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INJURIES ON DUTY AT KLERKSDORP /TSHEPONG / POTCHEFSTROOM HOSPITAL COMPLEX

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Public Health in the field of Hospital Management

Johannesburg, 2011

DECLARATION

I, Gloria Tlhoriso Tlhapi, declare that this research report is my own work. It is being submitted for the degree of Master Public Health in the field of Hospital Management at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or for any examination at this or any other University.



September 2011

DEDICATION

This study is dedicated to my children, Ramatua, Orapeleng and Tshegofatso. They are the reason I wake up every morning, your support is the engine of my career. I love you very much guys.

I dedicate this study to my mother Miriam Mokhethi, who is a mother, a friend and a sister. You always encourage me to work hard and to be humble at all the times. Thank you very much mom, for taking care of my children and guiding me. You are simply the best. You are right mom, hard work never kills.

A word of gratitude to my younger sister, Lerato Mokgeti, you are a mother figure to my children. Thank you very much my dear sister for contributing to the achievement of my studies.

KE A LEBOGA

ACKNOWLEDGEMENT

First of all, I want to acknowledge my LORD and my personal Saviour Jesus Christ of Nazareth for making all things possible. Your favours, divine protection and mercies are acknowledged. Thank you for making all good things works together for me.

My supervisor, Dr Moreshnee Govender, your undying support is acknowledged. Thank you for your patience, understanding and kindness. Dr Debashis Basu, you are a star, a leader and a mentor. Thank you very much guys!

ABSTRACT

Background: The hospital as an organisation employs many people who may be at risk for Injuries on Duty (IOD). Although IOD occur across the hospital and impact on staff morale and quality of care, no formal study has been conducted within the public hospitals in South Africa on the profile of employees who have sustained these injuries. This study was aimed at comprehensively describing the IOD and related factors at Klerksdorp/Tshepong/Potchefstroom (K/T/P) Hospital Complex in order to better understand and plan appropriate preventive strategies.

Methodology: The study was based on a cross-sectional design involving retrospective record review obtained from the hospital information system. No primary data was collected. The study setting was K/T/P Hospital complex. All records of employees who sustained IOD during the study period were reviewed. Data was collected on relevant variables such as employee profile, type of IOD during the study period. Descriptive statistics was used to analyse the data.

Results: The study found that the total number of IOD during this period was 152. The annual prevalence rate was 2.3% (Klerksdorp-Tshepong Hospital Complex) and 2.8% (Potchefstroom Hospital). . The category of employees who experienced injuries were administration (5.3%), support (18.8%), medical (34.9%), nursing (36.2%), professional (4.6%). The types of the injuries sustained were cut (8.6%), fall (19.7%), minor injuries (9.2%), needle prick (49.3%), patient related (1.3%), splash (11.8%). With regard to PEP costs, Klerksdorp Hospital incurred the highest costs of R31 231 34, followed by Potchefstroom Hospital with R23 714 83 and Tshepong Hospital with R19 305 57 during the study period

Conclusion: Emphasis should be placed in public hospitals to improve adherence to the North West Department of Health 'Policy on injuries on Duty to improve reporting and quality of data. Continuous training and development must be undertaken to improve appropriate use of protective clothing. In addition, there should be customised programs to prevent, track, and implement PEP holistically in these hospitals. A detailed risk assessment and ergonomic assessment should be conducted to identify possible hazards and prevent further falls by employees.

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GLOSSARY OF TERMS

Adverse events: World Health Organization defines adverse event as “an injury related to medical management, in contrast to complications of disease. Medical management includes all aspects of care, including diagnosis and treatment, failure to diagnose or treat, and the systems and equipment used to deliver care. Adverse events may be preventable or non-preventable” (WHO, 2005).

Hazard: A source of potential harm, or a situation with the potential to cause harm. (Mid Cheshire Hospitals NHS Trust, 2007).

Injury on duty: IOD claims are injuries resulting from, and directly attributable, to an employee’s work whilst on duty.

Needlestick injury: A penetrating stab wound from a needle (or other sharp object) that may result in exposure to blood or other body fluids. The main concern is exposure to the blood or other body fluids of another person who may be carrying infectious disease. (Medical Dictionary definition)

Place of Injury:

Administration refers to office areas

Outdoor refers to any place outside wards and support areas such as road, garden, stairs and corridors.

Support refers to Clinical support (Occupational therapy, Physio therapy Echo-cardiography, X-Ray) and non-clinical support (CSSD, Food services, Laundry, transport, Workshop)

Splash: accidental body exposure to blood or body fluids.

LIST OF ABBREVIATIONS

COIDA	Compensation of Injuries and Disease Act
HCW	Health care worker
IOD	Injury on duty
K/T/P	Klerksdorp/Tshepong/Potchefstroom
K/T	Klerksdorp/Tshepong
LCA	Latent Class Analysis
NWDoH	North West Department of Health
OHSA	Occupational Health and Safety Act
PEP	Post Exposure Prophylaxis
SAMDRA	South African Medicines and Medical Devices Regulatory Authority Act
UPFS	Uniform Patient Fee Schedule
WCA	Workman Compensation Act

CHAPTER 1
INTRODUCTION

The purpose of this study was to describe the injuries on duty (IOD), related factors (system and individual) and, the cost of clinical management of needle stick injuries (NSI) at Klerksdorp/Tshepong/Potchefstroom (KTP) Hospital Complex. This introductory chapter will cover the background to the study, statement of the problem, its aims and objectives and an outline of subsequent chapters.

1.1 BACKGROUND

Adverse events, specifically IOD significantly impact on overall hospital performance. It affects both service workload and staff allocation and negatively impacts the institution's performance and productivity. The study of associated risk factors is important to develop an understanding of the IOD and to design preventive measures based on the evidence collected at institutional level. This would require systematic study at institutional and sometimes even at departmental or unit level to develop a thorough understanding. Although there are significant direct and indirect costs associated with these IOD, these costs often remain unknown to the hospital management. As a result of this, the impact of IOD at institutional level is often under-estimated.

The majority of studies on IOD in hospital environments reflect experiences in developed countries and not in the developing countries where these studies are needed to prevent the occurrence of IOD. The South African health care sector employs a large number of people but few studies have been conducted to systematically study experiences in these institutions.

