely available in low and middle income countries (16). RAL is the preferred third drug by the Southern African HIV Clinicians Society guidelines (6) as it is associated with better tolerance and fewer side effects, but it is costly (16). Hospital C is also aware of the recommended HIV PEP and offers dolutegravir instead of RAL as the third drug. The co-ordinators of this programme say research shows that dolutegravir offers a much more convenient daily administration, less emergent drug resistance and has fewer side effects. Hospital E offers the PEP regimen that is recommended by the Southern African HIV Clinicians Society guidelines (6), that prefers RAL as the third drug. The five Wits affiliated hospitals offer the up to date HBV PEP regimen, but the supply of HBIG is subject to hospital stock availability as it is very expensive. The HCW is, however issued a prescription to purchase HBIG from a private pharmacy whenever it is not available.

Of the 146 anaesthetists who participated in the study, 73.9% of anaesthetists had occupational exposure to HIV, which is higher than the 50% and 55% of HCWs reported in the United States of America (USA) (17) and Uganda (18) respectively. Uganda is less developed than South Africa, yet it has a lower occupational exposure rate. The possible cause of the above could be that there is less reporting of occupational exposure in Uganda, therefore less data available for assessment. A developing country like South Africa could have a high occupational exposure rate because of low HCW to patient ratios, health facility overcrowding and limited awareness of the risks associated with infectious body

fluids (4). It could also result from the absence of training for HCWs and fatigue due to long working hours (19). Of these anaesthetists, 86.1% took HIV PEP, which is higher than the 65.9% of HCWs in India and USA (12). Although the more than 75% uptake of HIV PEP by HCWs in Thailand is better than that at Wits affiliated hospitals, the 65.5% of anaesthetists who completed the full course of medication is better than the 50% of HCW in Thailand (5). Most anaesthetists who discontinued the drugs did so because they experienced adverse side effects such as nausea, vomiting and dizziness. These side effects are common in the AZT based regimes such as that offered at Hospital B. Although 79.5% said the HIV PEP was not easily available, 65.5% managed to take the drugs within 2 – 6 hours post occupational exposure. The delay could be due to the time required for appropriate investigations before drug administration or lack of relief from responsibilities in theatre. Some anaesthetists stated that the delay was due to lack of knowledge of the correct drug regimen by the relevant HCW in casualty and lack of drug availability at the hospital. Only 45% of anaesthetists were not happy with the regimen given to them because it was not from the WHO or the Southern African HIV Clinicians Society PEP recommended guidelines.

Of the 146 anaesthetists, only 37.6% knew of the Southern African HIV Clinicians Society guidelines (6) for the HBV PEP regimen which is similar to the lack of knowledge of HBV PEP in HCWs described in a study in Mangalore, India (20). The mean score obtained by anaesthetists for knowledge of HBV PEP regimen was 64.0%. This is concerning as HBV can cause cirrhosis, hepatic failure and hepatic carcinoma post occupational exposure in HCWs (21). Lack of knowledge could also be due to there being no national policy in place for HBV vaccination in South Africa (22). Compared to HIV exposure, there were fewer reports of HBV exposure because most HCWs worry more about HIV than HBV and this is concerning as HBV is much more infectious than HIV (22). Of those exposed, 60.0% took HBV PEP and of these, 83.3% completed the full course of medication. Although HBV PEP is much more expensive (23), the adherence of HBV PEP is better than that of HIV PEP in this study. The reason for the above could be that the anaesthetists complained more about the side effects of HIV PEP than that of HBV PEP. The adherence to HBV PEP in this study is better than the 67.9% documented in another study done in Gauteng (22). It is also better

than that described amongst HCWs in Pakistan (24) and Turkey (25). This is reassuring as this practice decreases the risk of contracting HBV post occupational exposure.

No statistically significant difference was found between the knowledge of junior and senior anaesthetists. This was unexpected as seniors are expected to know more than juniors so as to be able lead and teach them accordingly. A weak positive correlation was found between anaesthetists knowledge of HIV and HBV, which was not statistically significant . This is surprising as these viruses are the most commonly transmitted post occupational exposure (3).

