

https://dspace.org/

Needlestick injuries at Kimberley Hospital Complex

Loots, Johanna Jacoba Maria

2012-07-10
http://hdl.handle.net/10539/11652

Downloaded from a DSpace repository. https://dspace.org/

NEEDLESTICK INJURIES AT KIMBERLEY HOSPITAL COMPLEX

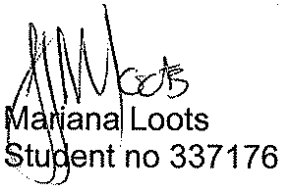
Johanna Jacoba Maria Loots

A RESEARCH REPORT SUBMITTED TO THE FACULTY OF HEALTH SCIENCES, UNIVERSITY OF THE WITWATERSRAND, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTERS OF PUBLIC HEALTH

JOHANNESBURG 2011

DECLARATION

I, JOHANNA JACOBA MARIA LOOTS declare that this research report is my own work. It is being submitted for the degree of Master of Public Health (Hospital Management) at the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or for any examination at this or any other university.



Mariana Loots
Student no 337176

September 2011

DEDICATION

I dedicate this study to the people who supported me:

My parents husband and kids.

Also to the Lord who gave me strength to continue: Praise His Name

ABSTRACT

Needlestick Injuries (NSI) that occur at Kimberley Hospital Complex (KHC) are reported by various categories of staff ranging from general workers to managers. They are regarded as medico-legal events and are classified as specific adverse events (AE). An AE is defined as any unexpected, unintended, unwanted event or circumstance that could have or did lead to unintended or unexpected harm, loss or damage.

Although there were regular meetings related to NSI, there has been no systematic analysis of applicable data related to employees at KHC. The aim of this study was therefore to describe the NSI at KHC over a 1 year period (1 Jan 2009 – 31 Dec 2009) in order to obtain baseline information which will contribute towards improved planning of targeted preventive strategies in this setting.

Methodology: A descriptive cross-sectional study was undertaken. This involved a retrospective review of selected hospital records relating to NSI reported by employees during this study period. No primary data was collected.

Results: A total of 32 employees reported NSI during the study period. The prevalence of NSI was 2% of overall staff compliment. The highest reported prevalence was amongst the doctors (13, 10.4%) and the lowest amongst the general assistants (5, 0.6%). The majority of NSIs occurred during the recapping activity (20, 62.5%), was reported by female employees (27, 84.4%), took place mainly during normal working hours (23, 72%), and were mostly located within the Internal Medicine Department (10, 31.3%). About a third of the employees who reported NSIs were between 26 to 35 years (31%). The total treatment costs including drugs and vaccines provided during the study period were R 13 509.12, and the total laboratory test costs were R20 978.24**.** Overall the costs for drugs, vaccines and laboratory tests that made up the post-exposure measures amounted to R34 487.36.

Results from this study suggest that reporting of NSI and other adverse events involving employees should be handled separately from those of patients. It is also important to profile the diverse employees that maybe at risk for this specific exposure and ensure that they are provided with the necessary training in this regard.There is a need to strengthen the relationship between the Quality Assurance Unit and the Wellness Clinic in order to optimize utilization of data regarding reported NSIs. Strategies to prevent NSIs should consider training on a regular basis and supervisors should work more closely with safety representatives in preventing NSIs.

ACKNOWLEDGEMENT

I hereby acknowledge the Department of Health Northern Cape for the opportunity to conduct the study and the management and staff at Kimberley Hospital complex who supported me during this period. My Supervisor Dr M Govender for the professional way of support to complete the study.

TABLE OF CONTENT

DECLARATION ii
DEDICATION iii
ACKNOWLEDGEMENT vi
TABLE OF CONTENT vi
LIST OF FIGURES ix
LIST OF TABLES ix
GLOSSARY OF TERMS x
LIST OF ABBREVIATIONS xii
CHAPTER 1 1
INTRODUCTION 1
1.1 BACKGROUND 1
1.2 PROBLEM STATEMENT 2
1.3 JUSTIFICATION OF THE STUDY 3
1.4 RESEARCH QUESTION 3
1.5 STUDY OBJECTIVES 4
1.5.1 BROAD OBJECTIVE 4
1.5.2 SPECIFIC OBJECTIVES 4
1.6 SUBSEQUENT CHAPTERS 4
CHAPTER 2 6
LITERATURE REVIEW 6
2.1 NEEDLESTICK INJURIES IN A HOSPITAL SETTING 6
2.2 PROFILE OF EMPLOYEES 8
2.3 COST IMPLICATIONS 10
2.4 REPORTING OF NSI 11
CHAPTER 3 14
METHODOLOGY 14
3.1 STUDY DESIGN 14
3.2 STUDY SETTING 14
3.3 STUDY POPULATION AND SAMPLE 14

3.4 DATA MANAGEMENT 15
3.4.1 VARIABLES 15
3.4.2 DATA COLLECTION 16
3.4.3 DATA ANALYSIS 16
3.5 PILOT STUDY 17
3.6 ETHICAL CONSIDERATIONS 17
CHAPTER 4 18
RESULTS 18
4.1 STUDY POPULATION 18
4.2 NEEDLESTICK INJURIES 19
4.3 PROFILE OF EMPLOYEES 21
4.4 FINANCIAL IMPLICATIONS 27
4.5 ADHERENCE TO THE REPORTING POLICY 28
CHAPTER 5 29
DISCUSSION 29
CHAPTER 6 36
CONCLUSIONS AND RECOMMENDATIONS 36
6.1 CONCLUSIONS 36
6.2 LIMITATIONS OF THE STUDY 39
6.3 RECOMMENDATIONS 40
6.3.1 APPLICABILITY 40
6.3.2 FURTHER RESEARCH 40
6.4 SUMMARY AND CONCLUSION 41
REFERENCES 42
APPENDICES 47
APPENDIX A: ETHICS CLEARANCE CERTIFICATE, LETTER OF PERMISSION FROM NORTHERN CAPE AND POSTGRADUATE COMMITTEE 47
APPENDIX B: DATA COLLECTION TOOLS 48

LIST OF FIGURES

Figure 1.1 Northern Cape Province 2
Figure 2.1 Diagram of the reporting process of an AE (includes NSI)..... 12
Figure 4.1 Age distribution of subjects (n= 32)..... 23
Figure 4.2 Gender distribution of Employees (n= 32) 24
Figure 4.3 Ethnicity distribution of subjects (n= 32) 25
Figure 4.4 Years of experience of subjects (n= 32) 26

LIST OF TABLES

Table 3.1 List of variables and tools..... 15
Table 3.2 Data source..... 16
Table 4.1 Study population (n=32)..... 18
Table 4.2 List of needle stick injuries (n= 32)..... 19
Table 4.3 Days of needle stick injuries (n= 32) 20
Table 4.4 Location of Injuries (n= 32) 21
Table 4.5 Study population (n=32)..... 22
Table 4.6 Age distribution (n=32)..... 22
Table 4.8 Gender distribution (n=32) 24
Table 4.8 Ethnicity of the employees (n=32)..... 25
Table 4.9 Years of experience (n=32)..... 26
Table 4.10 Financial implications of providing PEM..... 27
Table 4.11 Adverse Event Committee Meetings..... 28

GLOSSARY OF TERMS

Adverse Event: This is an unexpected, unintended, unwanted event or circumstance that could have or did lead to unintended or unexpected harm, loss or damage. It includes all possible medic-legal events and refers to near misses, accidents and injuries on duty. (Kimberley Hospital Complex Adverse Event Policy Document)

Adverse Event Management Committee: Medical Director (Chairperson), Occupational Medical Practitioner, Manager: Clinical Support Services, Manager: Clinical Services of Kimberley Hospital Complex, Manager: Quality Assurance and Patient Services, Manager: Facilities. Manager: Technical services. Head of Labour Relations, Compliance officer, Representative of Health and Safety Committee, Secretariat from Quality Assurance and Patient services. Their role is of a consultative nature in which to deal with adverse events. The functions of the committee include the discussion of Ethics dilemmas such as patient care issues, personnel issues and informed consent. A management tool to investigate, discuss, manage adverse events that happen in the complex, giving advice to management and to guide, educate, train and inform health care workers in their actions. The committee meets once a month and provides reports and data for discussion.

COIDA: (Compensation for Occupational injuries and diseases Act) is the legal framework for injuries, disablement, disease and death caused by work-related activities (occupational disease and accidents)

Injury on duty: An injury following an “accident arising out of and in the course of an employee’ s employment .” (COIDA, Act 130 of 1993)

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)

Post-exposure Prophylaxis: This refers to the anti-retroviral drugs provided to employees after a needlestick injury to reduce the risk of HIV transmission.