In terms of the South African regulatory framework, as stated in the OCCUPATIONAL HEALTH AND SAFETY ACT (OHSA) NO. 85 OF 1993, a workplace is considered "healthy" if it is free from illness or injury attributable to occupational causes. In addition, IOD are compensable under the

Compensation of Injuries and Disease Act (COIDA) No. 130 of 1993. According to COIDA, an "occupational injury" implies a personal injury sustained as a result of an accident in the course of performing work.

The researcher planned this study against this background at specific public hospitals which offers level 1, 2 and partially level 3 care of health services in the North West Province in South Africa.

1.2 JUSTIFICATION FOR THE STUDY

Although there is a perception that IOD are not an uncommon occurrence and that certain IOD are more common in some specific occupational categories at K/T/P Hospital Complex, no systematic study has been previously conducted in this Complex with regard to employees who have experienced IOD. This study provided meaningful and useful information about the profile of employees who reported IOD, the types of IOD reported and an assessment of the costs specifically related to IOD that require post–exposure prophylaxis (PEP). The results of this study will be used to assist the K/T/P Hospital Complex management to better understand these events and to subsequently develop more appropriate and cost-effective prevention strategies.

1.3 RESEARCH QUESTION

What are the types of IOD, related factors and estimated costs of the clinical management of Post Exposure Prophylaxis (PEP) at K/T/P Hospital Complex?

1.4 STUDY OBJECTIVES

1.4.1 BROAD OBJECTIVE

To describe the IOD, related factors (system and individual) and cost of the PEP at K/T/P Hospital Complex during a period from January 2008 to March

2010.

1.4.2 SPECIFIC OBJECTIVES

1. To describe the IOD sustained by employees with respect to the hospital complex, the types of injuries, affected body part, and time of occurrence.
2. To describe the profile of employees who experienced IOD during the study period, with respect to category of staff, gender, age, and ethnicity.
3. To estimate the costs of PEP related to needle stick injuries, splash incidents and lacerations according to the Uniform Patient Fee Schedule (UPFS) for Paying Patients Attending Public Hospitals.

1.5 SUBSEQUENT CHAPTERS

So far, the background to the research has been discussed. Then, research question and objectives were defined in this first chapter. A brief outline of following chapters is described below.

Chapter Two Literature Review: The purpose of the literature review is to review pertinent literature and to discuss concepts related to the IOD at hospitals in South Africa and elsewhere.

Chapter Three Research Methodology: This chapter describes the research methodology, study design, setting and scope and data management techniques used in this study.

Chapter Four: Presentation of Results: This chapter deals with an analysis of the data collected for this study relating to its aims and objectives.

Chapter Five: Discussion: The findings from the review of the literature are incorporated in this chapter with the results obtained from the analysis in order

to address the aims and objectives of the study.

Chapter Six: Conclusions and Recommendations: This constitutes the last chapter of the report and derives conclusions from the research related to the objectives of this study, makes recommendations and advocates areas for future research in the field of IOD in the hospital setting.

CHAPTER 2
LITERATURE REVIEW

In this chapter, relevant reports into maternal health services with particular reference to IOD at hospital setting are discussed. In addition to published literature, information from various unpublished sources is also reviewed.

2.1 INTRODUCTION

Health Care Workers (HCWs) face a wide range of occupational health and safety hazards. It is well-documented that the health care sector is plagued by high rates of work injuries and illnesses, absence from work and related costs. Research on the Canadian workforce indicates that HCWs have a greater risk of workplace injuries than any other occupational group (Garcia and Facchini, 2006). In addition, a few population-based studies also demonstrated unacceptably high rates of medical injury and preventable deaths (WHO, 2005).

2.2 PREVALENCE OF IOD AMONG HOSPITAL WORKERS

Very few studies have reported on the prevalence of IOD amongst HCWs. This may be due to poor record keeping as well as failure of staff to report these events. Interestingly, as a result of concerns relating to HIV in the workplace, more emphasis has been placed especially on the recording and management of exposure to biological hazards. This has resulted in more research being conducted in this particular area focusing on exposure to these specific hazards.

A study by Nagao, Linuma & Iqawa (2009) found that only 22% of staff who had experienced ‘exposure injuries’ reported them. Another recent study by Murray, Johnson & Conger (2009), reported an average exposure of 5.8 (range 2 – 16) staff per month. The majority of exposures were percutaneous finger prick injuries (74%), whereas the remainder were splashes (17%) or not

specified (9%).

Although it is obligatory for health workers to report IOD using the W.CL. 2(E) accident form (Department of labour, 1993), not everyone reports them and the data that is reported is not analysed systematically and published resulting in a paucity of research articles in this area.

2.3 FACTORS INFLUENCING IOD AMONG HEALTH CARE WORKERS

There are various factors that may expose the hospital workers to IOD, as described below:

2.3.1 PROFESSION

The skills mix and level of the employee, as well as the competency of the employee, have an impact on the quality of service as well as efficiency of service delivery (Buchan, 2000). Doctors and nurses are more prone to IOD, because of the nature of their work (Nagao et al., 2009). Other professionals who are exposed to IOD include cleaning staff that have been frequently associated with multiple ergonomic and chemical hazards, elevating the risk for occupational illness and injury. In Norway, the cleaning profession is characterised by a higher rate of morbidity and a higher level of disability pensioning, which is similar to findings from Australia (Buchan, 2000) and Poland (Hasanat and Lamgur, 2003).

Of major concern to health care workers is the risk of exposure to blood or other body fluids from needlestick injuries or splashes. The concerns relate to the risk of infection from human immunodeficiency virus (HIV), hepatitis B virus (HBV), or hepatitis C virus (HCV) (Schmid, Schwager et al. 2007).

Cross, Steinberg, Yassi, et al. 2007 classified hospital staff in respect of exposure to biological hazards into three categories, based on shift work,

frequency of handling of hollow-bore needles, and frequency of handling of tubes and drains. The categories were based on Latent Class Analysis (LCA): exposed, near exposed and unexposed.