As the results showed a lack of knowledge, the findings will be shared with the departmental management and it will be recommended that HIV and HBV PEP protocols be made readily available in the operating theatre complex. This may assist in educating the anaesthetists and possibly reduce occupational transmission. Periodic orientation of theatre staff to these protocols is also recommended.

Conclusion

The level of knowledge of HIV and HBV PEP of the anaesthetists was inadequate, especially in a developing country with high risk for occupational exposure. It is essential that anaesthetists are knowledgeable about these viruses and about how to protect themselves should they be exposed. All Wits affiliated hospitals need to have the same evidence based PEP regimens and make PEP easily available to all HCWs.

Conflict of interest

The authors declare that we have no financial or personal relationships, which may have inappropriately influenced us in writing this paper.

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Section 4: Proposal

Anaesthetists' knowledge and personal experiences regarding the standard safety precautions and post exposure prophylaxis of HIV and hepatitis B virus

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4.1 Introduction and problem statement

Occupational exposure is “skin, mucous membrane or parenteral contact with blood, bodily fluids, or other potentially infectious material that may result from the performance of one’s professional duties” (1). Occupational exposure can result in transmission of, amongst others, multiple viruses, and the subsequent consequences ranging from anxiety, chronic illness and premature death for the involved healthcare worker (HCW), that not only affects the HCW, but their family, colleagues and health department at large (2).

The risk of transmission of disease after occupational exposure amongst HCWs is dependent on many factors such as:

- prevalence of infection amongst patients
- the number of activities where transmission of infectious fluid is possible
- form and efficacy of transmission of exposure e.g. percutaneous injury versus exposure to mucous membranes
- virus present in the infectious fluid
- availability of post exposure prophylaxis (PEP) (3).

The risk of occupational exposure in developing countries is aggravated by factors such as low ratios of HCWs to patients, health facility overcrowding, inadequate supplies of basic safety equipment and the need to handle contaminated needles and other sharp objects that are processed for reuse (4).

Exposure to infected fluids can be in the form of a percutaneous injury, such as a needle stick injury, or contact with mucous membrane or non-intact skin (3).Varghese et al (3) states that the most common occupationally transmitted viruses are the human immunodeficiency virus (HIV) and hepatitis virus. The transmission risk of HIV to HCWs is approximately 0.3%, 0.09% and <0.09% following percutaneous, mucous membrane and non-intact skin exposures, respectively (5). There is a 6% risk of hepatitis B virus (HBV) transmission after a single parenteral exposure in a source patient who is HBV “e” antigen negative, to as high as 40% in a patient who is HBV “e” antigen positive (3).

Moorhouse et al (6) state that occupational exposure must be reported, documented and managed appropriately for favourable outcomes and subsequent compensation if required. PEP includes counselling, laboratory tests, short term medication and follow up evaluation (7). Post exposure management is initially the same for all types of exposures, except for the type and timing of medication used, as well as the laboratory tests required which are more specific (6).

In 2008, the Southern African HIV Clinicians Society (6) published guidelines on HIV PEP that were in contrast to all other international guidelines at the time, in that they had no distinction between occupational and non-occupational exposure and they advised a three-drug regimen for all exposures. The subsequent 2014 World Health Organization (WHO) PEP Guidelines (8) have adopted a similar approach to the Southern African HIV Clinicians Society guidelines.

The risk of transmitting the HBV is higher than that of HIV yet HCWs often neglect HBV PEP (6, 9). Unlike HIV PEP, HBV consists of hepatitis B vaccines, which is the core of all prevention and control strategies used to decrease the risk of HBV occupational transmission (6).

Problem statement

HCWs are exposed to multiple body fluids while on duty, some of which are infective. The infectious body fluids expose the HCW to many viruses, the most common being HIV and the hepatitis virus (3). Occupational transmission of these viruses can be reduced by following standard safety precautions, taking PEP and having the hepatitis B vaccine with regards to HBV (3, 6).