Post-exposure Measures: This refers to the anti-retroviral drugs, the Hepatitis vaccine, Tetanus vaccine and serological tests offered in the management of a NSI.

Sentinel event: A sentinel event is an unexpected occurrence involving death or serious physical or psychological injury and includes any process variation for which a recurrence would carry a significant chance of a serious adverse outcome e.g. Anesthetic death, patient suicide in hospital, retained instruments, infants given to wrong parents, wrong medication or dosage given with catastrophic affects, etc. (Kimberley Hospital Complex Adverse Event Policy Document)

LIST OF ABBREVIATIONS

AE	Adverse Event
AEMC	Adverse event management committee
IOD	Injury on duty
KHC	Kimberly Hospital Complex
COIDA	Compensation for Occupational Injuries and Diseases Act, 1993
CEO	Chief Executive Officer
NSI	Needlestick injury
MD	Medical Director
PEM	Post-exposure Measures
PEP	Post-exposure Prophylaxis

CHAPTER 1
INTRODUCTION

The purpose of this study was to report on needlestick injuries (NSI) at a regional hospital in the Northern Cape Province in order to plan appropriate preventive strategies and interventions. This introductory chapter covers the background to the study, statement of the problem, its aims and objectives and an outline of subsequent chapters.

1.1 BACKGROUND

NSI experienced at Kimberley Hospital Complex (KHC) are regarded as medico-legal events and are classed as adverse events (AE) which are defined as any unexpected, unintended, unwanted event or circumstance that could have or did lead to unintended or unexpected harm, loss or damage. These specific events are reported according to the KHC AE Reporting System for employees by various categories of staff ranging from general workers to managers. The relevant NSI policy indicates a clear guideline on the definition of NSI, the reporting procedures applicable to employees and supervisors, as well as timeframes for reporting to management.

KHC has a mandatory AE reporting system for patients and employees. The NSI are compiled, summarised and forwarded to the Chief Executive Officer on a weekly basis. The AE Clinical Complaints Review Committee has a monthly meeting to discuss all of these events.

KHC is a Regional hospital in Northern Cape. The hospital caters for level one, two and three patients and includes West End Psychiatry unit and Harmony Home Rehabilitation unit. The KHC has 809 beds and 3 operating theatres. The establishment consisted of 1698. employees.

Although there are regular meetings related to NSI, there has been no systematic analysis of applicable data related to employees at KHC. The aim of this study was therefore to describe the NSI at KHC over a 1 year period (1 January 2009 until 31 December 2009), in order to plan appropriate preventive strategies and interventions.



Figure 1.1 Northern Cape Province

1.2 PROBLEM STATEMENT

NSI have a significant negative impact on service delivery, system productivity and performance, and the personal life of employees. These repetitive costly events which are reported throughout the year can be prevented by better planning of targeted intervention strategies.

1.3 JUSTIFICATION OF THE STUDY

Employers have a legal and ethical obligation to provide a safe environment to every employee so that they are able to render an optimal service at the institution. NSI represent an exposure risk problem for employees which need to be addressed to ensure safer working environments. In this regard, routinely collected hospital data can be used to provide valuable insight into this problem.

It was important to understand and describe the NSI occurring periodically at the institution in order to develop appropriate prevention strategies e.g., training and skills development. Describing the profile of employees who sustained NSI can assist with providing information to target the particular groups of employees and thereby customising e the preventive and more cost-effective strategies.

More importantly, although there are regular meetings related to AEs, there was no systematic analysis of specific NSI data related to employees at KHC. It was the intention of this study to provide useful information regarding the NSI experienced by KHC employees and add value in the planning of targeted preventive strategies in this regard.

1.4 RESEARCH QUESTION

What is the impact of NSIs and related factors at KHC for the period of 1 January 2009 until 31 December 2009?

1.5 STUDY OBJECTIVES

1.5.1 BROAD OBJECTIVE

The overall aim of this study was to describe the impact of NSI and related factors at KHC for the period of 1 January 2009 until 31 December 2009, in order to plan appropriate preventive strategies and interventions.

1.5.2 SPECIFIC OBJECTIVES

1. To describe the NSI (types, date, time and location of injuries) reported by employees at KHC during the study period.
2. To describe the profile (demographic and work profile) of employees who experienced NSI during the study period.
3. To determine the financial implications of NSI for the institution.
4. To determine if these employees adhere to the reporting policy by reporting NSI appropriately and timelessly at KHC during the study period.

1.6 SUBSEQUENT CHAPTERS

The background to the research has been discussed and objectives defined in this first chapter. The following chapters are:

Chapter Two: Literature Review

The purpose of the literature review is to explain and discuss concepts related to the research and to search for solutions to the research problem.

Chapter Three: Research Methodology

The chapter describes the research methodology, methods and techniques used in this study.

Chapter Four: Presentation of Results

This chapter deals with an analysis of the findings and the study relating to its aims and objectives.

Chapter Five: Discussion

The findings from the review of the literature are integrated 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 final chapter of the report and draws conclusions from the research related to the aims of the study, makes recommendations and suggests areas for future research in the field of employee injuries in District Hospitals in the Department of Health in the Northern Cape Province.

CHAPTER 2
LITERATURE REVIEW

In this chapter, relevant reports based on needlestick injuries and various factors that might influence the occurrence of these injuries are discussed. In addition to published literature, information from various unpublished sources were also reviewed.

2.1 NEEDLE STICK INJURIES IN THE HOSPITAL SETTING

NSI are classified as specific AEs which, according to the World Health Organization definition is an injury related to medical management, in contrast to complications of a disease. This includes all aspects of care, including diagnosis and treatment, failure to diagnose or treat, and the systems and equipment used to deliver care. AEs may be preventable or non-preventable (WHO, 2005).

It is . These situations are also relevant in the hospital setting.

NSI happen in every hospital in the world. There is a general sense in the United Kingdom that safe management techniques used in other industries should be implemented in health. It is also acknowledged by researchers in the field that multiple factors that relate to latent conditions which may include managerial influences and social pressures do contribute to system failures. In addition, an employees' attitude, perception, competencies and patterns of behavior has also been shown to reflect management commitment to safety (Flin, Burns, Mearns, et al., 2006; Flin, Yule, McKenzie, et al., 2006). In two of Germany's hospitals alone half a million Health care workers were known to report NSI per annum. These events mainly occurred during disposal of used syringes and recapping (Hoffmann, Kralj, and Beie, 2002). Another study done in Germany indicated that

implementation of safety devices could lead to an improvement in medical staff's health and safety (Wicker, Jung, Allwin, et al., 2007).

Other studies also reveal that up to 75% of NSI are preventable and that more focus should be on prevention, which includes training (Sari, Sheldon, Cracknell, et al. 2007). In a study done in Nigeria, (Adegboye, Moss, Soyinka et al. 1994) reported that only 43% employees had access to gloves. They believed low cost interventions like the availability of gloves could be implemented in Nigeria as part of prevention of NSI.

In Saudi Arabia it was discovered that employees are not aware of the importance of post-exposure prophylaxis (PEP). According to published literature, NSI go undocumented in many developing countries (Maqbool, 2002).

According to Adesunkanmi, Badmus, Ogunlusi (2003) and van Wijk, Schneeberger, Heimeriks, et . (2009), occupational blood exposure accidents are the most common. An indication is also that these high risk accidents occur mainly in hospitals. The main cause for NSI reported was the manner in which sharps were handled. Areas affected according to these studies were the operating theatre and intensive care units where personnel sustained about 10% of the total injuries reported at an institution. A study done by Tabak, Shiaabana, ShaSha (2006) indicated that nursing staff experienced the highest rate, while doctors had the lowest. In a study done in Uganda only 18% of nurses and midwifes did not experience NSI in their entire career (Nsubuga and Jaakkola, 2005).

In United Kingdom, a study by Paton (2007) reported an increase of 49% to occupational exposures. The majority of injuries were caused by failure to comply with procedures for safe handling and disposal of sharps and clinical waste. These employees had retractable needles available and most of the injuries were preventable.

2.2 PROFILE OF EMPLOYEES EXPERIENCING NEEDLESTICK INJURIES

Health care is a demanding and challenging vocation. It is reported that an employees' performance can be affected by long working hours (Wright, Phillips-Bute, Mark, et al (2006). Dembe reported that fatigue may play a role in the occurrence of NSI. This is especially important either early in the morning when the nightshift employees are completing their duties or, late afternoon with completion of duties by day shift employees (Dembe, Delbos, and Erickson, 2009).