- Characteristics of the “exposed class” included relatively high probabilities of exposure to needle stick injuries (NSI), cuts with sharp objects, and splashes to eyes or mouth, and relatively low probabilities of near miss items.
- The “near exposed” class was characterized by relatively high probabilities of near misses for NSIs and splashes to the eyes or mouth, and low probabilities of actual exposure.
- The unexposed class included administrative staff that was not exposed to biological hazards.

The type of work may also contribute to the occurrence of IOD. For example, in operating theatres, Nagao et al. (2009) found that surgeons were more exposed to injuries than scrub nurses. Surgeons were most commonly injured during suturing (56%), followed by “handing over sharps” (8%). Scrub nurses, on the other hand, were mostly injured during “count and sorting of sharps” (15.41%), followed by “handing over sharps” and “splash”.

2.3.2 INCREASED WORKLOAD

Besides the nature of hospital work, the increased work-load associated with this type of service industry has been identified as one of the main contributory factors. Namaganda (2004) found that a shortage of appropriately skilled health care workers results in an increased workload and exposed staffs that are not able to adequately perform the necessary tasks. For example, shortage of nursing aides resulted in both inappropriate use of existing staff and increased work pressure on the nurses.

2.3.3 HOSPITAL POLICIES AND GUIDELINES

Hospital policies and guidelines for disposal of sharps and biological hazards,

as well as cultures, play an important role in the reduction of IOD (Saint, Kowalski, Banaszak-Holl, et al., 2009). However, availability of these policies and guidelines does not necessarily imply adherence to correct practice. For example, Hasanat et al. (2008) reported a significant association between inappropriate disposal of sharps and occurrence of IOD.

Other local factors may be important in a particular hospital. It is therefore important to systematically study routinely collected information. This may assist in developing appropriate preventative measures to reduce occupational injuries by providing education, mentoring, and competency training for HCWs.

CHAPTER 3
METHODOLOGY

The methodology for this study was selected on the basis of its aims. The study design is presented first followed by the setting and scope of the study, data collection methods, research tools and data analysis. Finally, issues surrounding ethics are discussed.

3.1 STUDY DESIGN

The study was a cross-sectional descriptive study, based on a retrospective record review.

3.2 STUDY SETTING

The study setting was K/T/P Hospital complex in the North West Province. This Hospital complex is situated in the Dr Kenneth Kaunda District (figure 1) in the North West Province providing level one, two and three services. The K/T Hospital complex is a referral hospital for the entire province for level 3 services, whilst Potchefstroom Hospital renders level 1 and 2 services and refers to KT Hospital Complex and tertiary institutions in Gauteng Province for other level 3 services. Referral support is provided to regional hospitals, district hospitals as well as community health centres and clinics. The Hospital complex has the approved staff establishment of 2883 posts.

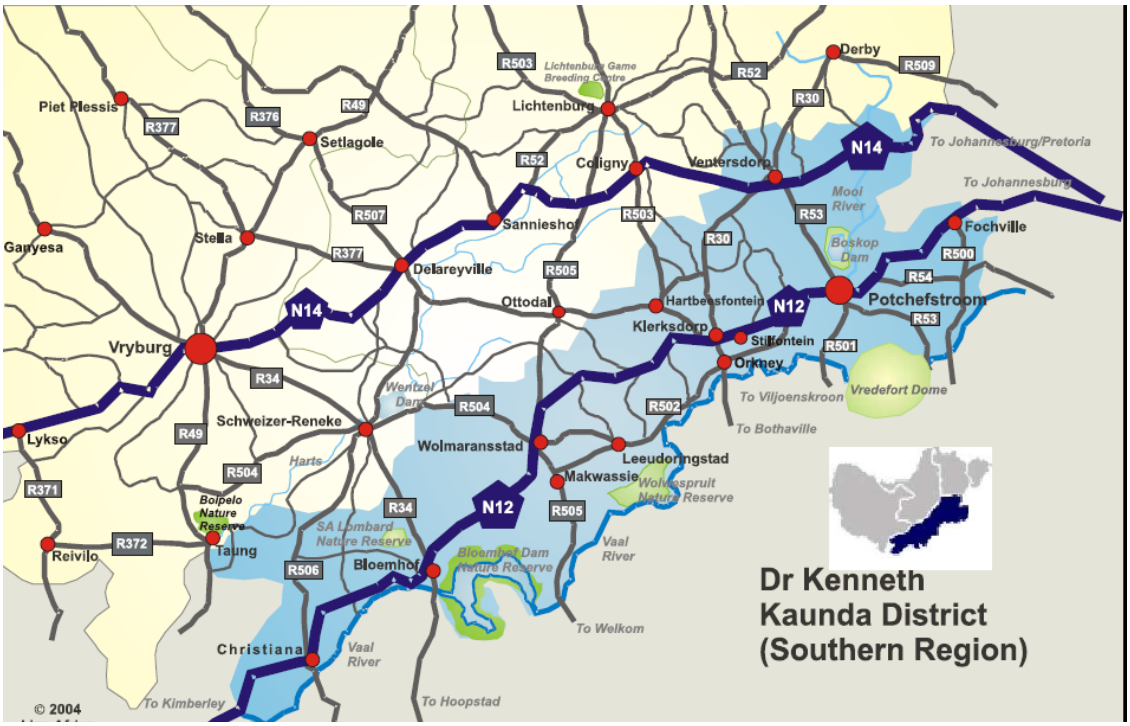


Figure 1: Map of Dr Kenneth Kaunda District

3.3 STUDY SCOPE

Past records from the Occupational Health unit and Human Resources section of the Hospital complex were reviewed for the study. No primary data collection was done.

3.4 STUDY PERIOD

The study period was two years and three months (1 January 2008 to 30 June 2010). This period was chosen to obtain as much data as possible for the study.

3.5 STUDY POPULATION AND SAMPLE

The study population included records of all employees who reported IOD during the period of January 2008 to June 2010. The entire study population was included therefore, no sampling was done.

3.6 MEASUREMENT AND DATA SOURCE

3.6.1 STUDY INSTRUMENT

Data collection tools developed in MS Excel was used to collect data from sources listed in Section 3.6.2 (Appendix B). These tools were piloted before use.

3.6.2 DATA COLLECTION

Data for this study are routinely collected and were extracted from the IOD register and the Compensation Commissioner Forms. No primary data was collected.