A study done in Ethiopia (2) showed that only 25,3% of exposed HCWs received HIV PEP and 47.4% in a separate study in Nigeria (10). Beyera and Chercos (2) state that this could be due to a lack of knowledge of and failure to comply with standard safety precautions and PEP regimens, which could lead to infection with these viruses and subsequent changes in lifestyle and health status of HCWs.

The knowledge and personal experiences of anaesthetists in the Department of Anaesthesiology at the University of the Witwatersrand (Wits) regarding the

standard safety precautions and PEP regimens for HIV and Hepatitis B virus (HBV), are not known.

4.2 Aim and objectives

4.2.1 Aim

The aim of this study is to describe the knowledge and personal experiences of anaesthetists in the Department of Anaesthesiology at Wits regarding the standard safety precautions and PEP regimens for HIV and HBV.

4.2.2 Objectives

The primary objectives of this study are to describe**:**

- the availability of the standard safety precautions and PEP regimens for HIV and HBV in the Wits affiliated hospitals.
- the anaesthetists' knowledge of the PEP regimens for HIV and HBV
- the anaesthetists' personal experiences with the PEP regimens for HIV and HBV.

The secondary objectives of this study are to**:**

- compare knowledge of the PEP regimens for HIV and HBV between junior and senior anaesthetists
- compare anaesthetists' knowledge of PEP regimens for HIV to that of HBV
- correlate the knowledge of HIV to that of HBV.

4.3 Research assumptions

The following definitions will be used in this study.

Anaesthetist: is any qualified doctor working in the Department of Anaesthesiology including interns, medical officers, registrars and consultants.

Intern: is a doctor who completed a university degree but is currently undergoing practical training prior to registration with the Health Professionals Council of South Africa an independent practitioner.

Medical officer: is a qualified doctor practising in the Department of Anaesthesiology under specialist supervision. Medical officers with more than 10 years of experience are career medical officers and are regarded as consultants.

Registrar: is a qualified doctor who is registered with the Health Professions Council of South Africa as a trainee anaesthetist.

Anaesthesiologist: is an anaesthetist who is registered with the Health Professions Council of South Africa as a specialist anaesthetist.

Consultant: is an anaesthesiologist or career medical officer.

Junior anaesthetist: are interns, medical officers, registrars with three years or less of training

Senior anaesthetist: are registrars with more than three years of training and consultants

Adequate knowledge: due to the importance of having knowledge regarding standard safety precautions and PEP, a score of 80% or more will be used, as is required for basic life support training (11).

4.4 Demarcation of study field

The study will be conducted in the Department of Anaesthesiology, affiliated to the Faculty of Health Sciences of the University of the Witwatersrand. The staff complement of the department is 74 consultants, 108 registrars and 22 medical officers and approximately eight interns rotating at each of the four hospitals. The core hospitals of the department's training platform are:

- Charlotte Maxeke Johannesburg Academic Hospital
- Chris Hani Baragwanath Academic Hospital
- Helen Joseph Hospital

- Rahima Moosa Mother and Child Hospital
- Wits Donald Gordon Medical Centre.

4.5 Ethical considerations

Approval to conduct the study will be obtained from the Human Research Ethics Committee (Medical) and the Graduate Studies Committee of Wits.

Once appropriate approval has been obtained, anaesthetists will be invited to participate in the study at academic meetings. Those who agree to participate will receive an information letter (Appendix A) and a self-administered questionnaire (Appendix B). Return of a questionnaire will imply consent. Participation in the study is voluntary.

Anonymity will be ensured by requesting no identifying information from participants. Upon completion, questionnaires will be folded and placed in a sealed collection box in the venue. Only the researcher and supervisor will have access to the raw data to ensure confidentiality. The collected data will be stored securely in a locked cupboard for six years following completion of the study.

If the results show a lack of knowledge, the researcher will report the findings to departmental management, with a suggestion to make HIV and HBV protocols readily available in the operating theatre complex.

The study will be conducted in adherence to the principles of the Declaration of Helsinki 2013 (11) and the South African Good Clinical Practice Guidelines (12).

