Personnel Health Service Infection Control Policies and Practices Regarding Accidental Needlestick Injuries in Selected South African Hospitals

By

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Part One: Review of Blood-Borne Occupational Health Problems in Hospitals

Part Two: Personnel Health Preventive Measures Against Blood-Borne Infection within Health Facilities

Part Three: Policies, Practices and Impact of Measures Against Personnel Exposures

Dedication

This work is dedicated to my wife, Nkemdilim, my unofficial study leader, for her love and support; and to my children, Joey, Chiderah and Chibueze

Acknowledgement

The author is greatly indebted to Dr. Jonathan Levin for his huge constructive contributions to the epidemiological study design and statistical analysis of this work. I also owe a lot of gratitude to my supervisors, Dr. F.C.A. Smith and Prof. C.B. IJsselmuiden. Their contribution to my training is invaluable. The co-operation of numerous staff and managers in the health facilities involved in this study, who spent time to provide the necessary information, is highly appreciated

Finally, I give thanks to my almighty creator for seeing me through my difficulties

Summary

This study aims to assess the problem of needlestick injuries in hospitals and evaluate the personnel health service infection control measures on blood-borne infections against an international standard, using the United States Centers for Disease Control and Prevention (CDC) guidelines.

Accidental needlestick injuries are the commonest occupational injury in health facilities. The high prevalence of serious infections with agents such as HIV or hepatitis B has given incidents of needlestick injuries new significance. While accidents cannot be avoided entirely, there are many effective technological/pharmaco-immunological as well as administrative and systems measures such as standard precautions, safety devices and improved instrument design that can reduce the occurrence of needlestick injuries and assist in managing the negative health sequelae.

This study was conducted by administering questionnaires to a sample of 230 doctors and nurses from a population of 7500 in 19 district and regional hospitals in Gauteng Province, to collect information on needlestick injuries. A response of 87% was obtained, with 201 individuals consenting to participate in the survey. Interviews were also held with the infection control personnel or any other person in-charge of personnel health in the selected hospitals, on the policies and practices present in the facilities on personnel health and safety infection control.

In addition, documents were collected or verified and practices observed to substantiate the claims made regarding policies and practices in the hospitals.

The result shows an incidence of 1. 050 (CI. 0.666 - 1.434) needlestick injuries per person per year, with 34% (CI. 27% - 40%) of the 201 respondents having had at least one needlestick injury in the twelve months preceding the study conducted between November 2000 and April 2001. Only about 4% of these needlestick injuries were reported.

The mean percentage of estimated needlestick injuries reported, as shown in hospital records, is 3.5% in the regional hospitals and 5.9% in the district hospitals. The ratio of estimated: reported was compared using Mann-Whitney test for ranks. There is slight evidence (p=0.0956) that reporting is better in the district. There is no statistically significant difference between the incidence of injuries in doctors and that in nurses; and between the district and regional hospitals.

Compared against eight recommendations in the category IA group, which are infection control policies and practices strongly recommended for all hospitals by the Centers for Disease Control and Prevention, 5% of hospitals (1 hospital) had all the category IA recommendations in place, 31% (6 hospitals) had 75% of the recommendations and 47% (9 hospitals) had 50% to 60% of the

recommendations. The rest 16% (3 hospitals) had less than 50% of these strongly recommended policies and practices.

All the recommendations were grouped into a list of 12 policy documents or records. Only 2 hospitals (10%) had up to 6 of the 12 recommended policy documents or records. One hospital had none.

This study showed no statistically significant association between number of policies and practices in the category IA in the respective hospitals and the incidence of needlestick injuries. (coef. -107.486, conf. Interval -271 to 56, t = -1.40, p = 0.182).The correlation was however on the expected side of more policies in place, the less needlestick injuries.

Key words: Personnel health and safety; policies and practices; accidental needlestick injuries; preceding activities; reporting rate of incidents.

OPSOMMING

Die doel van die studie is om die probleem van naaldprikbeserings in hospitale te ondersoek en die personeelgesondheidsdienste se infeksiebeheermaatreëls teen bloedgedraagde infeksies teen internasionale standaarde te evalueer deur gebruik te maak van van die stel riglyne van die Sentrum vir Siektebeheer(CDC) in die Verenigde State van Amerika.

Naaldprikbeserings wat per ongeluk opgedoen word is die mees algemene beroepsbesering in gesondheidsfasiliteite. Die hoë prevalensie van ernstige infeksies soos MIV en hepatitis-B het aan naaldprikbeserings 'n nuwe betekenis gegee. Terwyl alle ongelukke nie altyd vermy kan word nie, is daar tog effektiewe tegnologiese / farmoko-immunologiese sowel as administratiewe en sisteem-maatreëls soos byvoorbeeld standaard voorsorgmaatreëls, veiligheidstoerusting en verbeterde ontwerp van instrumente wat kan help om die probleem te verminder.