- **Objective 1:** All IOD records for employees who had been exposed to adverse events for the study period were reviewed. (Tool 1)
- **Objective 2:** Data was extracted from the employee records at human resources and IOD records (Tool 2)
- **Objective 3:** UPFS database was used to cost needle stick injuries, splash incidents and lacerations per category and total cost (Department of Health, 2009).

3.6.3 VARIABLES

The following variables, listed below were used for this study.

- Hospital: Klerksdorp Hospital, Tshepong Hospital, Potchefstroom Hospital
- Type of injuries on duty (needle prick, cut, splash, fall, minor injuries and patient related)

- Affected body part (hand, upper limb, lower limb, back, head or facial
- Place/locality (Administration, Clinical support and Clinical)
- Activity prior to IOD (Administrative, Clinical, Non-clinical)
- Time of injury (day shift or night shift)
- Socio-demographic profile: Age, Gender, Ethnicity
- Category of Staff: Administration, Support, Medical, Nursing, Professional (Medical and allied)
- Cost estimates (PEP)

The Uniform Patient Fee System (UPFS) database was used to estimate the total cost of PEP provided for specific IOD for the hospital complex (UPFS, 2009). These included those IOD which required PEP namely NSI, splashes and lacerations. In this respect, the cost of PEP will be determined per patient and in total for the duration of the study period, which will include initial HIV screening tests (Rapid, Eliza, Hepatitis A, B and C, Full blood count, urea and electrolytes, creatinine, Liver function tests, and the confirmatory tests which included HIV, Urea, electrolytes and creatinine, Hepatitis A and B.

3.6.4 DATA ANALYSIS

Data was captured onto the MS excel spreadsheet and analysed with NCSS software (NCSS, 2007)

Descriptive statistics were used for reporting the results of the study

- Continuous variables: mean and standard deviation (data with normal distributions) and median and inter-quartile ranges (when data were not normally distributed)
- Categorical variables: (such as ethnicity and gender): results were presented as count and proportions.

3.7 PILOT STUDY

The tool was piloted at another Hospital near K/T/P Hospital Complex before

using in order to determine the IOD reporting system, appropriateness of the tools and also to familiarise the researcher with the tools.

3.8 ETHICAL CONSIDERATIONS

Permission for conducting research and accessing documents was obtained from the head of the NWDoH. The project was approved by the Wits Human Research Ethics Committee (Clearance no: M10638). Confidentiality and anonymity were maintained all the time for collection, capturing, and reporting of the information. To further ensure anonymity, the data was only analysed at a group level that protects the identities of individuals.

CHAPTER 4
RESULTS

The results obtained from the analysis of data were described in this chapter.

4.1 THE NUMBER OF INJURIES ON DUTIES IN THE K/T/P HOSPITAL COMPLEX

The total number of IOD during this period was 152 (50 in 2008, 58 in 2009 and 46 in the six-month period in 2010). The mean number of IOD was 18 per month. The total number of staff during the study period were 1749 (Klerksdorp-Tshepong Hospital Complex) and 719 (Potchefstroom Hospital). Therefore, the prevalence of IOD during the entire study period was 5.7% (Klerksdorp-Tshepong Hospital Complex) and 7% (Potchefstroom Hospital) respectively. The annual prevalence rate was 2.3% (Klerksdorp-Tshepong Hospital Complex) and 2.8% (Potchefstroom Hospital).

The different categories of staff from the three hospitals in the K/T/P Hospital Complex are described below in Table 4.1.

Table 4.1 Categories of staff who sustained IOD

	Total (n=152)	**Klerksdorp Hospital (n=59)**	**Tshepong Hospital (n= 42)**	**Potchefstroom Hospital (n=51)**
Administration	8 (5.3%)	5 (8.5%)	2 (4.8%)	2 (2%)
Support	29 (18, 8%)	9 (15.3%)	11 (26.2%)	11 (17.6%)
Medical	53 (34.9%)	18 (30.5%)	18 (42.9%)	19 (33.3%)
Nursing	55 (36.2%)	25 (42.4%)	9 (21.4%)	16 (41.2%)
Professional	7 (4.6%)	2 (3.4%)	2 (4.8%)	2 (5.9%)
Total	**152 (100%)**	**59 (100%)**	**42 (100%)**	**51 100%)**

There was no significant association between staff categories and hospitals

among the staff who sustained IOD during the study period (Chi-square test, p=0.39).

4.2 TYPE OF INJURIES

Types of injuries are described in Table 4.2. There was no significant association between staff categories and hospitals among the staff who had IOD during the study period (Chi-square test, p=0.19).

Table 4.2 Type of injuries

	Total (n=154)	**Klerksdorp Hospital (n=59)**	**Tshepong Hospital (n= 44)**	**Potchefstroom Hospital (n=51)**
Cut	13 (8.6%)	7 (11.9%)	4 (9.5%)	2 (3.9%)
Fall	30 (19.7%)	15 (25.4%)	6 (14.3%)	9 (17.6%)
Minor injuries	14 (9.2%)	3 (5.1%)	6 (14.3%)	5 (9.8%)
NSI	75 (49.3%)	24 (40.7%)	24 (57.1%)	27 (52.9%)
Patient related	2 (1.3%)	0	1 (2.4%)	1 (2%)
Splash	18 (11.8%)	10 (16.9%)	1 (2.4%)	7 (13.7%)
Total	**152 (100%)**	**59 (100%)**	**44 (100%)**	**51 100%)**

In terms of place of injury, NSI were significantly more common in Wards (n=33) and splash injuries occurred in many Units of these Hospitals.

Table 4.3 Place of injuries and type of injuries

	Total (n=154)	Casualty	OPD	ICU and theatre	Support	Admin	Outdoor	Ward
Cut	13 (8.6%)	0	0	4 (15.4%)	7 (30.4%)	1 (25%)	0	1 (1.8%)
Fall	30 (19.7%)	4 (13.3%)	2 (33.3%)	2 (7.7%)	5 (21.7%)	3 (75%)	5 (62.5%)	9 (16.4%)
Minor	14 (9.2%)	0	0	3 (11.5%)	4 (17.4%)	0	3 (37.5%)	4 (7.3%)
NSI	75 (49.3%)	23 (76.7%)	4 (66.7%)	13 (50%)	2 (8.7%)	0	0	33 (60%)
Patient related	2 (1.3%)	0	0	1 (3.8%)	0	0	0	1 (1.8%)
Splash	18 (11.8%)	3 (10%)	0	3 (11.5%)	5 (21.7%)	0	0	7 (12.7%)
Total	**152 (100%)**	30 (100%)	6 (100%)	26 (100%)	23 (100%)	4 (100%)	8 (100%)	55 (100%)

There was a significant association between staff category and type of IOD (Chi-square test, $p < 0.0001$). More doctors and nurses reported NSI. Fall was common among administration, support and professional staff.