4.6 Research methodology

4.6.1 Research design

A prospective, contextual, descriptive research design will be followed in this study.
In a prospective study, a sample of a population is selected and followed over time to determine outcomes (13). In this study data will be collected from anaesthetists at the time the study is taking place.

A contextual study focuses on a particular group or population referred to as a "small- scale world" (14). This study is contextual because it will involve anaesthetists working in the Department of Anaesthesiology at Wits.

A descriptive study seeks to describe a phenomenon with no manipulation of variables and no effort to determine the relationship between variables. The variables are defined and classified as facts, needs, opinions or personal experiences. They are then described to provide a picture of the phenomenon as it occurs (13). This study will describe the anaesthetists' knowledge of and personal experience with the standard safety precautions and the PEP regimens for HIV and HBV.

4.6.2 Study population

The study population will consists of all anaesthetists working in the Department of Anaesthesiology at Wits.

4.6.3 Study sample

Sample size

The sample size will be determined by the response rate. Questionnaires will be distributed to the entire accessible population. A minimum response rate of 60% (144) is considered acceptable(15).

Sampling method

In this study a convenience sampling method will be used. Convenience sampling is a process where all readily available subjects are included by the researcher (16). In this study all available anaesthetists will be invited to participate in the study at departmental academic meetings

Inclusion and exclusion criteria

All anaesthetists working in the Department of Anaesthesiology at Wits meet the inclusion criteria.

The exclusion criteria in this study will be:

- anaesthetists who refuse to participate in the study
- blank questionnaires
- anaesthetists involved in the adaptation of the questionnaire

4.6.4 Data collection

Availability of guidelines

The researcher will visit or each of the Wits affiliated hospitals and confirm the availability of standard safety precautions and PEP regimens for HIV and HBV.

Questionnaire development

The questionnaire was developed after reviewing the literature. A published questionnaire by Mathewos et al (7) was identified as appropriate for this study. Permission was obtained from the author to use and adapt the questionnaire to the Wits context (Appendix C). The questionnaire was adapted to context and questions were added. This draft questionnaire was given to three senior anaesthesiologists to review and the feedback was incorporated into the questionnaire.

Content validity of the questionnaire was ensured by the reviewing literature, incorporating a published questionnaire and the review by three senior anaesthesiologist. Face validity was ensured by the review of the three senior anaesthesiologists. The final questionnaire (Appendix B) consists of the following sections:

- demographics
- HIV
- HBV.

Data collection

Data will be collected at departmental academic meetings. The convenor of the meeting will be approached by the researcher to ask for permission to distribute the questionnaire and to grant the participants 10 minutes to complete it. The anaesthetists who agree to participate in the study will receive an information letter

(Appendix A) and a self-administered questionnaire (Appendix B). The questionnaires will be numbered to monitor the response rate. The researcher will be present to distribute the questionnaire, to answer any questions and to prevent data contamination. The participants will put the folded completed questionnaires in a sealed collection box.

4.6.5 Data analysis

Questionnaires returned blank will be excluded from the study and questions not answered will be considered incorrect. Some questions have more than one correct answer and each correct answer will receive a score of one. Data will be captured onto a Microsoft Excel spread sheet and analysed in consultation with a biostatistician using STATA (StataCorp,USA) version 13. Descriptive and inferential statistics will be used. Categorical variables will be described using frequencies and percentages. The scores will be reported using means and standard deviation or medians and interquartile ranges depending on the distribution of the data. The comparisons will be done using either unpaired t-tests or the Mann-Whitney tests. Comparisons between junior and senior anaesthetists per question will be done using Chi-square or Fishers exact tests. A correlation will be done between the knowledge of HIV and HBV using Pearsons or Spearmans correlation technique. A p- value of < 0.05 will be considered statistically significant.

4.7 Significance of the study

HCWs are continuously at high risk of occupational exposure, especially in developing countries where there is a high incidence of blood borne diseases (3). Numerous studies show that occupational transmission can be reduced by following standard safety precautions and taking appropriate PEP (2, 6, 10, 17, 18).