Rowin and colleagues established that nursing staff reported 45.3%, whilst other hospital employees reported 53.6% and physicians only 1.1%. They also found that student nurses claimed that they were not eager to report AEs because they were anxious of the possible laboratory results and were afraid of subsequent punitive action (Rowin, Lucien, Panker, et al, 2008).

A study done in United States indicated that little research was done on student nurses and their profile (Blackwell, Bolding, Cheely, et al, 2008). It seems that nursing students specifically do not report AEs because of feelings of fear, insecurity and low self-esteem. The study by Tabak, et al. (2006) highlights the fact that doctors often do not comply with reporting AEs and that they tend to report the least stating this activity was time consuming. This finding indicates that doctors should be made aware of the consequences for future healthcare planning and the importance of preventive measures. Although this study is not about the beliefs of hospital staff and the influence on reporting, the study will give an indication of the profile of employees who experience the highest rate of NSI and provide valuable information to target appropriate preventive strategies.

A study done by Dembe, Erickson, Delbos, et al., (2005) indicated that extended working hours may cause fatigue and increased risk of experiencing an occupational injury or illness. Other factors highlighted by Tibby, Correa-West,

Durward, et al. (2004) were the workload, skill mix and supervision related to work activities.

Workload and lack of supervision may also contribute to occurrence of AEs. The employee with a heavy workload, or who is working in a stressed area without the necessary supervision will more easily present with NSI (Dembe, et al., 2005). It was also reported that clinical staff are more anxious when they are aware of patients who are carriers of blood borne pathogens. This related anxiety may further contribute to NSI (Wilburn, Wilburn and Eijkenmans, 2004).

In addition, Tibby et al. (2004) reported on the years of experience of employees as well as the effect of workload as indicated by the bed occupancy rate. These were indicated as possible risk factors for NSI. As patients and the workload increase, a risky situation for NSI may occur (Tibby, et al. 2004). A study in Nigeria demonstrated significant findings that surgeons that conduct long operations (more than one hour) were more likely to get NSI. The same study demonstrated the possibility that clinical employees will sustain a NSI is 27% for one year (Adegboye, Moss, Soyinka, et al., 1994).

In England, a 10 year study conducted by Jagger, Hunt, Brand-Elnaggar, et al. (1998) reported that 35% of employees sustained NSI from disposable syringes, of which one third were recapping related. The study by Adesunkanmi, Badmus, Ogunlusi (2003) indicated that left hand injuries were more dominant and represented 63% of total hand injuries reported.

2.3 COST IMPLICATIONS

A study by Lee, Botteman, Xanthakos, et al (2005) indicated that the economic cost of managing NSI are substantial. In United States, it ranged from 51 to 3766 dollars in 2002. This amount did not include the costs for the complications of NSIs.

According to Solano, Hernández, Montes, et al (2005), the main cost driver for NSI are serological tests and post-exposure prophylaxis (PEP). They found an average cost of preventative treatment of these injuries to be were €388, should the employer not provided the immunization the cost would have been €666. Another study in United States conducted in 2003 indicated a cost escalation of between $ 71 and $4 838 depending on the type of severity and exposure source of infection status of an employee. The three main pathogens of concerned were Hepatitis B virus, Hepatitis C virus and human immunodeficiency virus. This included the different protocols implemented, and an annual increase of inflation cost, should no intervention take place (O'Malley, Scott, Gayle, et al, 2007). The main message was to put preventative measures in place and curb financial expenditure.

In Sweden, the cost per reported NSI is estimated at € 272. This country has one of the lowest incidents in Europe and United States as a result of thorough investigations and treatment procedures (Glenngard and Persson, 2009).

In France, at a University hospital, Nidegger, Castel, Peltier (2004) estimated the cost implications for occupational exposures for blood at €68 310 for 243 employees. This study emphasized the hidden costs, laboratory costs, leave of employees and PEP. In KwaZulu Natal, a study on NSI estimated the cost per NSI to be R2 612 (PATH, 2007).

2.4 REPORTING OF NEEDLESTICK INJURIES

KHC has a mandatory AE reporting system for patients and employees. This type of reporting system is claimed to be more effective when compared to voluntary reporting systems as reported in studies in US hospitals (Nuckols, Bell, Lui, et al., 2007).

It is reported that in Uganda the employees do not report needle stick injuries because of stigmatisation and the fear of their HIV status being disclosed (Alenyo, Fualal, Jombwe, 2009). The reporting system of NSI differs from country to country. The developed countries like United States and United Kingdom have electronic systems to report all NSI.

Diagram 2.1 illustrates the reporting process for AEs, which includes reporting of NSIs as stipulated in the policy document of KHC.

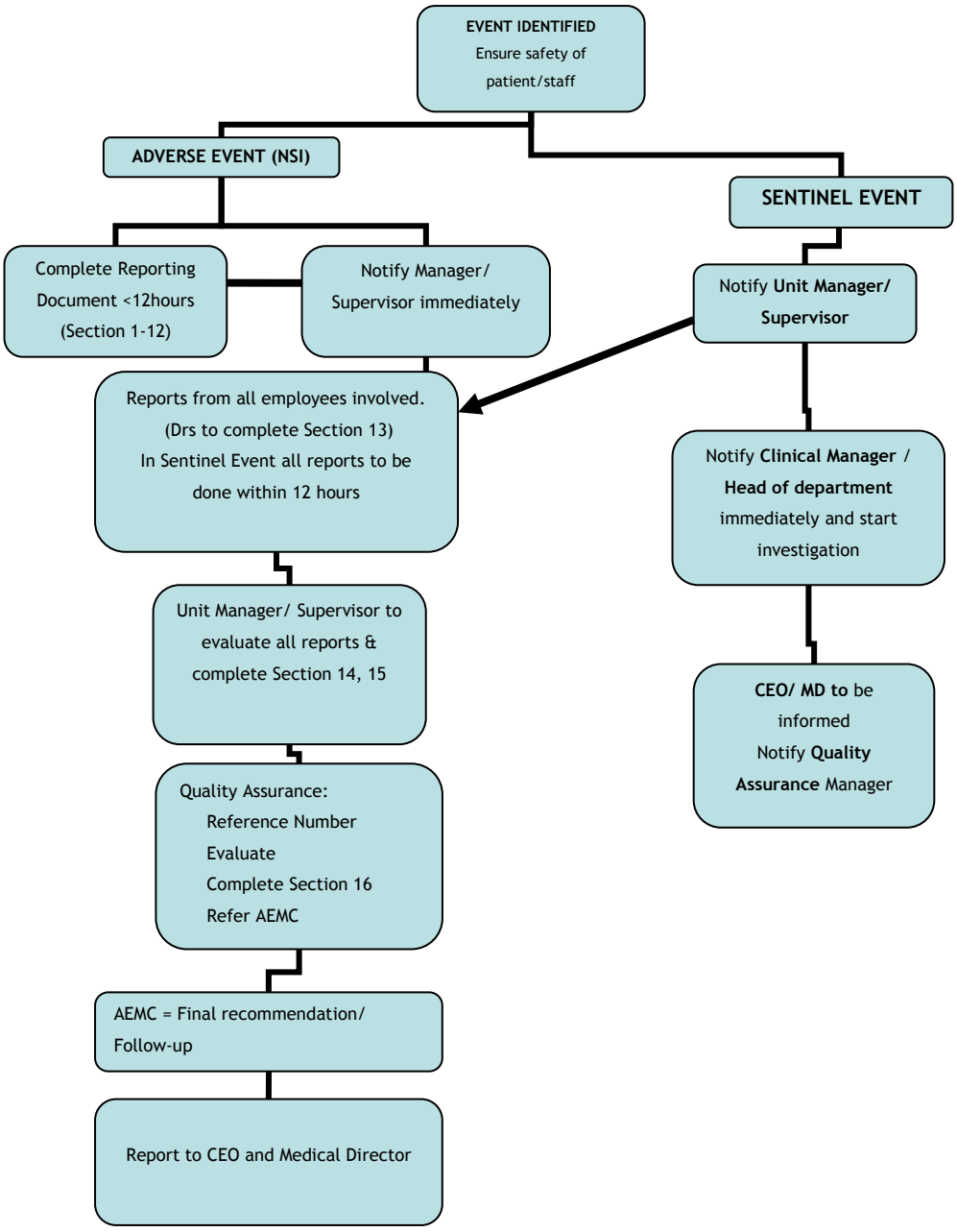


Figure 2.1 Diagram of the reporting process of an AE (includes NSI)

A reporting document, KH1219, must be complete within 12 hours after the incident.