Table 4.4 Type of injuries and staff categories

	Total (n=154)	**Administration (n=8)**	**Support (n=29)**	**Medical (n=53)**	**Nursing (n=55)**	**Professional (n=7)**
Cut	13 (8.6%)	1 (12.5%)	5 (17.2%)	2 (3.8%)	3 (5.5%)	2 (28.6%)
Fall	30 (19.7%)	5 (62.5%)	10 (34.5%)	2 (3.8%)	10 (18.2%)	3 (42.9%)
Minor injuries	14 (9.2%)	2 (25%)	4 (13.8%)	2 (3.8%)	5 (9.1%)	1 (14.3%)
NSI	75 (49.3%)	0	8 (27.6%)	39 (73.6%)	28 (50.9%)	0
Patient related	2 (1.3%)	0	0	0	2 (3.6%)	0
Splash	18 (11.8%)	0	(6.9%)	8 (15.1%)	7 (12.7%)	1 (14.3%)
Total	**152 (100%)**	**8 (100%)**	**29 (100%)**	**53 (100%)**	**55 (100%)**	**7 (100%)**

There was a significant association between types of injuries and body parts (Chi-square test, $p < 0.0001$) (Table 4.5). Cut and needle-stick injuries were more common in the category ‘hands’. History of fall was commonly associated with the category ‘legs’ due to falls experienced by administrative

and professional staff. The injuries were presented mostly in the ankle due to slipping whilst lifting patients or using stairs.

Table 4.5 Body parts involved in the IOD

	Total (n=154)	**Hand (n=8)**	**Leg (n=53)**	**Multiple (n=55)**	**Torso (n=7)**	**Head (n= 29)**
Cut	13 (8.6%)	10 (10.3%)	2 (8.7%)	0	1 (14.3%)	0
Fall	30 (19.7%)	6 (6.2%)	17 (73.9%)	2 (66.7%)	4 (57.1%)	1 (4.5%)
Minor injuries	14 (9.2%)	4 (4.1%)	3 (13%)	1 (33.3%)	2 (28.6%)	4 (18.2%)
NSI	75 (49.3%)	74 (76.3%)	1 (4.3%)	0	0	0
Patient related	2 (1.3%)	2 (2.1%)	0	0	0	0
Splash	18 (11.8%)	1 (1%)	0	0	0	17 (77.3%)
Total	**152 (100%)**	**97 (100%)**	**23 (100%)**	**3 (100%)**	**7 (100%)**	**22 (100%)**

The activities prior to IOD are described in Table 4.5. There was no significant association between Hospital and activities prior to IOD (Table 4.5).

Table 4.6 Activities prior to IOD

	Total (n=152)	Klerksdorp Hospital (n=59)	Tshepong Hospital (n= 42)	Potchefstroom Hospital (n=51)
Administrative duties	7 (4.6%)	5 (8.5%)	1 (2.4%)	1 (2%)
Non-clinical duties	27 (17.8%)	7 (11.9%)	11 (26.2%)	9 (17.6%)
Clinical	118 (77.6%)	47 (79.7%)	30 (71.4%)	41 (80.4%)
Total	152 (100%)	59 (100%)	42 (100%)	51 100%)

There was a significant association between type of IOD and activities prior to IOD (Chi-square test, $p < 0.01$) (Table 4.7). The history of fall was most common among staff who performed administrative and non-clinical duties prior to the IOD occurring. Splashes and NSI were common with staff engaged with clinical duties.

Table 4.7 Type of IOD and activities prior to IOD

	Total (n=154)	**Administrative duties (n=7)**	**Non-clinical duties (n=27)**	**Clinical duties (n=118)**
Cut	13 (8.6%)	1 (14.3%)	4 (14.8%)	8 (6.8%)
Fall	30 (19.7%)	4 (57.1%)	9 (33.3%)	17 (14.4%)
Minor injuries	14 (9.2%)	2 (28.6%)	4 (14.8%)	8 (6.8%)
NSI	75 (49.3%)	0	8 (29.6%)	67 (56.8%)
Patient related	2 (1.3%)	0	0	2 (1.7%)
Splash	18 (11.8%)	0	2 (7.4%)	16 (13.6%)
Total	**152 (100%)**	**7 (100%)**	**27 (100%)**	**118 (100%)**

4.3 TIME OF INJURIES

Time of injuries is described in Table 4.8. There was no significant association between the hospital and the shifts (Chi-square test, p – 0.72).

Table 4.8 Duty shift and IOD as per Hospital

	Total (n=152)	Klerksdorp Hospital (n=59)	Tshepong Hospital (n= 42)	Potchefstroom Hospital (n=51)
Day	115 (75.7%)	45 (76.3%)	30 (71.4%)	40 (78.4%)
Night	37 (24.3%)	14 (23.7%)	12 (28.6%)	11 (21.6%)
Total	152 (100%)	59 (100%)	42 (100%)	51 100%)

There was a significant association between type of injury and duty shift (Chi-square test, $p<0.05$) (Table 4.9). The probability of NSI was higher at night and falls were more common during the day.

Table 4.9 Duty shift and type of IOD

	Total (n=154)	Day shift (n=115)	Night shift (n=37)
Cut	13 (8.6%)	8 (7%)	5 (13.5%)
Fall	30 (19.7%)	26 (22.6%)	4 (10.8%)
Minor injuries	14 (9.2%)	13 (11.3%)	1 (2.7%)
NSI	75 (49.3%)	51 (44.3%)	24 (64.9%)
Patient related	2 (1.3%)	1 (0.9%)	1 (2.7%)
Splash	18 (11.8%)	16 (39.9%)	2 (5.4%)
Total	**152 (100%)**	**115 (100%)**	**37 (100%)**

4.4 SOCIO- DEMOGRAPHIC PROFILE OF PATIENTS INVOLVED WITH INJURIES ON DUTY

4.4.1 AGE

The age distribution of the subjects is illustrated in Table 4.10. There was a significant association between the different types of IOD and age. The age was not normally distributed. The staff with history of fall was significantly older (median = 43) whereas splashes were more common among younger staff (median = 28.5).