The risk of occupational transmission from developed countries is well documented but limited information is available from developing countries (19). The limited information that is available shows poor adherence to standard safety precautions, sub-optimal documentation of occupational exposure and poor

knowledge about HIV PEP amongst HCW (3, 20). Gounden and Moodley (20) showed that 48% of the exposed HCWs who had initiated HIV PEP were not compliant with medication due to adverse side effects. HBV prophylaxis is often not considered, yet the risk of transmitting the HBV is higher than that of HIV (6).

This study will assess the knowledge of and personal experiences regarding HIV and HBV PEP of anaesthetists in the Department of Anaesthesiology at Wits. If the results show poor knowledge, the researcher will report the findings to departmental management, with a suggestion to make HIV and HBV protocols readily available in the operating theatre complex. This will improve the safety of anaesthetists.

4.8 Validity and reliability of the study

The validity of a study according to Botma et al (16) “indicates whether the conclusions of the study are justified based on the design and interpretation” and the reliability represents “the consistency of the measure achieved”.

Validity and reliability of the study will be ensured by:

- using an appropriate research design
- using a questionnaire with face and content validity
- researcher being present at data collection to answer questions and to prevent data contamination
- analysing data with the assistance of a biostatistician
- targeting a representative study sample.

4.9 Potential limitations

This study will be done contextually in the Department of Anaesthesiology and the results of the study may not be generalisable to other departments of anaesthesia. Data contamination is possible as the questionnaire will be distributed at more than one departmental academic meeting. This has, however, not been found to have occurred with previous studies in the Department of Anaesthesiology.

4.10 Project outline

4.10.1 Time frame

Activity	Nov 2017	Dec 2017	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
Literature review										
Proposal preparation										
Proposal submission										
Ethics approval										
Postgraduate approval										
Data collection										
Data analysis										
Draft article										
Submission										

4.10.2 Budget

The Department of Anaesthesiology will bear the cost of the paper and printing.

Item	Cost	Quantity	Total
Paper and printing	R1 per page	1800	R1810
Binding	R100 per copy	2	R200
Total			**R2010**

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4.12 Appendices

Appendix A: Information letter

Dear Colleague

My name is Lihle Maphumulo. I am a registrar in the Wits Department of Anaesthesiology. I would like to invite you to participate in a research project titled " Anaesthetists' knowledge and personal experiences regarding the standard safety precautions and post exposure prophylaxis of HIV and hepatitis B virus". This report will be submitted to the Faculty of Health Sciences to fulfil the requirements for my M Med degree.

As healthcare workers, we are all exposed to the risk of coming into contact with infectious fluids and we need to know how to protect ourselves by knowing standard safety precautions and the appropriate post exposure prophylaxis.

Completing the questionnaire should take no longer than 10 minutes. Participants are encouraged not to share information as this can produce inaccurate results. No incentives will be provided for completing the questionnaire.

Participation is completely voluntary and consent will be implied by your completion and return of a questionnaire. Information will be kept anonymous and confidential as none of your personal details will be required and only the researcher and supervisors will have access to the raw data. There is no penalty for not participating in the study.

Kindly return all questionnaires whether completed or not, by placing it in the box marked "returned questionnaires". The numbering of questionnaires is to determine the response rate and is for data capturing purposes.

The Human Research Ethics Committee (HREC) (Number M) and Graduate Studies Committee of Wits have approved the study.

If you have any questions regarding the study, please do not hesitate to contact me on 0726399408 or the chairperson of the HREC on 0117172513

Thank you for taking the time to read this information letter.

Lihle Maphumulo

Appendix B: Questionnaire

Please mark the correct box with X.

Section 1: Demographic information

1.1 Gender	
Male	
Female	

1.2 Age	
25 – 30 Years	
31 – 35 Years	
36 – 40 Years	
41 – 45 Years	
46 – 50 Years	
> 50 Years	

1.3 Professional designation	
Intern	
Medical officer	
Registrar – 1st, 2nd, 3rd year	
Registrar – 4th year	
Anaesthesiologist / Career medical officer (> 10 years)	

Section 2: HIV

- The following questions are based on the Southern African HIV Clinicians Society post exposure prophylaxis (PEP) guidelines.