Die studie is uitgevoer deur die aanwending van vraelyste aan 'n steekproef van geneeshere en verpleegsters in 19 distriks- en streekhospitale in die provinsie Gauteng om die inligting oor naaldprikbeserings in te samel. Onderhoude is ook gevoer met infeksiebeheerpersoneel of enige ander persoon in beheer van personeelgesondheidsdienste in die onderskeie hospitale, oor die beleid en gebruike wat in die fasiliteit bestaan ten opsigte van personeelgesondheid en veiligheid en infeksiebeheer. Dokumente is ook versamel en gebruike waargeneem in die hospital om die aansprake wat gemaak is te staaf.

Die resultate toon 'n insidensie van 1.050 (CI. 0.666 – 1.434) naaldprikbeserings per persoon per jaar, met 34% (CI. 27.23% - 40.43%) van die 201 respondente wat ten minste een naaldprikbesering in een jar gehad het. Slegs ongeveer 4% van die naaldprikbeserings word aangemeld.

Die gemiddelde aanmeldingskoers in streekhospitale is 5.9%. Die verhouding van beraamde: aangemelde soos aangedui in hospitaalrekords is vergelyk met behulp van die Mann-Whitney toets vir rangorde. Daar is geringe bewys (p=0.0956) dat aanmelding in die distrik beter is. Daar is nie 'n statisties betekenisvolle verskil tussen die voorkoms van beserings in dokters en verpleegsters nie; ook nie tussen distriks en streekhospitale nie.

In vergelyking met agt kategorie 1A aanbevelings vir hospitale, ontwikkel deur die Sentrum vir Siektebeheer (CDC), gebaseer op bevindings van goed ontwerpte eksperimentele en epidemiologiese studies, het 5% (1) hospitaal al die kategorie 1A aanbevelings in plek gehad, 31%(6) hospitale het 75%van die aanbevelings , en 47%(9) hospitale het 50% tot 60% van die aanbevelings in plek gehad. Die oorblywende 16%(3) het minder as 50% van hierdie noodsaaklike aanbevelings en gebruike in plek gehad.

Al die aanbevelings is gegroepeer in 'n lys van 12 beleidsdokumente of geskrifte. Slegs 2 hospitale het 6 van die aanbeveelde beleidsdokumente gehad.Een hospital het geen beleidsdokumente gehad nie.

Die studie het geen statisties betekenisvolle verband tussen die die aantal beleidsdokumente en gebruike in die kategorie1A in die onderskeie hospitale en die voorkoms van naaldprik beserings getoon nie. (koëf. –107.486, vertrouensinterval –271 tot 56, t=-1.40, p=0.182). Die korrelasie was egter aan die verwagte kant van hoe meer beleidstukke in plek, hoe minder naaldprikbeserings.

Sleutelwoorde: Personeelgesondheid en –veiligheid; beleid en gebruike; toevallige naaldprikbeserings; voorafgaande aktiwiteite; aanmeldingskoers van voorvalle.

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Part One

Review of Blood-Borne Occupational Health Problems in Hospitals

1. Introduction

1.1 Important occupational health problems in the health setting

Accidental needlestick injury (ANI) is one of the most important occupational health issues among health workers.[1, 2, 3] A wide range of infections can be contracted through ANI. In fact, almost any blood-borne pathogen may occur in the community at large or within health care organisations and can affect both personnel and patients through ANI. However, only those infectious diseases that occur frequently in the health care setting or are most important to personnel will be the focus of this work.

The important infectious diseases that can be contracted by health personnel through ANI include Hepatitis B, Hepatitis C and Human Immunodeficiency Virus.[4]

1.2 Blood-borne occupational health problems and risks

In 1994, a study conducted in Kangwane, South Africa showed 14.6% of males and 4.6% of females positive for hepatitis B virus surface antigen.[2] An estimated 1000 health care personnel were believed to have become infected with Hepatitis B virus in 1994 in the United States. This showed a decline of about 90% since 1985, and is attributable to the use of vaccine and adherence to other preventive measures like "standard precautions".[5]

The rate of sero-conversion after percutaneous exposure to blood or serum from Hepatitis B surface antigen positive patients has been quoted as between 12% and 17%, even after passive immunization of recipient with immune serum globulins.[6] Active Hepatitis B virus immunization will improve this outlook, however, it has been shown that 4% of individuals do not acquire immunity after the vaccination[7]. After Hepatitis B infection, 90% of patients can expect recovery, the remainder will become chronic carriers. About 50% of patients with chronic hepatitis will eventually die of complications of liver cirrhosis or hepatocellular carcinoma.[8]

Hepatitis C virus (HCV) is the aetiological agent in most cases of parenterally transmitted Non A, Non B Hepatitis. In a follow-up study of health care personnel who sustained percutaneous exposures to blood from anti-HCV seropositive patients, the rate of anti-HCV sero-conversion averaged 1.8% (range 0% to 7%)[9]. Studies using HCV RNA polymerase chain reaction methods to measure HCV infection show rate of transmission of up to 10%.[10, 11] About 50% of patients with acute hepatitis C will develop chronic hepatitis.