Table 4.10 Age distribution of subjects

	Total (n=152)	Klerksdorp Hospital (n=59)	Tshepong Hospital (n= 42)	Potchefstroom Hospital (n=51)
Median (IQR)	32 (27- 43)	32 (28 - 46)	33 (28 – 43)	32 (26 - 42)
Range	20 to 45	23 to 46	23 to 64	20 to 54

4.4.2 ETHNICITY

The ethnicity of the subjects is illustrated below in Table 4.11. There was no

significant association between the different types of IOD and ethnicity (Chi-square test, p = 0.27).

Table 4.11 Ethnicity of subjects

	Total (n=152)	**Klerksdorp Hospital (n=59)**	**Tshepong Hospital (n= 42)**	**Potchefstroom Hospital (n=51)**
Black	91 (59.9%)	34 (57.6%)	27 (64.3%)	30 (58.8%)
Coloured	5 (3.3%)	1 (1.7%)	1 (2.4%)	3 (5.9%)
Indian	2 (1.3%)	1 (1.7%)	1 (2.4%)	0
white	54 (36.5%)	23 (39%)	13 (31%)	18 (35.3%)
Total	**152 (100%)**	**59 (100%)**	**42 (100%)**	**51 (100%)**

4.4.3 GENDER

The gender of the subjects is illustrated in Table 4.12. There was no significant association between the different types of IOD and gender (Chi-square test, p = 0.94).

Table 4.12 Gender of subjects

	Total (n=152)	Klerksdorp Hospital (n=59)	Tshepong Hospital (n= 42)	Potchefstroom Hospital (n=51)
Male	45 (29.6%)	18 (30.5%)	13 (31%)	14 (27.5%)
Female	107 (70.4%)	41 (69.5%)	29 (69%)	37 (72.5%)
Total	152 (100%)	59 (100%)	42 (100%)	51 (100%)

4.5 CLINICAL MANAGEMENT OF INJURIES ON DUTIES

Counselling was offered to all the patients who had needle prick, cut and splash injuries. However, first and second screening was done for NSIs and splashes. Only first screening was done for cuts/lacerations.

4.6 ASSOCIATED DIRECT COSTS

The unit cost of laboratory test and drugs for PEP are listed in Table 4.13.

Table 4.13 Unit cost of laboratory tests and drugs

	Unit cost (R)
Laboratory costs (HIV test rapid)	R601.34
Laboratory cost (HIV test ELISA)	R 155.17
Drug cost (initial)	R20.70
Drug cost (full cost)	R 82.62

The total cost for PEP for cut, splash and NSIs are listed below in Table 4.14 for the period of 1 January 2008 to 30 June 2010.

Table 4.14 Total cost for cut, splash and needle prick

	Total (n=152)	Klerksdorp Hospital (n=59)	Tshepong Hospital (n= 42)	Potchefstroom Hospital (n=51)
NSI	n=75	n=24	n = 24	n = 27
Laboratory cost	R 46,796.92	R 16,139.03	R14, 335.01	R 16,322.88
Drug cost	R 3,925.64	R 1,239.84	R 1,177.76	R 1,508.04
Total cost	R 50,732.56	R17,378.87	R 15,512.77	R 17,840.92
Cut	n =13	n = 7	n = 4	n = 2
Laboratory cost	R 8,166.44	R 5,295.57	R 2870.87	R 0
Drug cost	R 248.40	R 165.60	R 82.80	R 0
Total cost	R 8,414.84	R 5,461.17	R 2953.67	R 0
Splash	n = 18	n = 10	n =1	n = 7
Laboratory cost	R 13,627.18	R 7,565.10	R 765.51	R 5296.57
Drug cost	R 1,487.16	R 826.20	R 82.62	R 578.34
Total cost	R 15,104.34	R 8391.30	R 839.13	R 5873.91
TOTAL COST	**R 74,251.74**	**R 31,231.34**	**R 19,305.57**	**R 23,714.83**

CHAPTER 5
DISCUSSION

In this chapter, the results obtained from the analysis of the data are discussed and compared with those from other published studies.

5.1 NUMBER OF IOD AT K/T/P HOSPITAL COMPLEX

The total number of IOD during the study period was 152 (50 in 2008, 58 in 2009 and 46 in 2010 (6 months)). The mean number of IOD was 18 per month. The total number of staff employed during this period were 1749 (Klerksdorp-Tshepong Hospital Complex) and 719 (Potchefstroom Hospital) and with a prevalence of IOD at 5.7% and 7% respectively. The annual prevalence rate was 2.3% (Klerksdorp-Tshepong Hospital Complex) and 2.8% (Potchefstroom Hospital) which is within the range (2 -16) reported by Murray, Johnson and Conger, et al., (2009). It is important to note that under-reporting of IODs may also contribute to these findings being within acceptable limits. Further studies could attempt to provide more meaningful information in this regard.

5.2 TYPE OF INJURIES

The types of injuries reported included : cuts (13, 8.6%), falls (30, 20%), minor injuries (14, 9%), NSIs (75, 50%), patient-related injuries (2, 1%) and splash incidents (18, 12%) which were overall much lower than a previous study conducted in Iraq where the reported prevalence for percutaneous NSI was 74%, and splash incidents were 17% whereas were 9% injuries were ‘not documented or not reported’ (Murray, et al., 2009).