- Some of the questions may have more than 1 correct answer.

2.1 Are you familiar with the HIV PEP guidelines?	
Yes	
No	

2.2 For HIV, which of the following are infectious?	
Vaginal secretions	
Penile pre-ejaculate and semen	
Saliva and sputum	
Amniotic fluid	
Ascitic fluid	
Cerebrospinal fluid	
Urine	

2.3 When is HIV PEP indicated post occupational exposure?	
Source patient is at high risk for HIV	
Source patient is known to be HIV positive	
Source patients' HIV status is unknown	
After any needle stick injury in the work place	
After mucous membrane (e.g. eye) splash	

2.4 When is it best to start HIV PEP?	
Within 1 hour post exposure	
Wtihin 6 hours post exposure	
Within 12 hours post exposure	
Within 72 hours post exposure	

2.5 What is the maximum approved time between HIV exposure and initiation HIV PEP?	
12 hours	
24 hours	
48 hours	
72 hours	

2.6 What is the effectiveness of HIV PEP when taken within 24 hours?	
100%	
80 – 90%	
60 – 70%	
30 – 50%	
20 – 30%	

2.7 What is the advised duration within which to complete HIV PEP?	
14 days	
28 days	
42 days	
180 days	

2.8 Does the afore mentioned HIV PEP guideline advise a different HIV PEP regimen for high and low risk exposure?	
Yes	
No	

2.9 Do you know where to go for assistance after occupational exposure at ALL hospitals affiliated to WITS.	
Yes	
No	

2.10 Have you ever had an occupational exposure to HIV?	
Yes	
No	

- **If NO, please continue to question 2.17**
- **If YES, please continue with the following questions**

2.11 Did you take HIV PEP after occupational exposure?	
Yes	
No	

2.12 Was the HIV PEP easily available?	
Yes	
No	

If PEP regimen was not easily available, please state the reason why.

2.13 Were you happy with the type of regimen given to you?	
Yes	
No	

If NO, please give reasons for your answer and further state whether you had to go privately for the HIV PEP regimen of your choice.

2.14 When did you start taking HIV PEP?	
Within 1 hour	
Within 2 – 6 hours post exposure	
Within 7 – 12 hours post exposure	
Within 13 – 72 hours post exposure	

2.15 Did you complete the full course of HIV PEP?	
Yes	
No	

- **If YES, please continue to question 2.17**
- **If NO, please choose the appropriate box.**

2.16 Reason for discontinuation of drugs?	
Experienced adverse drug effects	
Assumed that it was the right time to discontinue drugs	
Source patients' recent/repeat blood results allowed for the discontinuation of drugs e.g HIV negative	
Other	

If OTHER, please state reason.

2.17 Is there more than 1 HIV PEP regimen available at your work place?	
Yes	
No	

Section 3: Hepatitis B virus (HBV)

3.1 Are you familiar with the HBV PEP guidelines?	
Yes	
No	

3.2 The risk of occupational transmission is highest with?	
HIV	
HBV	

3.3 Which of the following is correct regarding hepatitis B vaccine?	
Should be given to all healthcare workers	
Should be given as a set of 2 injections over 6 months	
Booster doses are recommended for all healthcare workers after a period of time	
After last dose administration, hepatitis B surface antibody levels should be tested 5 months later	

3.4 When is hepatitis B immunoglobulin indicated post occupational exposure?	
After all occupational exposures	
Source patient is hepatitis B surface antigen positive, healthcare worker (HCW) is not vaccinated for HBV	
Source patient is hepatitis B surface antigen positive, HCW previously vaccinated with hepatitis B surface antibody level < 15 iu/ml	
Source patient is hepatitis B surface antigen positive, HCW previously vaccinated with hepatitis B surface antibody level < 10 iu/ml	

3.5 Have you ever had an occupational exposure to HBV?	
Yes	
No	

- **If NO, please do not continue with the questionnaire**
- **If YES, please continue with the following questions**

3.6 Did you take HBV PEP after occupational exposure?	
Yes	
No	

3.7 Was the HBV PEP easily available?	
Yes	
No	

If PEP regimen was not easily available, please state the reason why.