A study in South Africa showed positivity of Anti-Hepatitis C in 1.8% of patients with sexually transmitted diseases, 0.9% of blood donors and 3.3% in asymptomatic lower-class volunteers.[12]

The high prevalence of these blood-borne infections in the community is a pointer to the much higher prevalence among hospitalised patients to which health workers are exposed to in health care institutions.

Nosocomial HIV transmission occurring after ANI has become one of the most visible concerns of health workers. According to prospective studies of health care personnel percutaneously exposed to HIV- infected blood, the average risk for HIV infection has been estimated to be 0.3%.[3, 13] Factors such as prevalence of infection among patients, the risk of infection transmission after exposure, and the frequency and nature of exposures determine health care personnel's risk of infection after ANI.[14] For parenteral exposure per se, the risk ranges from 1,3 per 1000 to 3,9 per 1000.[15]

The incidence of AIDS apparently acquired after occupational contact with body fluid is small in comparison with the case of hepatitis B acquired this way. This is also true of health care workers transmitting the infection to patients.[16] The main problem with HIV in this regard is that it has a very high prevalence rate of 22% in South Africa[17], and is a fatal disease, thus explaining why it receives a lot more attention and publicity.

2. Incidence of needlestick injuries

In a cross-sectional survey of a random sample of Health Care Workers in University Hospital and clinics in Ile-Ife, Nigeria, needlestick accidents during the

previous year were reported by 27% of 474 health care workers, including 100% of dentists, 81% of surgeons, 32% of non-surgical Physicians and 31% of nursing staff. The rate of injury per person per year was 2,3 for surgeons and dentists.[18] Another study done in 2001 among interns in Chris Hani Baragwanath and Johannesburg Hospitals showed that 33% had accidental percutaneous exposure to HIV-infected blood. 64% of percutaneous exposures to HIV-infected patients were reported.[19]

Epidemiological studies in the United States have shown that needlestick injury is the leading cause of all work-related injuries and illness in nurses.[15]

3. Cost of accidental needlestick injury

Accidental needlestick injury has a huge financial cost, which emanates from the prevention and treatment of diseases that could possibly result. Data from the study of needlestick-prevention devices in 10 New York State hospitals enabled application of cost-effectiveness analysis techniques for determining relative benefits of various safety interventions. Data aggregated from participating institutions, estimates the expected cost of needlestick injury to be $363 (about R3, 000.00 South African, at August 2001 exchange rate of R8.30 : US$1.00).[11]

4. Conclusion

South Africa has a very high prevalence of HIV and Hepatitis B.[2, 17] This fact ought to make health service providers and managers astute[12] with handling of personnel health service infection control. Personnel shortages and lack of capacity at the lower levels of care is an obvious problem that could hamper implementation of effective measures at the district and regional level facilities.

Management and control of personnel exposures to body fluid of patients with its attendant risks require accurate data. It is standard practice for all cases of needlestick injuries to be reported to a responsible officer in health facilities in South Africa, however, the reported incidences is believed to be for various reasons, significantly less than actual occurrence.

Attempts are often made to describe needlestick injuries in facilities in South Africa and Southern Africa where the HIV pandemic is severe, but these efforts have concentrated mainly on analysis of reported incidences of needlestick injuries.

The seriousness of accidental needlestick injuries both in terms of occurrence and risk of infection makes it an important factor, and a useful outcome of personnel health service infection control policies and practices. This study will describe the incidence of needlestick injuries and other body fluid exposures, both reported and unreported, within a high HIV prevalence community of South Africa.

Part Two

Personnel Health Preventive Measures Against Blood-Borne Infection within Health Facilities

1. Introduction

Various studies in numerous centres using different methods all confirm a high incidence of ANI. Given the high cost of this common injury, it is an absolute necessity that time tested preventive measures, as well as effective management of these accidents are instituted in all health facilities. This often requires the use of both technology and implementation of appropriate administrative and management systems.

2. Mechanism of needlestick injuries

The causes of accidents are difficult to summarise. There have been suggestions that it is all due to "accident proneness" or at the other extreme that accidents are entirely due to "chance". Many accidents are clearly multi-factorial.

Some of the more important factors associated with accident are[20]:

- Age
- Experience
- Time of day
- Work rate
- Type of work
- Health of worker
- Industrial relations

Four important activities leading to needlestick injury in nurses can be identified:

- Recapping of used needles
- Disposal of used needles
- Venepuncturing
- Administration of intravenous therapy or injections

Together the above account for between 76% and 90% of activities known to be associated with needlestick injuries.[21] In a separate study, a fifth activity, suturing or assisting in suturing was included. This activity accounted for 8,4% of the last known episodes of needlestick injuries among nurses in a general hospital in Malaysia. The other preceding activities in this study were recapping of used needles (60,1%), disposal of used needles (19,2%), venepuncturing (6,7%) and others (5,6%).[22]

3. "Universal Precaution"

The concept of "Universal precautions" proposed by the United States Centres for Disease Control and Prevention is a first step in preventing ANI and the health implications of this accident.[23] This concept suggests that patients should be assumed infectious for HIV and other blood-borne pathogens, and that good work practice and appropriate personal protective equipment should be applied at all times.