There was a significant association between staff category and type of IOD (Chi-square test, $p < 0.0001$). More doctors and nurses experienced NSIs. Since this category of staff is mainly engaged with clinical activities involved in direct patient care, it is understandable that they will present more often with

this type of injury. Studies have indicated that doctors and nurses are more prone to IOD due to the nature of their work (Nagao, et al., 2009). Of 136 employees sustaining IOD requiring PEP, 87 (64.0%) were surgeons, and 49 (36.0%) were scrub nurses. Surgeons were most commonly injured during suturing activities (49, 56%), followed by “handing over sharps” (7, 8%), whereas scrub nurses were most commonly injured during “counting and sorting of sharps” (15, 41%), followed by “handing over sharps,” and “splash.” Their study revealed that compliance with goggles, face shields, and double gloving was poor, and only 9% of respondents routinely used the hands-free technique. Falls were more common among Administration, Support and Professional staff. These categories of staff are usually more mobile in these environments which may explain these findings. According to the study by Hasanat, in Poland (2003), cleaners were found to be at an elevated risk of all injury categories compared with health care workers in general. This is understandable since this category of employees come into close contact with all forms of physical and biological hazards.

In terms of place of injury and type of injuries, Casualty (n=23, 77%) and the wards (n=33, 60%) reported the most NSIs. This can be explained by the nature of activities in this department where HCWs are usually engaged in activities, which are fast paced and invasive. The wards, and ICU & theatre reported all types of injuries. The only type of injury not reported from the support areas were those that were considered ‘patient-related’. This is an important finding in terms of future targeted intervention strategies.

There was a significant association between types of injuries and body parts (Chi-square test, $p < 0.0001$) (Table 4.4). Cut and NSIs were more common in hands. This is understandable since procedures are performed in close proximity with the medical devices and the patients. History of falls was more commonly associated with the body part classified as ‘legs’. This can be explained by the slips and falls encountered whilst being mobile within the hospital environment. The administrative staff members and support staff were prone to falls whilst utilising stairways to and from their offices. Support

staff usually fell whilst lifting objects or pushing trolleys.
Most falls from the administrative staff was due to slippery floors and most falls by professionals was due to the nature of work where they have to support the patient.

Cross et al. (2007) classified hospital staff in respect of exposure to biological hazards into three categories, based on shift work, frequency of handling of hollow-bore needles, and frequency of handling of tubes and drains. The categories were based on Latent Class Analysis (LCA): exposed, near exposed and unexposed. Characteristics of the “exposed class” included relatively high probabilities of exposure to NSIs, cuts with sharp objects, and splashes to eyes or mouth, and relatively low probabilities of near miss items. This study found a higher incidence of NSIs and splash incidents, which were more common amongst doctors and nurses, who can be classified as the ‘exposed group.

There was a significant association between type of IOD and activities prior to IOD (Chi-square test, $p < 0.01$). The history of fall is commonest among staff who were involved with administrative duties and non-clinical duties prior to the IOD. NSIs and splash incidents were common with staff engaged in clinical duties prior to IOD occurrence. Type of work may also contribute towards IOD. For example, in operating theatres, Nagao et al. (2009) found that surgeons were more exposed to injuries than scrub nurses which is consistent with this study which demonstrated that NSIs were most common amongst the doctors (39, 52%).

5.3 TIME OF INJURIES

There was a significant association between type of injury and duty shift (Chi-square test, $p<0.05$). The probability of NSI was high at night. This may be due to more emergency cases being attended during the night when ‘skeleton staff’ operate resulting in increased workload and fatigue. The history of falls were more common during the day, when the majority of staff were on-duty

and moving about the facilities.

5.4 SOCIO- DEMOGRAPHIC PROFILE OF PATIENTS

There was a significant association between the different types of IOD and age. The staff with a history of falls were significantly older (median = 43) whereas splash incidents were more common amongst younger staff (median = 28.5). Other professionals who were exposed to IOD included the cleaning staff. Although studies on this group of employees have reported higher rates of morbidity and a higher level of disability pensioning (Buchan,2000) and (Hasanat and Lamgur, 2003), related to multiple ergonomic and chemical hazards, this was not demonstrated in this study. This may be due to under-reporting or under-diagnoses of related injuries or illnesses.

5.5 CLINICAL MANAGEMENT OF INJURIES ON DUTIES

Counselling was offered to all the patients who sustained NSI, cuts and splash incidents. However, first and second screening was offered to NSI and splash injuries and only first screening was offered to staff who sustained cuts/lacerations. However, the researcher believes, the second counselling should be offered to all the patients who had cut or lacerations, in order to ensure that comprehensive package is given to prevent transmission of infection.

5.6 ASSOCIATED DIRECT COSTS

The total cost for cut, splash and NSI is listed below in Table 4.13. The total cost for PEP during the study period was R74 251 74. NSIs were higher in costing R50,732.56 followed by splash incidents with a cost of R15,104.34 and cuts (R8,414 84). Klerksdorp Hospital incurred the highest costs for PEP of R31,231 34, followed by Potchefstroom Hospital with R23,714 83 and Tshepong Hospital with R19,305 57. No previous study was found in a similar setting. In view of this, the study provides the baseline data, which can be

used by others in a similar setting.

CHAPTER 6
CONCLUSION AND RECOMMENDATIONS

In this chapter, the results obtained from this study were assessed in relation to the aims and objectives of the study, so that appropriate conclusions can be drawn. The limitations of the study were listed. Based on the findings of the study, appropriate recommendations and suggestions for future research were included.

6.1 CONCLUSIONS RELATED TO THE AIMS OF THE STUDY

This was a cross-sectional study that looked at broad issues pertaining to the IOD, related factors (system and individual) and cost of PEP for NSI, splash incidents and cuts at K/T/P Hospital complex during a period of 27 months.

6.1.1 DESCRIPTION OF THE IOD SUSTAINED BY EMPLOYEES

This is probably the first study conducted at the hospital complex in South Africa. The study found that NSIs (49%) were the most common IOD followed by falls (20%), splash events (12%), minor injuries (9.%) and, patient- related injuries (1%). Although the prevalence of NSIs and splash injuries were lower than the previously reported studies, the relatively high proportion of NSIs raises concern and would require further prospective studies to understand this further.

6.1.2 DESCRIPTION OF THE PROFILE OF EMPLOYEES

This study clearly indicated that nurses and doctors were more prone to NSIs than any other category due to the nature of their work. It is important to recognise that skill and competence of staff will impact on this type injuries. In addition, appropriate training needs to be developed for this category of staff and should also be addressed in the curriculum of academic colleges. Falls

were more common among administrative staff and professionals who are generally more mobile in the course of their working activities in the hospital . Most of these employees fell whilst using the stairways to go to various departments within the hospital. Perhaps there are possible design elements related to the stairs that need to be looked at in this regard to reduce these events from re-occurring. Lifting of patients and wheeling them were the main reason why professionals fell. This will need to be address with specific training and orientation programmes for these employees to ensure that safer work techniques are used.