Section 1 – 12, as indicated in the diagram, include general information:

- Section 1: incident information, how, when and where did it happened as well as was the incident reported
- Section 2: Personal information
- Section 3/4/5: Described the condition of involved person before incident
- Section 6: Specific focus on patient in hospital, secure the safety of patient
- Section 7: Equipment used to assist patient during stay in hospital.
- Section 8: What causes incident, why and what happened
- Section 9: Explain which part of the body was affected
- Section 10: Any observation of injuries
- Section 11: Report from employees involved in Adverse event
- Section 12: Categorize incident type by a tick as indicated on the form
- Section 13: Indicate injuries of patient from report of doctor
- Section14: Comments by supervisor after evaluation of the report provided.
- Section 15: Comments by Assistant Manager after evaluation of the report provided on a specific Adverse Event.
- Section 16: Comments by Manager of Quality Assurance which combine the reports and comments of everybody on the specific Adverse Event.

CHAPTER 3
METHODOLOGY

The methodology for this study was selected on the basis of its aims and objectives. In this chapter the following were discussed: setting, scope, study design and research tools.

3.1 STUDY DESIGN

The study was a descriptive cross-sectional study based on retrospective record review of hospital records, adverse event registers and Quality Assurance unit records for the period from 1 January 2009 until 31 December 2009.

3.2 STUDY SETTING

The study setting was the Kimberley Hospital Complex in the Northern Cape Province. This Hospital caters for health care needs for level one, two and limited level three health care.

Only the adverse event records of the employees who were on the establishment, reported NSI during the study period and supporting managerial documents (policy, procedures, forms and meetings) were reviewed.

3.3 STUDY POPULATION AND SAMPLE

The study population consisted of employees of KHC who reported NSI during the study period of 1 January 2009 to 31 December 2009. In addition, the records of all employees who reported these NSI and were treated at the Wellness centre for the same period were also reviewed. The approximate

number of files at the clinic and Accident and Emergency unit were about 200. As all relevant records were reviewed, no sampling was done.

3.4 DATA MANAGEMENT

3.4.1 VARIABLES

The following variables were used for the study. The type of NSI refer to the different ways of sustaining NSI.

Table 3.1 List of variables and tools

Variables	Indicator	Description / Coding
Type of NSI, Date of NSI, Time of NSI, Location of NSI, Injury status, Injury location	Number of NSI reported per category, Number of NSIs reported during night, day and weekends	Categorical variable Discrete Time NSI reported 1: day report 2: night report 3: weekend report Location of NSI : 1 – Ward 2 – Sluice room 3 – Bathroom
Employee category, Employee department, Age, Gender, Ethnicity, Years employed	Percentage of staff reporting NSI per employee category/gender/ race	Categorical variable: Nominal for categories: sex/ethnicity :Nominal for employee category 1 - Prof Nurse 2 – Enrolled nurse 3 – Nursing Assistant 4– General worker 5 – Doctor Numerical variable: Continuous: years employed
Reporting status Date of meeting, Name of meeting, Attendance	Number of meetings	Number of actions taken after NSI

3.4.2 DATA COLLECTION

Data was captured in MS Excel based data collection tools (Annexure A) and was checked to eliminate errors. Then it was analysed using Epi Info version 3.4.1. The data of the employees who sustained NSIs were collected by the researcher. Some of the data was available electronically. The researcher was the only person who collected and analysed the data.

The report of an accident is captured in the Compensation of Occupational Injuries and Disease Act (COIDA) 1993, [W.CL. 2(E)] form. The other sources included the register and meeting minutes of the institution as reflected in table 3.2 below.

Table 3.2 Data source

Objectives	Data source
1	Employer's report of an accident [W.CL. 2(E)] form AE register
2	AE form
3	Meeting minutes

The researcher personally captured the coded data onto a computer and double checked the data. MS-excel software was used and descriptive statistics were applied to analyse the data. Counts and proportions were used to measure categorical variables and measures of central tendencies used for continuous variables.

3.4.3 DATA ANALYSIS

The data from these sources was exported to the MS Excel based spread sheet designed for this study. Data from missing records was entered manually from the employees' files. Discrete numerical variables were used to give an indication

of the percentage of NSI's reported during the day, night or over a weekend.
Nominal categorical variables were used to get an indication of the percentage of different employee categories that were affected by NSI's.
Descriptive statistics was calculated and presented as follows:

- Continuous data with normal distribution: Central tendency (Mean) and standard deviation
- Continuous data not normally distributed: Central tendency (Median) and inter-quartile range)
- Categorical data: Proportion and ratios were calculated

Statistical tests were done to determine associations between types of needle stick injuries and specific factors (Date, time, location of NSI and, employee profile). The significance level is 0.05.

3.5 PILOT STUDY

The pilot study was done on twenty files which recorded generic IODs outside the study period to get an indication if the necessary information was available and to check adequacy of the data capture tool.

3.6 ETHICAL CONSIDERATIONS

Permission was obtained from the Head of Department as well as the Hospital CEO to conduct the study. Ethical clearance was sought from Wits University Human Research Ethics Committee (Clearance Certificate No: M10M101170). All the information collected on the data collection sheet was kept confidentially and only group data was reported upon. Codes were used and entered on the data collection sheet instead of employees names. No employees' records or register was removed from the Wellness centre or Accident and Emergency unit. Only the researcher had access to these records during the study period.

CHAPTER 4
RESULTS

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

3.5 STUDY POPULATION

The study population consists of 32 employees who reported NSI during the study period (Table 4.1). The prevalence of NSI was 2% overall, the highest was among the doctors (13, 10.4%) and the lowest amongst the general assistants (5, 0.6%).

Table 4.1 Study population (n=32)

Staff category	Total staff	Staff with NSI	Prevalence
Doctors	125	13	10.4%
Nurses	664	14	2.1%
Professional nurses	338	6	1.8%
Enrolled nurses	56	2	3.6%
Nursing assistants	270	2	0.7%
Student nurses	117	4	3.4%
General assistants	839	5	0.6%
TOTAL	**1628**	**32**	**2%**

3.6 NEEDLE STICK INJURIES

3.6.1 TYPE OF INJURIES

These NSI happened whilst employees performed various duties as listed in Table 4.2. The majority of injuries occurred during the recapping activity (20, 62.5%).

Table 4.2 List of needle stick injuries (n= 32)

Type of injuries	**N (%)**
Recapping needle	20 (62.5%)
Emptying bins	2 (6.3%)
Unblocking drains	1 (3.1%)
Cleaning equipment	1 (3.1%)
Making beds	1 (3.1%)
Removing bed linen	1 (3.1%)
Stitching in operation theatre	1 (3.1%)
Pricked by colleague	1 (3.1%)
Finger prick testing	1 (3.1%)
Putting up an intravenous drip	1 (3.1%)
Total	**32 (100%)**

3.6.2 TIME AND DAY OF INJURIES

The majority of NSI (23, 72%) took place mainly during normal working hours being Monday to Friday (8:00 to 16:00 hours). The remaining injuries (9, 28%) occurred after-hours (Monday to Fridays 16:00 to 8:00 hours and Saturdays, Sundays and public holidays). Overall, a quarter of these NSI (8, 25%) happened after midday. Approximately one eighth of the overall injuries (4, 13%)

occurred during the night, which includes weekends (from 19:00 hours to 7:00 hours).

NSI were reported on every day of the week during the study period (Table 4.3). The majority of injuries happened during Tuesdays (10, 31.3%).and the least on Saturdays (1, 3.1%)

Table 4.3 Days of needle stick injuries (n= 32)

Type of injuries	**N (%)**
Mondays	5 (15.6%)
Tuesdays	10 (31.3%)
Wednesdays	4 (12.5%)
Thursdays	7 (21.9%)
Fridays	2 (6.3%)
Saturdays	1 (3.1%)
Sundays	3 (9.4%)
Total	**32 (100%)**

3.6.3 LOCATION OF INJURIES

The specific area where these injuries occurred is listed in Table 4.4. The majority of the injuries occurred within the Internal Medicine Department (10, 31.3%) and the least in ICU (2, 6.2%).

Table 4.4 Location of Injuries (n= 32)

Location of injuries	**N (%)**
Internal medicine	10 (31.3%)
Surgery	5 (15.6%)
Paediatrics	3 (9.4%)
Obstetrics and Gynecology	3 (9.4%)
Accident and Emergency	3 (9.4%)
Operating Theatre	3 (9.4%)
ICU	2 (6.2%)
Primary Health care Clinics	3 (9.4%)
Total	**32 (100%)**

3.7 PROFILE OF EMPLOYEES WHO HAD NEEDLE STICK INJURIES

3.7.1 PROFESSION OF EMPLOYEES

The total staff establishment indicated that the majority staff is general assistants, followed by nursing staff. The doctors are the smallest number on the establishment.