This concept is summarised as a list of "Ten Commandments" regarding protocol and device applications, as follows:

- Wash hands
- Handle blood as potentially infectious
- Wear gloves
- Do not recap or manipulate needle
- Wear gowns
- Dispose waste in the appropriate containers
- Handle all linen as potentially infectious
- Wear masks
- Disposable resuscitation equipment, gloves, masks, linens, washing hand soap and waste disposal containers, should be provided at reasonable distance to the site of clinical procedures to enable health care workers practice universal precautions effectively.

4. Preventive measures against needlestick injuries

Different intervention strategies have been evaluated and while increased staff education and enlightenment is advocated, the assertion that it is usually more effective to rely on an inherently safe device than to depend on human effort to change work habit.[22] remains valid, albeit with caution. These intervention strategies have been broadly grouped into engineering controls (e.g. safety

devices) and work practice controls (e.g. techniques to reduce handling of sharp instruments).[24]

4.1 Engineering controls

Various studies have applied different intervention strategies with rather inconclusive results regarding the efficacy of various devices.[25, 26]

The use of standard precautions, which incorporates universal precautions, will reduce contact with blood and body fluids. The use of engineering controls such as safety devices, and changes in work practices like techniques to reduce handling of sharp instruments can reduce the frequency of percutaneous injuries. In settings such as the operating room, changes in instrument design and techniques for performing surgical procedures and modified personnel barriers have been shown to reduce blood contact.[27] However, despite adherence to standard precautions and implementation of some new techniques and devices, percutaneous injuries such as ANI continue to occur. This is of grave concern because these represent the greatest risk of transmission of blood-borne pathogens to health workers. Few studies evaluated show that a limited number of safety devices have demonstrated a reduction in percutaneous injuries among personnel.[26, 27]

4.2 Policies and practices

The reality of working in a hospital environment and in health care in general is that ANI is going to occur. Coherent infection control policies and practices is crucial in managing the ANI cases that will occur.

4.2.1 Components of personnel health infection control

Sound personnel health service infection control measures revolve mainly around the following[28]:

A. Immunisation for vaccine preventable diseases

B. Isolation precautions to prevent exposures to infectious agents

C. Management of health care personnel exposure to infected persons, including post-exposure prophylaxis, and work restrictions for exposed or infected health care personnel

D. Prevention of sensitisation to latex among health care workers

4.2.2 Objectives of personnel health infection control

Personnel health service infection control should be an integral part of health care organisation's general program for infection control.

The objectives are primarily to[27]:

a. Educate personnel about the principles of infection control and stress individual responsibility for infection control

b. Collaborate with the infection control department in monitoring and investigating potentially harmful infectious exposures and outbreaks among personnel

c. Provide care to personnel for work-related infectious illnesses and exposures

d. Identify work-related infectious risks and institute appropriate preventive measures

e. Contain costs by preventing infectious diseases that result in absenteeism and disability

To attain these infection control objectives of a personnel health service, the following are essential[29]:

1. Co-ordination with other departments
2. Medical evaluation
3. Health and safety education
4. Immunization programs
5. Management of job-related illnesses and exposures to infectious diseases, including policies for work restrictions for infected or exposed personnel and counselling services for personnel on infection risks related to employment or special conditions
6. Maintenance and confidentiality of personnel health records
7. Management of Latex hypersensitivity[30]

5. Policy and practice recommendations

Several recommendations exist for the control of blood-borne infections in health facilities. These recommendations comprise to varying degrees of emphasis, the basic elements and core objectives of infection control.[30] The United States Centres for Disease Control and Prevention (CDC) has categorised a set of infection control guidelines. The categories are based on existing scientific data, theoretical rationale, applicability, and potential economic impact. These are as follows[28]:

Category IA

Strongly recommended for all hospitals and strongly supported by well-designed experimental or epidemiological studies.

Category IB

Strongly recommended for all hospitals and reviewed as effective by experts in the field and a consensus of Hospital Infection Control Practices Advisory Committee members on the basis of strong rationale and suggestive evidence, even though definitive scientific studies have not been done.

Category II

Suggested for implementation in many hospitals. Recommendations may be supported by suggestive clinical or epidemiological studies, a strong rationale, or definitive studies applicable to some but not all hospitals.

No recommendation, Unresolved

Practices for which insufficient evidence or consensus regarding efficacy exists.

The Centres for Disease Control and Prevention guideline will be used as the standard to measure infection control policies and practices in the hospitals, because of its comprehensiveness and the extensive range of epidemiological evidence sited to support the rationale for the recommendations. These guidelines are designed for hospitals and other health care facility infection control in general. However, only aspects related to management of ANI are of concern to this work and are therefore included in the interview. Asterisks indicate the different recommendations and the appropriate categories into which they are classified. (Annexure 1). The guidelines are not designed as question sets. The researchers have used the guidelines to synthesis questions for the interviews in this study.