6.1.3 ESTIMATION OF THE COSTS OF PEP FOR REPORTED NSIs, SPLASHES AND LACERATIONS

The total cost for PEP was R74 251 74. NSIs reflected the highest cost followed by splashes and cuts. The costs varied among the three hospitals the highest was in the Klerksdorp Hospital and the lowest was in the Tshepong Hospital. This is probably due to more staff allocated due to the nature of services (both secondary and partially tertiary services) rendered in Klerksdorp hospital, it is also a referring hospital for the province of North West.

6.2 POSSIBLE LIMITATIONS OF THE STUDY

The major limitations of the study was poor quality of data and recording. There was missing information in some files. Some documents did not correlate with each other, for example, records from the risk register and staff records.

6.3 RECOMMENDATIONS

The recommendations made below were based on the findings from this study as well as from the Hospital staff. The analysis of the data also revealed some areas that need to be evaluated and recommendations were made based on

the results of this study. Recommendations for further or more in depth research were also highlighted. Hospital policies and guidelines for disposals of sharps and biological hazards, as well as cultures, play an important role in the reduction of IOD (Saint et al. 2009). However, availability of these policies and guidelines does not necessarily imply adherence to correct practice. For example, Hasanat et al. (2008) reported a significant association between inappropriate disposal of sharps and IOD.

Other local factors may be important in a particular hospital. It is therefore important to systematically study routinely collected information. This might assist in developing appropriate preventative measures to reduce occupational injuries by providing education, mentoring, and competency training for HCWs.

A risk assessment should be conducted on the common pathways and stairways used by HCWs to identify possible hazards and prevent further falls by employees. In addition, an ergonomic assessment should be conducted with professional lifting and moving patients with wheelchairs to reduce further risk in this regard.

A low prevalence of IODs found in this study was of probably due to under-reporting of such injuries in terms of the North West Department of Health 'Policy on injuries on Duty. Emphasis should be placed in public hospitals to improve adherence to this policy. Data for IODs must be accurate to give a clear reflection of the study. Continuous training and development must be undertaken and the emphasis on the use of protective clothing such as goggles, face shields and double gloving. In addition, there should be customised programs to prevent, track, and implement PEP holistically in these hospitals.

6.3.1 FOLLOW UP

Follow up on the study on the cost of other types of injuries should be done in

order to estimate the overall total costs of all IODs.

6.3.2 FUTURE RESEARCH

The researcher would like to propose the following studies based on the findings of the study:

- That another study is undertaken on IODs, which will entail the analysis of other injuries and their financial implications.
- There should be further risk-related research to fully comprehend the hazards that maybe contributing to specific injuries.

6.4 SUMMARY AND CONCLUSIONS

This is the first study that looked at broad issues related to the IODs, related factors (system and individual) and, cost of clinical management of NSIs, lacerations and splash incidents at K/T/P Hospital complex in the North West Province and probably in South Africa.

The NSIs and splash injuries were high for the study period probably due to the nature of service rendered in acute hospitals. Significant number of these injuries were at casualty reported by clinicians and nurses. This study clearly indicated that nurses and doctors are more prone to NSIs than any other category of staff due to the nature of their work. Falls were more common among administrative staff who experienced injuries whilst moving about the hospital and professionals who sustained injuries whilst moving patients..

Therefore, the annual prevalence rate was 2.3% (Klerksdorp-Tshepong Hospital Complex) and 2.8% (Potchefstroom Hospital). With regard to PEP costs, Klerksdorp Hospital incurred the highest costs of R31 231 34, followed by Potchefstroom Hospital with R23 714 83 and Tshepong Hospital with R19 305 57 during the study period

Emphasis should be placed in public hospitals to improve adherence to the North West Department of Health 'Policy on injuries on Duty to improve reporting and quality of data. Continuous training and development must be undertaken to improve appropriate use of protective clothing. In addition, there should be customised programs to prevent, track, and implement PEP holistically in these hospitals. A detailed risk assessment and ergonomic assessment should be conducted to identify possible hazards and prevent further falls by employees.

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APPENDICES

APPENDIX A

ETHICS CLEARANCE CERTIFICATE AND LETTERS OF PERMISSION

Faculty of Health Sciences
Medical School, 7 York Road, Parktown, 2193
Fax: (011) 717-2119
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Reference: Ms Tania van Leeve
E-mail: tania.vanleeve@.wits.ac.za
12July 2010
Person No: 331516
PAG

Mrs GT Tlhapi
133 Kock Street
Potchefstroom
2520
South Africa

Dear Mrs Tlhapi

Master of Public Health (Hospital Management): Approval of Title

We have pleasure in advising that your proposal entitled "*Injuries on duty at Klerskdorp/Tshepong/Potschefstroom Hospital Complex*" has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Ms Gloria T Tlhapi

CLEARANCE CERTIFICATE	**M10638**
PROJECT	Injuries on Duty at Klerksdorp/Tshepong/ Potchefstroom Hospital Complex
INVESTIGATORS	Ms Gloria T Tlhapi.
DEPARTMENT	School of Public Health
DATE CONSIDERED	25/06/2010
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 28/06/2010 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Dr M Govender

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

APPENDIX B

DATA COLLECTION SHEET

TOOL 1: DESCRIPTION OF IOD's

Study no.	Date of IOD	Time of IOD	Type of IOD	Affected body part	Place of IOD	Activity prior to IOD	Employee category	Age (yrs)	Ethnicity	Gender (M/F)	Shift (Day/Night)

TOOL 2: Cost Estimate of POST EXPOSURE PROPHYLAXIS (PEP)

Study number	Procedure1 (Counselling) Yes /No	Procedure2 (Baseline Screening test)	Procedure3 (2nd screening Test)	Drugs (ARV)	Total Cost per patient

Unit cost of Counselling session = _____

Unit cost of Baseline screening test = _____

Unit cost of 2nd screening test = _____

Total cost of PEP = Unit cost x quantity