3.8 Did you complete the full course of HBV PEP?	
Yes	
No	

If NO, please state reason.

Thank you for taking the time to complete completing the questionnaire.

Section 5: Annexures

5.1 Ethics approval

WITS UNIVERSITY

DEPARTMENT OF ANAESTHESIOLOGY
UNIVERSITY OF THE WITWATERSRAND,
JOHANNESBURG
Tel.(011)933-9334/5 / Fax (011)933-1843

FACULTY OF HEALTH SCIENCES

02 March 2018

Ms Zanele Ndlovu
Administrative Officer
Human Research Ethics (Medical)

RE : DR THEMBELIHLE MAPHUMULO STUDENT NUMBER 1256440

I herewith grant permission to Dr Thembelihle Maphumulo to conduct the study titled "Anaesthetists knowledge and personal experiences regarding the standard safety precautions and post exposure prophylaxis of HIV and Hepatitis B virus" in the University of the Witwatersrand Department of Anaesthesiology. The proposed study entails distributing a questionnaire to doctors working in anaesthesia in Charlotte Maxeke Johannesburg Academic Hospital, Chris Hani Baragwanath Academic Hospital, Wits Donald Gordon Medical Centre, Helen Joseph Hospital and Rahima Moosa Mother and Child Hospital.

With Kind Regards

Yours sincerely

PROF. A.C. LUNDGREN
CHIEF SPECIALIST AND HEAD
DEPARTMENT OF ANAESTHESIA
UNIVERSITY OF THE WITWATERSRAND

5.2 Graduate studies approval

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG | FACULTY OF HEALTH SCIENCES

10 April 2018
Person Number: 1256440

PAG

Dr Thembelihle Maphumulo
189 Libertas Street
Sonneveld
Brakpan
1540

Dear Dr Maphumulo

MASTER IN MEDICINE (ANAESTHESIA): Approval of Protocol

We have pleasure in advising you that your protocol has been approved;

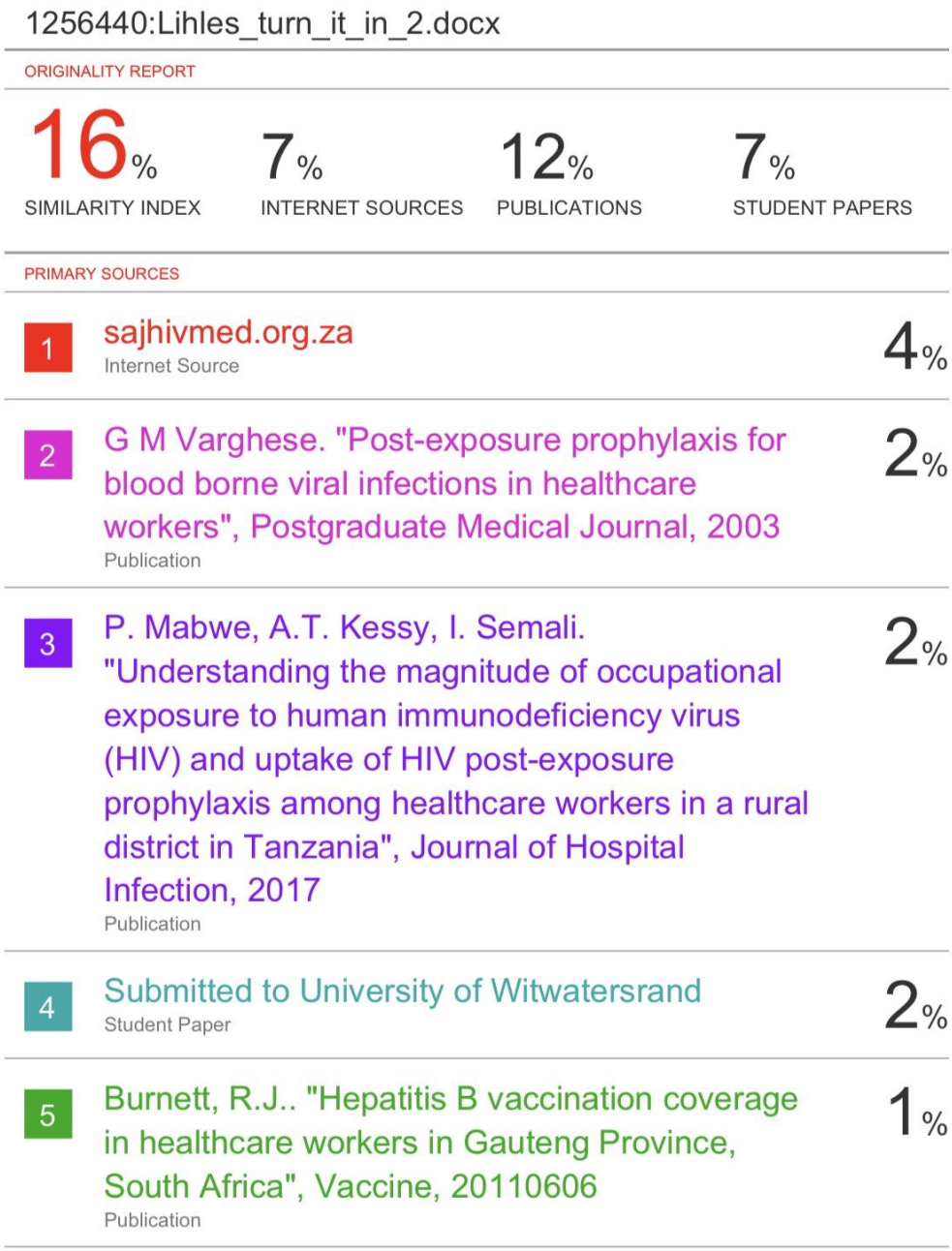
Title: Anaesthetists' knowledge and personal experiences regarding the standard safety precautions and post exposure prophylaxis of HIV and Hepatitis B virus