6. Conclusion

The White Paper for the Transformation of the Health System in South Africa has spelt out government's commitment to decentralization, and district based primary health care.[31] This shift from tertiary to primary care entails that there be improved emphasis on this level of care in terms of occupational health services.

This study is aimed at evaluating the personnel health service infection control measures on blood-borne infections against an international standard, using the CDC set of guidelines.

The specific objectives are to:

1. Describe the infection control policies and practices on blood-borne infections
2. Provide a simple audit tool for evaluating the personnel health service infection control measures for blood borne diseases in hospitals and health care settings
3. Stimulate action on the part of hospital managers in re-evaluating and improving infection control and personnel health service efforts
4. Provide hospital managers with a tool to evaluate compliance with some of the provisions of the Occupational Health and Safety Act regarding steps to ensure safe working environment.[32]
5. Describe the incidence of accidental needlestick injuries in district and regional hospitals
7. Ascertain the extent to which staff occupational health information is kept confidential
8. Ascertain the extent to which policies are made to control latex hypersensitivity, thereby, ensuring compliance to the use of protection with gloves

Part Three

Policies, Practices and Impact of Measures Against Personnel Exposures

1. Introduction

The problem of infectious diseases and emerging infections is one of the major obstacles facing the health care industry in the new millennium.

1.1 Study relevance

A high incidence of needlestick injury in a society with high prevalence of HIV[17], Hepatitis B[2], and other blood-borne diseases[12] combine to make the health care profession a hazardous one.

Efforts to prevent occurrence of accidental needlestick injuries must always be accompanied by a comprehensive policy, which includes management of accidental needlestick injuries before, and when they occur.

This study, by providing an audit for infection control of blood-borne infections, will play a very useful role in assisting health facility managers to evaluate in a comprehensive manner, where they stand on this important aspect of personnel management.

1.2 Study question

A. To what extent are the different categories of CDC recommendations met in the seven elements of personnel health service infection control in district and regional hospitals in Gauteng Province.

B. What is the incidence of reported and unreported accidental needlestick injuries in the district and regional hospitals?

1.3 Study population

This study was conducted amongst staff in all the 19 district and regional Hospitals in Gauteng Province (6 district and 13 regional hospitals). Study was conducted in secondary level facilities because of the government's move towards decentralization and a district based primary health care as envisioned in the White Paper for the Transformation of the Health System in South Africa.[31] This shift from tertiary to lower levels of care, with the necessary referral chains, entails that there be improved emphasis on these facilities. Unfortunately, lack of capacity at these levels has resulted in many instances, to neglect of occupational health functions.

Gauteng province was chosen for this study because the researcher's contacts, resources and experience are based in this province. Furthermore, it does not appear that the experience in this subject in Gauteng Province will be markedly different from the rest of the country.

1.4 Study design

Questionnaires were administered to the heads of the personnel health service in each hospital or the head of infection control team where there is no personnel health service unit. This policy and practices interview has 8 questions in category

IA and 44 questions in category IB. Annexure 1. Attached. The chairperson of health and safety committee, or anyone in charge of personnel health services in a particular facility could also be interviewed if there is no other staff responsible for personnel health and safety. The Occupational Health and Safety Act 85 of 1993 specifies that one health and safety representative should be appointed for every fifty employees, and a health and safety committee in each work place where two or more safety representatives have been designated. A health and safety representative is among others, supposed to review the effectiveness of health and safety measures.[32] To substantiate the claims made about health policies and practices, this study also entailed accessing documents in the facilities that are relevant to the policy and practice questions asked in the interview. A total of 12 policy documents and records were sought. (Annexure 2). The questionnaires were interviewer administered. The principal researcher, Dr. Jude Ugwu was the interviewer in all cases.

Table 1: Individuals interviewed in the different hospitals

Hospital	Individuals responsible for personnel health and safety/Infection Control
NATALSPRUIT	Chairperson Health & Safety Committee
SEBOKENG	Head of Infection Control
GERMISTON	Head of Infection Control
KALAFONG	Head of Infection Control
SOUTH RAND	Head of Infection Control
TEMBISA	Head of Infection Control
PRETORIA WEST	Head of Infection Control
HEIDELBERG	Chairperson Health & Safety Committee
CORONATION	Head of Infection Control
CARLETONVILLE	Head of Infection Control
FAR EAST RAND	Chairperson Health & Safety Committee
KOPANANG	Head of Infection Control
LERATONG	Head of Infection Control
PHOLOSONG	Head of Infection Control
TAMBO MEMORIAL	Head of Infection Control
YUSAF DADOO	Head of Infection Control
MAMELODI	Superintendent
EDENVALE	Head of Infection Control
HELEN JOSEPH	Head of Personnel health and safety

The number of institutions without health and safety committees as required by the Occupational Health and Safety Act[32] was noted.

The records of reported needlestick injuries were collated and the number of reported incidents among staff analysed.