When there is a comparison of NSI's in the hospital it give another indication. The majority of the staff who sustained injuries were nurses (14, 43.7%) and doctors (13, 40.6%). Amongst the nurses, the professional nurses were more affected (refer Table 4.5).

Table 4.5 Study population (n=32)

Staff category	Staff with needle stick injuries
Doctors	13 (40.6%)
Nurses	14 (43.7%)
Professional nurses	6
Enrolled nurses	2
Nursing assistants	2
Student nurses	4
General assistants	5 (15.7%)
Total	**32 (100%)**

3.7.2 AGE OF EMPLOYEES

The age of the employees is described in Table 4.6. It was not normally distributed (Figure 4.1). The median age was 38.5 years (IQR 23 to 53 years).

Table 4.6 Age distribution (n=32)

Age (in years)	Total (n =32)	Doctors (n=13)	Nurses (n= 14)	General assistants (n= 5)
Median (IQR)	38.5 (26-53)	26 (25-28)	53 (35-58)	41.5 (35-45)
Range	23- 64	23-53	26-64	33-47

The affected nurses were significantly older than the other categories of staff (One way Analysis of Variance, $p< 0.01$)

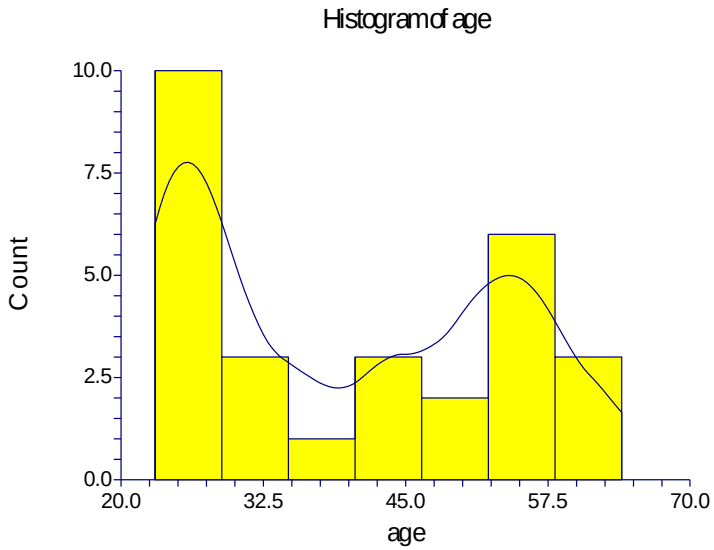


Figure 4.1 Age distribution of subjects (n= 32)

As noted in the table below, most of the employees were between 26 to 35 years (31%). The distribution in the younger (<26 years) and older workforce(>55) was the same.

Table 4.7: Age distribution

Age group	% (n=32)
<26 years	17.2%
26-35 years	31.0%
36-45 years	13.8%
46-55 years	20.7%
> 55 years	17.2%

3.7.3 GENDER OF EMPLOYEES

The gender of the employees is described in Table 4.7. As shown in figure 4.2, the majority of them were female (27, 84.4%). In addition, all the doctors who sustained injuries were also female.

Table 4.8 Gender distribution (n=32)

Gender	Total (n =32)	Doctors (n=13)	Nurses (n= 14)	General assistants (n= 5)
Female	27 (84.4%)	13 (100%)	12 (87.5%)	2 (40%)
Male	5 (15.6%)	0	2 (14.3%)	3 (60%)
Total	**32 (100%)**	**13 (100%)**	**14 (100%)**	**5 (100%)**

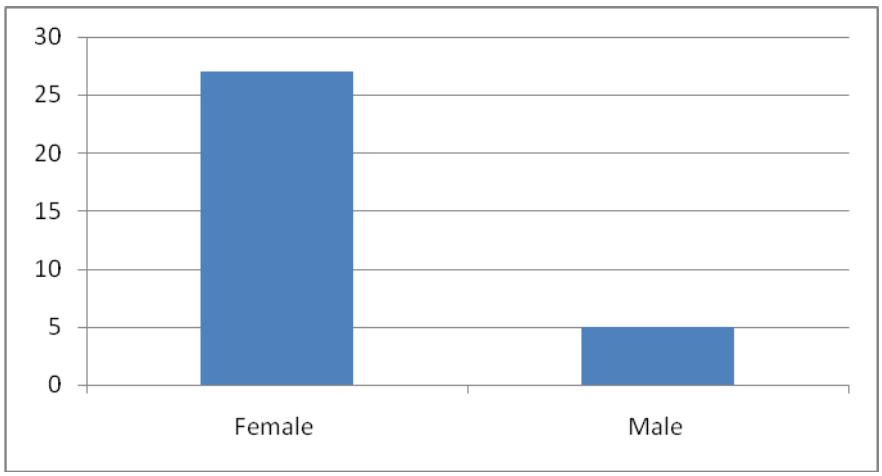


Figure 4.2 Gender distribution of Employees (n= 32)

3.7.4 ETHNICITY OF EMPLOYEES

The ethnicity of the employees is described in Table 4.8.

Table 4.8 Ethnicity of the employees (n=32)

Gender	Total (n =32)	Doctors (n=13)	Nurses (n= 14)	General assistants (n= 5)
Black	15 (46.9%)	2 (15.4%)	8 (57.1%)	5 (100%)
Coloured	5 (15.6%)	1 (7.7%)	4 (28.6%)	0
White	12(37.5%)	10 (76.9%)	2 (14.3%)	0
Total	**32 (100%)**	**13 (100%)**	**5 (100%)**	**14 (100%)**

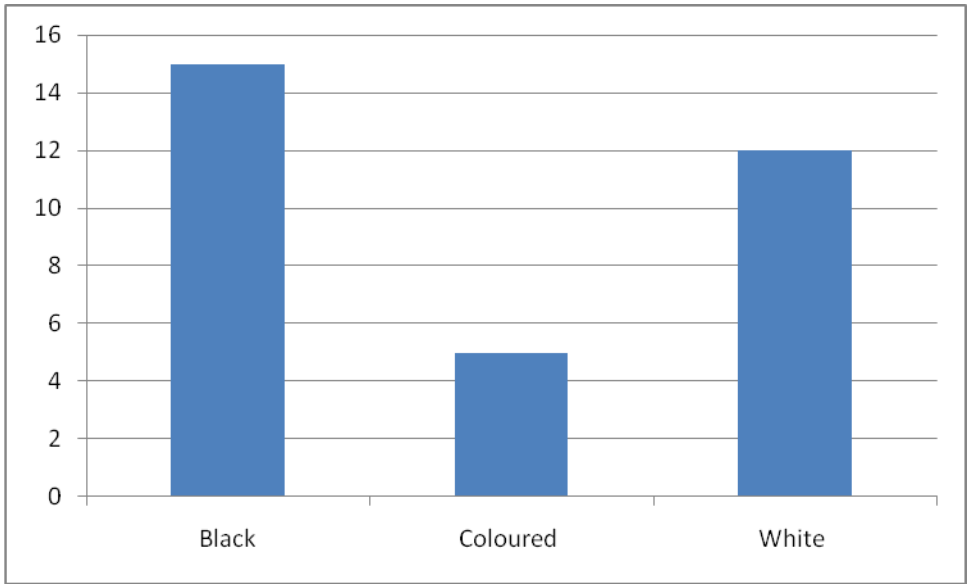


Figure 4.3 Ethnicity distribution of subjects (n= 32)

As shown in figure 4.3 above, the majority of the employees who sustained NSI were classified ‘black’.

3.7.5 YEARS OF EXPERIENCE

The years of experience of the employees is described in Table 4.6. The median was 3.5 years (IQR 0.6 to 14.6 years).

Table 4.9 Years of experience (n=32)

Years of experience (years)	Total (n =32)	Doctors (n=13)	Nurses (n= 14)	General assistants (n= 5)
Median (IQR)	3.5 (0.6-14.6)	0.8 (0.1- 1.3)	17 (4-29)	0.7 (0.6-8.5)
Range	0.1 - 33.4	0.1 - 14.6	2.4 - 33.4	0.6 - 12

The affected nurses were significantly more experienced than the other categories of staff (One way Analysis of Variance, p< 0.01)

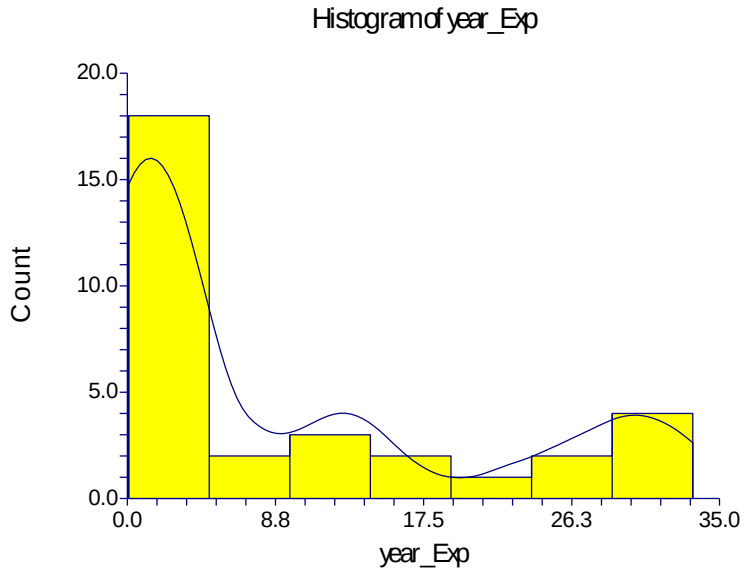


Figure 4.4 Years of experience of subjects (n= 32)

As displayed in the figure above, years of experience is not normally distributed.