Yours sincerely

Miss Thando Mbolekwa
On behalf of Mrs Sandra Benn
Faculty Registrar

UNIVERSITY OF THE WITWATERSRAND
10 APR 2018
FACULTY OF HEALTH SCIENCE
YORK ROAD, PARKTOWN
2193
JOHANNESBURG

5.3 Turnitin report



1256440:Lihles_turn_it_in_2.docx

ORIGINALITY REPORT

16%	7%	12%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

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2	G M Varghese. "Post-exposure prophylaxis for blood borne viral infections in healthcare workers", Postgraduate Medical Journal, 2003 Publication	2%
3	P. Mabwe, A.T. Kessy, I. Semali. "Understanding the magnitude of occupational exposure to human immunodeficiency virus (HIV) and uptake of HIV post-exposure prophylaxis among healthcare workers in a rural district in Tanzania", Journal of Hospital Infection, 2017 Publication	2%
4	Submitted to University of Witwatersrand Student Paper	2%
5	Burnett, R.J.. "Hepatitis B vaccination coverage in healthcare workers in Gauteng Province, South Africa", Vaccine, 20110606 Publication	1%

6	www.e-mjm.org Internet Source	1%
7	Laura Nyblade. "Combating HIV stigma in health care settings: what works?", Journal of the International AIDS Society, 2009 Publication	1%
8	ir.dut.ac.za Internet Source	1%
9	"Current Progress in Medical Mycology", Springer Science and Business Media LLC, 2017 Publication	1%
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UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG | FACULTY OF HEALTH SCIENCES

24 March 2020

The Chairperson
Graduate Studies Committee
Faculty of Health Sciences
University of the Witwatersrand

Dear Professor Papathanasopoulos

Re: M Med: **Anaesthetist's knowledge and personal experiences regarding standard safety precautions and post exposure prophylaxis of HIV and Hepatitis B virus**

Dr Thembelihle Maphumulo, student number: 1256440, has submitted her research report to Turnitin which revealed a similarity index of 16%. These similarities appear not to be plagiarism but mainly the use of common terminology and phrases specific to the topic of the research.

Yours sincerely,

Juan Scribante
Supervisor

1