A survey to validate the reporting rate of needlestick injuries was done amongst doctors and nurses in the hospitals since these professional categories perform the majority of procedures involving needles and are also in contact with patients most.[19]

Questionnaire for this interview is attached (Annexure 3). Questionnaire was interviewer administered.

A pilot test of questions was done with the head of Pretoria Academic Hospital occupational health service in order to test the user friendliness and comprehensibility of questions.

1.5 Sampling strategy

A list of doctors and nurses in a particular hospital was obtained from the personnel unit. Staff were selected on a systematic random sample basis. A number is chosen from the telephone directory by blindly opening it around the middle pages and selecting the last number of the telephone number appearing on the top of the right page. The selected number became the number on which systematic random sampling is based. If a staff member was selected but was not on duty, the next on duty on the list was selected.

The number of doctors and nurses selected from any particular facility was weighted on the number of doctors and nurses in those facilities. However, a minimum of 3 doctors and 5 nurses was selected in each hospital.

A sample size of 100 doctors and 100 nurses was estimated on the whole. This sample size is able to,

a. Estimate approximately the prevalence of accidental needlestick injury in

each group to within plus minus 10%

b. Logistics dictate that this is the maximum sample size that will not compromise the quality of the data by not stretching the resources of researcher to the point that results become inaccurate

An assumption of 30% chances of accidental needlestick injury per year was made in the sample size calculations since studies in different centres placed occurrence between 16% and 80%.[16, 18 and 19]

1.6 Analysis

Epi-Info 6 software package was used to calculate sample sizes and all other statistical analysis.

Analysis and presentation of results are performed in aggregates, and the identity of specific hospitals are not disclosed in the results.

2. Results

2.1 Hospitals and individuals in the study

19 hospitals participated in the study, 6 district and 13 regional.

One of the hospitals participating in the study had no Health and Safety Committee at the time of the study.

To accommodate non-responders in the needlestick injury survey, 100 doctors and 130 nurses were selected for the study. 201 respondents were obtained (75 doctors and 126 nurses), giving a response rate of 87%.

14% of respondents work in the outpatient department, 48% in in-patient, 26% in both in-patient and outpatient and 11% in other departments.

57% of respondents have more than 7 years of practice experience in their respective professions, 23% have 3 - 7 years experience and 20% have 2 years or less practice experience.

2.2: Accidental Needlestick Injuries in the preceding 12 months among respondents

There were a total of 211 ANI. among respondents. The mean ANI. per person per year is 1.050 (CI. 0.666 - 1.434). About 34% (CI. 27.23% - 40.43%) of staff interviewed had at least one ANI in the preceding one year, with values ranging from one to 30.

The mean number of ANI per person per year in the regional hospitals was 0.92 and 1.49 in the district hospitals, with no statistically significant difference.

Doctors had slightly higher injuries (mean ANI = 1.16) than nurses (mean ANI = 0.98). Also the proportion of doctors incurring ANI was higher (37.33%) than that of nurses (33.83%), however, the differences were not statistically significant.

32.47% of respondents in the regional hospitals had ANI while 38.30% in the district hospitals had, but the difference was not statistically significant.

2.3: Reporting of ANI

All hospitals had underreporting, with a ratio ranging from 1:9 to 1: 234.

Overall, the mean estimated number of ANI per hospital was 382 (CI. 174.437 - 588.739) and the mean reported number was 14.6 (5.473 - 23.684). In effect, 1 in 26 was reported in the hospital records and consequently treated as needlestick injuries according to protocol (3.8% of ANI were reported). The reporting rate using claims made by respondents rather than figures on reported incidents in hospital records however, is 14.43%. The reporting claims that are not captured on records would most probably not have been treated according to protocol in terms of the necessary laboratory investigations, possible treatment and documentation etc. As such, they are as good as not reported as far as the occupational health purpose of reporting is concerned. Reporting in this work therefore refers to cases captured in hospital records.

The mean reporting rate in the regional hospitals is 3.5% and in the district hospitals it is 5.9%.

The ratio of estimated: reported was compared using Mann-Whitney test for ranks. There is slight evidence (p=0.0956) that reporting is better in the district.

Table 2: Reasons for not reporting ANI

Reasons	No. of Individuals	Percent
Applied basic first aid.	3	6.25%
Does not have time to report	4	8.33%
Too common to report	3	6.25%
Makes no difference in outcome	2	4.17%
Sterile needle	8	16.67%
Small/light exposure	14	29.17%
Reluctant/Scared	2	4.17%
Injury due to carelessness	1	2.08%
Patient HIV Negative	7	14.58%
Reporting too cumbersome	4	8.33%
Total	48	100.0%

The commonest reasons given for not reporting are sterile needle 16.67%, small/light exposure 29.17%, and patient was HIV Negative 14.58%.