3.8 FINANCIAL IMPLICATIONS OF NEEDLE STICK INJURIES

The cost of providing Post-exposure measures (PEM) for each NSI and the overall total costs are described in Table 4.10 below. The overall estimate cost for laboratory tests were significantly more than the treatment costs for each patient and contributed about 61% towards the total costs for PEM.

The laboratory tests were done by the Wellness clinic at the hospital. The knowledge of the HIV status of the source patient was not always known to the staff members..The general assumption by the employees is that unknown patients are positive, because of the high incident rate of HIV and Aids in South Africa. The HIV rapid tests were done immediately after the employee reported the NSI. The Elisa test was done after three months. In addition, all the employees received antiretroviral therapy as preventative method.

Table 4.10 Financial implications of providing PEM

	Unit cost	**Total cost**
Treatment		
Anti-retro viral drugs	R 394.32	R 12,618.24
Hepatitis B vaccine	R 19.29	R 617.28
Tetanus vaccine	R 8.55	R 273.60
Total	**R422.16**	**R 13,509.12**
Laboratory Tests		
HIV rapid test	R37.10	R1187.20
HIV ELISA	R 36.73	R 1175.36
Hepatitis B	R105.89	R3388.48
Hepatitis C	R 108.02	R3456.64
RPR	R 37.70	R 1206.40
Full Blood Count	R 48.30	R 1545.60
Urea and electrolytes	R 25.27	R 808.64
Liver Function Tests	R 256.56	R 8209.92
Total	**R655.57**	**R20,978.24**
Grand Total	**R1 077.73**	**R34 487.36**

3.9 ADHERENCE TO THE REPORTING POLICY

The scheduled of meetings of the Hospital Adverse Event Committee is described in Table 4.11.

Table 4.11 Adverse Event Committee Meetings

Month	Total Committee members	Total attendance n (%)	Decision taken
January	12	8 (66%)	None
February	12	7 (59%)	None
March	12	10 (83%)	None
April	12	5 (41%)	None
May	12	8 (66%)	Increase awareness by providing information
June	12		No Meeting
July	12	7 (59%)	None
August	12	6 (50%)	None
September	12		No Meeting
October	12	5 (41%)	None
November	12		No Meeting
December	12		No Meeting

There were only 8 (66%) meetings held during the study period. The average attendance was 7 members (± 1.7). Minimum and maximum numbers of attendees were 5 and 10 respectively.

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 INTRODUCTION

This study was done in order to describe the NSI occurring at KHC in order to plan appropriate preventive strategies and interventions at a regional hospital level. It is the first study to look at the trends of employees who reported NSI and the profile of these employees. In addition, it also reflects the financial implications for the institution in terms of providing PEP, and overall adherence to the AE Reporting Policy at the institution.

5.2 NEEDLESTICK INJURIES

The majority of the NSI occurred during clinical activities with recapping being the most prominent. This corresponded to studies done by Jagger, Hunt, Brand-Elnaggar, et al. (1998) and by Hoffman, Kralj and Beie,(2002). Later studies as indicated by Adesunkanmi, Badmus,Ogunlusi ,(2003) and van Wijk, Schneeberger, Heimeriks, et al. (2009), also supports this finding. It is possible that the delayed recapping of needles by the health professionals' results in many exposed used needles being subsequently forgotten and left in inappropriate places which results in hazardous situations at this facility. This finding has highlighted the need for proper disposal and adherence to guidelines in this environment.

NSI also occurred during performance of other clinical procedures related to NSI. This included stitching in the operating theatre, putting up intravenous drips and

finger prick testing. Overall, these injuries may have occurred because of the lack of supervision and, or lack of experience which was also highlighted in a study done by Tibby (2004). Other studies done by Adegboye, Moss, Soyinka et al. (1994) indicated that colleagues may accidentally prick colleagues who are assisting them. This can be explained by inadequate supervision of inexperienced employees.

This study has highlighted the contributing factors which need to be addressed to prevent NSI in future. The study has shown that used needlesticks were found in patient beds (3.1%), linen (3.1%), equipment trays (3.1%), drains(3.1%) and dustbins (6.3%) which are areas other than the allocated medical waste containers. This demonstrates that employees did not adhere to the policies in place to safely dispose these devices. A study done by Paton in 2007 supports this finding in that the majority of NSI were caused by failure to comply with procedures for safe handling and disposal of sharps. It is possible that the reason for employees not following protocol in these instances was due to the provision of inadequate medical waste containers in areas where clinical procedures took place or, these containers were not collected and replaced as often as they should by infection control. In addition, it is also possible that employees were not properly trained in the handling of this type of medical waste and the risks involved in this type of hazardous behavior.

It is important to note that most of the NSI could have been prevented if staff were trained and supervised to followed appropriate disposal guidelines. This preventive aspect is supported by a study done by Sari, Sheldon, Cracknell et al. (2007). Those NSI which can be considered difficult to prevent occurred in the Paediatric unit where the babies and young children tend to move when blood is taken or an intravenous drip is administrated.

In the nursing category the prevalence rate amongst the Enrolled Nurses were the highest (3.6%), followed by the student nurses (3.4%) and least by the

Professional Nurses (1.8%). This may be an indication that the lower-skilled nursing employees may be more at risk for NSI or that these categories of employees perform more clinical tasks that increases their exposure to NSI. Student nurses are still receiving training to develop their skills and they should be provided with adequate supervision when performing clinical tasks.
It is a concern that nursing assistants and general assistants were exposed to used needlesticks which is not the usual work hazards they are concerned about in the scope of their work.

This study revealed that almost a third of the total NSI occurred in the Internal Medicine Department followed by the Surgical wards. It is possible that a combination of increased workload, inadequate employee allocation and infection control practice in these particular areas may have impacted on this finding. However this will need further research to be established.. A study by Tibby, Correa-West, Durward, et al. (2004) demonstrated that increased workload and inadequate staff allocation contributes to NSI.

In addition, the employees working in the clinical wards may be more anxious whilst having to work with patients who are possible carriers of blood borne pathogens like HIV. This is supported by research conducted by Wiilburn, Willburn and Eijkenmans, (2004) who demonstrated that employee anxiety could possible contribute to NSI.

Almost a third of the total NSI occurred on Tuesdays (32%) followed by Thursdays (20.1%). It is possible that more clinical investigations were done as a result of the specialist clinics operating on Tuesdays and Thursdays and subsequently resulting in greater intake of patients, influence negative on the overall increased workload. This correlates with the study done by Tibby, Correa-West, Durward, et al. 2004 where it was stated that heavy workload contributed towards NSI.

With respect to the site of injury, this study revealed that more than a third of the NSI (37.5%) were sustained on the left hand. This finding is supported by a study done by Adesunkonmi, Badmus, Ogunlusi,(2003). This can be explained by the fact that most employees are right handed and this will have implications when performing clinical activities especially when recapping needles etc.

5.3 PROFILE OF EMPLOYEES WHO HAD NEEDLESTICK INJURIES

This study revealed that the doctors had the highest prevalence of 10.4% and was therefore the group most at risk for NSI which contradicts the studies done by Tabak, Shiaabna, Shasha (2006) and by Nsubug and Jaakkola(2005) demonstrating that nursing staff experienced the highest rate of NSI. It is possible that the doctors are engaged with more clinical activities, are inadequately allocated, and subsequently have a higher workload coupled with insufficient sleep resulting in greater fatigue which contributes to their increased risk for NSI. This is supported in a study done by Dembe, Erickson, Delbos, et al.(2005) which gives a clear indication between NSI and fatigue.

It is important to note that all the doctors who sustained NSI were female and mainly young graduates. This can be explained by the changing demographics related to medical school intakes whereby more women are entering the medical profession. Another explanation why the prevalence of the medical doctors was high could be that the newly trained doctors do not have the expertise when performing procedures as indicated in a study done by Tibby (2004).

Most of the employees (48.2%) who sustained NSI were between the ages of 20– 35 yrs. Overall, the doctors reflected a younger generation (median age 26) and the general assistants (median age 42) and nurses (median age 53) a much older group. This explains the fact that the younger employees tended to have lesser experience [doctors years of experience (0.8 years) and nurses years of

experience (17 years)] and skill which increases their risk for NSI which is further supported in a study by Tibby (2004). Of not is that finding that the general assistant were from an older age group but tended to be the least experienced (median years of experience 0.7). It is possible that these categories of employees are employed at an older age and also experience a higher turnover with respect to the nature of this type of work.

GENDER

The majority of the NSI were sustained by female employees (84.4%). This reflects the healthcare work demographics whereby more women tend to be employed in these sectors.

Ethnicity

Although the study did not focus on ethnicity per se, it did reveal that most of the employees who sustained NSI were from the 'Black' (46.9%) racial group. This once again reflects the working demographics of this institution.

5.4 FINANCIAL IMPLICATIONS OF NEEDLESTICK INJURIES

The NSI sustained resulted in cost implications for this institution. The employees in this study all received PEM which included antiretroviral treatment, vaccines and serological tests. The overall cost for treatment per person was R422.16 and the laboratory tests per person were R655.57 implying that the total cost per employee for PEM was R1077.73. The PEM costs for the 32 employees who sustained NSI during the study period were R34 487.36. This is a substantial amount of money which could have been put into preventive interventions. A study by Solano, Hernández, Montes, et. al (2005) revealed that the serological tests and PEP were the main cost drivers in this regard.

The study done in Kwazulu Natal demonstrated a higher cost of R2612 per person. This maybe due to the difference in the PEP protocol.

This study did not look at other hidden costs related to absenteeism, downtime, operational costs including the salaries of laboratory personnel, equipment and electricity etc. as indicated in the study by Nidegger, Castel, Peltier, (2004). In addition, our the study did not take into consideration the salaries of the Wellness Clinic personnel which includes a doctor and a professional nurse who gave counseling, did the blood tests and provided the treatment.

5.5 ADHERENCE TO THE REPORTING POLICY

The percentage of NSI actually reported y by the doctors were 41%) and by nurses were 44%. This proportionately reflects the staff demographics. The high reporting by doctors is contradictory to the study by Tabak, et al (2006) who indicated that medical doctors were not keen to report NSI because they found it time consuming. This does not seem to be the case at KHC. This may be because the newly trained medical doctors are aware of the consequences and subsequently report these events as they understand the importance of immediately obtaining the PEP which can only be received upon adhering to the reporting policy. The reporting by doctors could also be influenced by their inherent cautious behavior as supported in the study by Tabak, Shiaabana, Shasha, (2006). In addition, their reporting behavior may have been influenced by the training and information they received as part of their orientation. A further aspect relating to non-reporting also needs to be taken into account in interpreting the findings of this study.

The other important consideration related to reporting of NSI is concerned with the issue of trust. Since HIV is still regarded as a highly stigmatised disease, this will definitely influence this process at an institutional level. In addition, fear of punitive measures being taken could also hinder reporting. This is supported by Blackwell, Bolding, Cheely et, al. (2008) who indicated that student nurses were not eager to report NSI.

Only 66% of the scheduled AE Committee meetings actually took place during the study period and only once was a decision made about an intervention. This is an important finding from a management perspective. The functioning of this Committee needs redefining in the light of this finding. The average attendance to these meetings was 58%. The main focus of these meetings was on patients with AE and their complaints. It seems that the hospital focused mainly on patient-related AE rather than the employee-related AE which is also reflected in the policy. This finding demonstrates the need for greater clarity and attention to be given to employee –related issues which are further discussed in the recommendations.

The reporting of NSI which follows the AE Reporting Policy is mandatory at KHC. According to this policy, an AE, which includes the NSI, should be reported within 12 hours to the relevant supervisor. This study could not capture the time taken for reporting as this was not recorded on the form; hence this forms part of the limitation of this study.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

Although there are clear policies in place to guide safer working behaviours especially with regard to biological hazards, this study revealed that some employees did not adhere to these guidelines.

This was an indication that the lower category ies specifically needed training and awareness campaigns. It would have been of interest to know what the knowledge of General Assistants was as far as NSIs and the handling thereof.

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 articulated. Appropriate recommendations were made within the context of the findings of this study. Finally, 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 issues pertaining to the subject of NSI in a hospital setting in order to plan appropriate preventive strategies and interventions. Additional observational and qualitative studies will contribute more meaningful information towards developing a better understanding of the various factors that influence NSI in a hospital setting. These behavioral studies should focus on the reporting and specific work practices. In addition, the AE Policy should be reviewed with the intention of updating it and including the employee perspective.

6.1.1 DESCRIPTION OF THE NEEDLESTICK INJURIES

Induction and on-going training is needed to ensure that employees comply with work procedures. This training should be provided in health care facilities to all categories of health care staff including the general assistants. Training topics should include the handling of medical waste including syringes, needles etc , In addition, the findings from this study could be used in the training programme to demonstrate the 'real-world' evidence of experiences in this setting. It would be useful to extend this training to the local nursing college.

Adequate and updated records should be kept of employees who have undergone training. This will enable management to effectively and appropriately plan for future training sessions. In addition, standard operational procedures (SOP) related to the handling of needles should be developed and displayed in the various clinical settings. This SOP should take the form of user-friendly algorithm.

Employees should be educated about the health care setting and the issues related risk in this environment. An understanding of integrated risk management and Infection Control will increase the awareness of how individual actions can impact on the wider environment. An example could be to demonstrate how delayed removal of full medical waste containers could put employees and patients at risk in this setting.

Further research should be undertaken to investigate why NSI occurs mainly at specific locations, e.g internal medicine, and to further assess whether employee workload is contributing to the risk for NSI. Related to this, a review and focus group discussion should be conducted on the working hours of the doctors to determine if this contributes in any way to increased risk for NSI. Observational studies would also add valuable information about the hazards in this work

environment especially with regard to infection control practices and the handling of medical waste containers.
From a design point of view, a costing study would be useful to determine if the introduction of retractable needles would be a more cost-effective way of managing these risks in this setting.

6.1.2 THE DEMOGRAPHIC AND WORK PROFILE OF EMPLOYEES

A much more in depth investigation should be done to understand the risk profiles of the different employees. Risk-taking behavior and the research in this area would explain why some employees seem more prone to NSI than others.

6.1.3 DETERMINATION OF THE FINANCIAL IMPLICATIONS

Prevention is a recognised as a more cost-effective method than treating employees post –exposure in the health care setting. Although only some of these costs were determined in this study, these injuries consume much more resources than can be demonstrated in research studies. Focusing on prevention with training as a main component should be considered. In this regard, there should be a dedicated budget in the Human resource development unit for the training of employees to alert them on safety issues in their unit.

Active health and safety committees are needed to follow-up on these incidents. These committees should be mandated to ensure that adequate protective equipment is available for all employees. They can also support and ensure adequate staffing norms at the different units. Regular meetings should be held and reports on interventions taken to further reduce risk should be circulated. Innovative programmes could be looked at to encourage safer working practices. This could include the concept of ‘needle stick free periods’ and the presentation of awards to facilitate this process. The concept of “needle stick free periods” in

department of Health is similar to the concept of 'accident free hours' in the mining sector.

6.1.4 ADHERENCE TO THE REPORTING POLICY

There should be education and training to highlight the importance of reporting NSI. In addition, a guide should be developed to ensure that supervisors and members of the health and safety committee are able to correctly complete the reporting forms.

Information systems should be upgraded to ensure better flow of information between the various units involved in risk management. This will improve the reporting of AE in the institution. The data should be regularly analysed and feed-back should be given to employees about their performance in terms of safety in the different units.

6.2 LIMITATIONS OF THE STUDY

Information bias was the main limitation in this study. Since this was a retrospective study, the quality of the data in existing records was also a limitation. This was reflected by some missing data from employees' records and the adverse event register. Some of the variables used in the study were recorded by different individuals at different times which could have affected data quality contributing to information bias.

There is also the possibility of employees who did not report needlestick injuries.

The financial implications per employee after NSI were estimated and need to be investigated more thoroughly to provide the exact amount of money spent on each employee who had a needlestick injury.

6.3 RECOMMENDATIONS

The recommendations made below were based on the findings from this study as well as from the staff involved with patient care as well as those responsible for the recording of AE information. The analysis of the data also revealed some areas that need to be evaluated and recommendations were made based on the analysis. Recommendations for further research were also highlighted.