2.4: Activities preceding ANI and suggested preventive solutions

Table 3: Contribution of different activities to occurrence of ANI

Activity	No. Of ANI	Percent
Recapping	11	11.5
Disposal of Needle	12	12.6
Venepuncturing	15	15.8
Admin. Of Inj. Or IV	30	31.6
Suturing	25	26.3
Others	2	2.1
Total	95	100.0%

Table 4: Suggested preventive solutions for ANI

Preventive Solutions	Freq.	Percent
Availability of appropriate equipment	8	12.9%
Proper disposal of Needles	8	12.9%
Unavoidable	11	17.7%
Proper restraint of patients	9	14.5%
Adhering to acceptable technique	19	30.6%
Better workload/work distribution	7	11.3%
Total	62	100.0%

2.5 Occurrence of Skin and Mucous Membrane Exposures (MCE) in the past 12 months

Table 5: Intact skin exposures

No. Of Exposures	No. Of Persons	Percent
None	73	36.32%
Infrequent (1-10)	61	30.35%
Mod. frequent (11-50)	24	11.94%
Highly frequent >50	43	21.39%
Total	201	100.0%

About 64% of respondents reported at least one intact skin exposure.

Table 6: Non-Intact skin exposures

No. Of Exposures	No. Of Persons	Percent
0	167	86.53
1	7	3.63
2	3	1.55
3	3	1.55
4	2	1.04
5	1	0.52
6	1	0.52
9	1	0.52
10	1	0.52
12	4	2.07
15	1	0.52
24	1	0.52
Daily	1	0.52
Total	193	100.00

13% of respondents had non-intact skin exposure at least once in the past year.

Number of exposures per person range from 1 to 24, except for one individual claiming to have exposures on a daily basis.

Table 7: Mucous membrane exposures

No. Of Exposures	No. Of Persons	Percent
0	165	82.50
1	10	5.00
2	14	7.00
3	3	1.50
4	2	1.00
5	2	1.00
6	1	0.50
10	1	0.50
12	1	0.50
20	1	0.50
Total	200	100.00

18% of respondents had mucous membrane exposures, while the average number of exposures per person is 0.57.

2.6: Reporting of skin and mucous membrane exposures

Of a total of 61 individuals who had non-intact skin and mucous membrane exposures, only 5 persons (8%) of respondents reported non-intact skin and mucous membrane exposures in terms of claims made by respondents.

Table 8: Reasons given for not reporting skin and mucous membrane exposures by respondents

Reasons	Freq.	Percent
Skin was intact	47	25.4%
Thinks it is of negligible risk	32	17.3%
Not aware it should be reported	11	5.9%
Not Applicable	57	30.8%
Too common to be reported	10	5.4%
Makes a difference in outcome	2	1.1%
Reluctant/Scared	1	0.5%
Injury due to carelessness	4	2.2%
Did basic first aid.	12	6.5%
Did not have time to report	5	2.7%
Patient was HIV Negative	4	2.2%
Total	185	100.0%

2.7 Contribution of different activities to Skin and Mucous Membrane exposures and suggested preventive solutions

Of a total of 176 individuals indicating various activities preceding exposures, only one individual (0.57%) implicated recapping of used needle, 7 individuals (3.98%) implicated disposal of used needles, 34 individuals (19.32%) implicated venepuncturing, 41 individuals (23.30%) implicated suturing, 45 individuals (25.57%) implicated administration of injection and I.V. fluid, while 48 individuals (27.27%) implicated other activities.

Table 9: Suggested preventive solutions for Skin and Mucous Membrane exposures

Preventive solutions	Individuals	Percent
Wearing gloves	51	26.8%
Availability of gloves	17	8.9%
Wearing other PPE. E.g. Masks	35	18.4%
Unavoidable	11	5.8%
Do not know	55	28.9%
Proper restraint	1	0.5%
Better workload/work distribution	5	2.6%
Adhering to acceptable procedures	14	7.4%
Total	189	100.0%

The highest proportion (26.8%) of respondents who proffered solutions identified wearing gloves as the preventive measure that would avoid their exposures.

2.8: Association between ANI and number of Policies and Practices in Category IA

There is no statistically significant association between number of needlestick injuries and the number of policy and practice recommendations implemented in category IA (coef. -107.486, conf. Interval -271 to 56, t = -1.40, p= 0.182).The association was however on the expected side, with more policies in place, the less ANI.

2.9: Association between ANI and number of written policy documents or records

There is no significant association between the number of written policy documents or records in place and number of ANI. In fact, the association was in the opposite direction, with higher numbers of written policy documents and records in place being associated with higher ANI.

(Coef. 58.38856, t = 1.11, p = 0.283, CI = -53.48011 to 170.2572).

2.10: Association between number of beds per doctor or nurse and incidence of needlestick injuries

There is no statistically significant association between number of beds per doctor and the incidence of needlestick injuries among doctors. Coefficient of association = 0.516, t = 0.51, p = 0.608.

There is also no statistically significant association between number of beds per nurse and the incidence of needlestick injuries among nurses. Coefficient of association = 0.460, t= 0.71, p = 0.477.