Feedback on the improvement of the environment for the employees should be a standing item on the AE Committee agenda.

The current AE reporting document needs to be further revised and updated. In addition, it is important that the new policy is user-friendly considering the needs of the employee at this institution.

6.3.1 APPLICABILITY

Information from this study will be utilised within the KHCto improve the management of NSI. Information will also be made available to the Northern Cape Provincial Department of Health, to share these experiences with other health facilities in the Northern Cape Province and for future preventative measures. In addition, information will also be made available to the University of the Witwatersrand for use in future research, as a reference base to students and teaching of students.

6.3.2 FURTHER RESEARCH

Investigate the possibility to decrease the percentage of NSIs in the Internal medicine unit.
Investigate the cause of increased NSIs on Tuesdays and Thursdays.

Investigate the possibility of medical doctors on call and have to work the following day which may cause accidental NSIs because of fatigue.

6.4 SUMMARY AND CONCLUSION

- Integrated risk management (sharing of information at a management level)
- Prevention (training, design issues, surveillance of AEs and NSIs)
- Policy (Specific employee policy related to reporting of NSI)
- Research

NSIs and other AEs relating to employees should be handled separately from those of patients. More emphasis should be put on prevention strategies. This should include a dedicated budget for training of all employees and giving refresher information sessions to the employees. The possibility to implement retractable needle devices should be assessed from both a cost and user perspective.

The Health and safety representatives have to play a bigger role in the different units. This should be considered as part of their overall performance as well. Supervisors should be more alert of the possibility of employees who may be injured. In addition, to the training of employees, the provision of personal protective equipment, the workload of the employees should also be closely monitored.

REFERENCES

Adesunkanmi AK, Badmus TA, Ogunlusi JO. 2003. Accidental injuries and cutaneous contaminations during general surgical operations in a Nigerian teaching hospital East Afr Med J. 80(5): 277 – 34

Adegboye AA, Moss GB, Soyinka F, et al. 1994. The epidemiology of needle stick and sharp instrument accidents in a Nigerian hospital Infection control Hosp Epidemiology 15 (1): 27 – 31

Alenyo R, Fualal J, Jombwe JJ. 2009. Knowledge, Attitude and Practices of Staffs towards Post-exposure Prophylaxis for HIV Infection at Mulago Hospital in Uganda. East and Central African Journal of Surgery, 14(2): 99 - 102

Blackwell L, BoldingJ, Cheely E, et al. 2007. Nursing students' experiences with needle stick injuries. Journal of Undergraduate Nursing Scholarship, 9 (1).< http://www.juns.nursing.arizona.edu/articles/Fall%202007/Nursing%20Students'%20Experiences%20with%20Needlestick%20Injuries.pdf> [accessed 31/07/2010].

Compensation for Occupational **Injuries** and Diseases Amendment Act (No 130 of 1993)
<http://www.doh.gov.za/search/index.html >[accessed 18/02/2011]

Dembe AE, Erickson JB, Delbos RG, et al. 2005. The impact of overtime and long work hours on occupational injuries and illnesses: new evidence from the United States. Occupational Environment Med March: 62: 588 - 597

Dembe AE. Delbos R and Erickson JB. 2009. Estimates of injury risks for healthcare personnel working night shifts and long hours. Qual Safe Health Care. 18(5):336-40.

Ebrahim H, Khosravi A. 2007. Needle stick Injuries among Nurses. J Res Health Sci, 7(2): 56 – 62

Elmiyeh B, Whitaker S, James MJ, Chahal CAA, et al. 2004. Needle-stick injuries in the National Health Service: a culture of silence. Journal of the Royal Society of Medicine, 97 (7): 326 – 327

PATH. 2007. Evaluation of a Retractable syringe in South Africa. Acceptability, safety, and cost implications. Seattle: Program for Appropriate Technology in Health. < http://www.path.org/files/TS_eval_rtr_syr_sa.pdf> [accessed 31/07/2010].

Flin R, Burns C, Mearns K, Yule S, et al. 2006. Measuring safety climate in health care. Qual Saf Health Care. 15(2):109-15.

Flin R, Yule S, McKenzie L, Paterson-Brown S, et al. 2006. Attitudes to teamwork and safety in the operating theatre. Surgeon. 4(3):145-51.

Fredrich MN, and Maritta SJ. 2005. NSIs among nurses in sub-Saharan Africa. Tropical Medicine & International Health, 10(8), 773 – 381.

Glenngard AH, Persson U. 2009. Cost associated with sharps injuries in the Swedish health care setting and potential cost savings from needle-stick prevention devices with needle and syringe. Scand J Infect Disease 41 (4): 296-302.

Harrington JM. 1994. Shift work and health – a critical review of the literature on working hours. Ann Acad Med Singapore Sep: 23 (5): 699 – 705.

Hoffmann F, Kralj N and Beie M. 2002. NSIs in health care – frequency, causes und preventive strategies. Gesundheitswesen, 64(5):259-66.

Jagger J, Hunt EH, Brand-Elnaggar J, et al. 1998. Rates of needle-stick injury caused by various devices in a university hospital. N Engl J Med, 319(5): 284 – 288.

Lee JM, Botteman MF, Xanthakos, N. et al 2005 NSIs in the United States. Epidemiologic, economic, and quality of life issues. Abt Assosiates, Inc, Bethesda, Maryland, USA.

Maqbool A. 2002. Knowledge, attitude and practices among health care workers on NSIs. Annuals of Saudi Medicine, 22: 5-6.

Nidegger D, Castel O, Peltier MP. 2004. Assessing the cost of occupational exposures to blood, in a French university hospital. Med Mal Infect, 34(1) 28-36.

Nsubuga FM, and Jaakkola MS. 2005. Needle stick injuries among nurses in sub-Saharan Africa. Trop Med Int Health.10(8):773-81.

Nuckols TK, Bell DS, Lui Honghu, et al 2007. Rates and types of events reported to established incident reporting systems in two US hospitals. Qual Saf Health Care 16: 164 – 168.

O'Malley EM, Scott RD 2nd, Gayle J, et al 2007. Cost of management of occupational exposures to blood and body fluids. Infection Control Hosp Epidemiol, 28(7):774-82.

Paton N. 2007. This Might Hurt – Hospital Management. < http://www.hospitalmanagement.net/features/feature978/> [accessed 31/07/2009]

Rowin EJ, Lucien D, Panker SG. et al 2008. Does error and adverse event reporting by physicians and nurses differ. Jt Comm J Qual Patient Saf., 34(9):537-45.

Sari AA, Sheldon TA, Cracknell A, et al. 2007 Extent, nature and consequences of NSIs: results of a retrospective casenote review in a large NHS hospital. Quality Safety Health care. 16:434-439.

Shaw R, Hughs H, Osborn S, Williams S 2005. NSIs and near miss reporting in the NHS. Quality Saf Health Care; 14: 279 – 283.

Solano VM, Hernández MJ, Montes FJ, et al. 2005. Update of the cost of needlestick injuries in hospital healthcare personnel. Gac Sanit. 19(1):29-35.

Tabak N, Shiaabana AM, ShaSha S. 2006. The health beliefs of hospital staff and the reporting of needlestick injury. Journal Clinical Nursing, 15(10): 1228 – 1239.

Tibby SM, Correa-West J, Durward A, et al. 2004. NSIs in a pediatric intensive care unit: relationship to workload, skill mix and staff supervision. Intensive Care 30 (6): 1160 –1166.

Van Wijk PT, Schneeberger PM, Heimeriks K, et al. 2009. Occupational blood exposure accidents in the Netherlands. Eur J Public Health, 20(3):281-7.

Visser L.2006. Toronto Hospital Reduces sharps injuries by 80%, Eliminates Blood Collection Injuries. Healthcare Quarterly, 9 (1): 68 – 70.

Wicker S, Jung J, Allwin R, et al. 2007. Prevalence and prevention of NSIs among health care workers in a German university hospital. Springer-Verlag

World Health Organisation: Draft guidelines for NSIs reporting and learning systems. (2005) WHO, 8.

Wright MC, Phillips-Bute B, Mark JB, et al. 2006). Time of day effects on the incidence of anaesthetic NSIs. Qual Saf Health Care; 15: 258-263.

Wilburn SQ, Eijkenmans G.2004. Preventing Needlesticks Injuries among Healthcare Workers. Int Journal Environ Health; 10: 451 – 456.

APPENDICES

APPENDIX A: ETHICS CLEARANCE CERTIFICATE, LETTER OF PERMISSION FROM NORTHERN CAPE AND POSTGRADUATE COMMITTEE

APPENDIX B: DATA COLLECTION TOOLS