2.11: Presence of the category IA recommendations in the facilities studied

Table 10: Facilities with measures to ensure that health care personnel are familiar with precautions to prevent occupational transmission of blood-borne pathogens

Measures	No. Of Hosps.	Percent
Present	18	94.7%
Absent	1	5.3%
Total	19	100.0%

Table 11: Facilities where Hepatitis B vaccine is administered to personnel who perform tasks involving routine and inadvertent contact with blood and other body fluids

Vaccination	No. Of Hosps.	Percent
Yes	18	94.7%
No	1	5.3%
Total	19	100.0%

Table 12: Facilities where routine serologic screening is performed before vaccinating for hepatitis B

Screening	No. Of Hosps	Percent
No	15	78.95
Yes	4	21.05
Total	19	100.00

It should be noted that the appropriate response here is no. The practice of routinely performing serological screening before hepatitis B is not recommended. This can only be justified if the health care organisation considers screening to be cost-effective or the potential vaccinee requests it.

Table 13: Facilities where post-vaccination screening for immunity to hepatitis B is performed within 1 to 2 months after the third dose of vaccine for hepatitis B

Screening	No. Of Hosps.	Percent
Yes	4	21.1%
No	14	73.7%
Not sure	1	5.3%
Total	19	100.0%

Table 14: Facilities where both passive and active immunisation are used for post-exposure prophylaxis in susceptible persons who have needlestick injuries, percutaneous, or mucous membrane exposure to blood known or suspected to be at high risk for being HBsAg seropositive

Immunisation	No. Of Hosps.	Percent
Yes	5	31.6%
No	9	47.4%
Not sure	4	21.1%
Total	19	100.0%

Table 15: Facilities using appropriate recommendation for post-exposure prophylaxis after percutaneous or mucous membrane exposure to blood and body fluid that is known or suspected to be at high risk for being HbsAg seropositive

Recommendation	No. Of Hosps.	Percent
Yes	12	63.2%
No	6	31.6%
Don't Know	1	5.3%
Total	19	100.0%

Table 16: Facilities that ensure that emergency-response employees are routinely notified of infectious diseases in patients they have cared for or transported

Notify	No. Of Hosps.	Percent
Yes	9	47.4%
No	10	52.6%
Total	19	100.0%

Table 17: Facilities with policies that ensure that health care professionals are familiar with hospital rules to prevent occupational transmission of blood-borne pathogens

Policy	No. Of Hosps.	Percent
Yes	18	94.7%
No	1	5.3%
Total	19	100.0%

2.12 Implementation of confidentiality and latex allergy policies

2.12.1 Confidentiality

Table18: Facilities that ensure that updated health record for all personnel are kept, maintain the confidentiality of their records while providing appropriate management for occupational illnesses or exposures

Policy	No. Of Hosps.	Percent
Present	12	63.2%
Absent	7	36.8%
Total	19	100.0%

Table 19: Facilities with policies that ensure that when data on personnel health are made public, the individual's confidentiality is maintained, for example, by releasing only aggregate numbers

Policy	No. Of Hosps	Percent
Yes	19	100.0%
Total	19	100.0%

2.12.2 Latex allergy

Only 5 facilities (26%) had measures for managing latex allergy, while 3 facilities (16%) had a written protocol for managing latex allergy. 7 facilities (37%) had a surveillance mechanism for identifying and managing latex allergies. 14 facilities (74%) had a non-latex glove supply program. 3 facilities (16%) assess the impact of their latex allergy prevention activities. 10 facilities (53%) had educational activities on latex allergy.

2.13 Cumulative number of recommendations practised in the 19 facilities

Table 20: Frequency table of category IA recommendations (Annexure 1) practised in the studied hospitals

No. Of Recs.	No. Of Hosps.
3	3
4	2
5	7
6	3
7	3
8	1
Total	19

5% of hospitals (1 hospital) had all the category IA

recommendations in place, 31% (6 hospitals) had 75% of the recommendations and 47% (9 hospitals) had 50% to 60% of the recommendations. The rest 16% (3 hospitals had less than 50% of the recommended policies and practices.

Table 21: Frequency table of category IB recommendations (Annexure 1) practised in the studied hospitals

No. Of Recs.	No. Hosps.
15	1
19	1
23	1
24	2
25	2
26	2
28	1
30	1
31	3
33	4
36	1
Total	19

About 90% (17) of all hospitals met 50% and above of the category IB recommendations.

2.14: Existence of appropriate written policy documents or records

Table 22: Frequency table of number of written policy documents or records (annexure 2) for the relevant recommendations in the 19 hospitals studied

Written policies and records	No. Of Hosps.	% of Hosps.
0	2	10.53
1	2	10.53
2	3	15.79
3	5	26.32
4	3	15.79
5	2	10.53
6	2	10.53
Total	19	100.00

Only 2 hospitals (10%) had up to 6 of the 12 policy documents or records recommended. One hospital had none. Only 3 out of the total of 19 hospital had a written protocol on managing latex allergy.

3. Discussion

Accidental needlestick injury is a major occupational health risk in the hospital and health care environment.[1, 2, 3] The rising incidence of emerging infections, drug resistance and pandemics such as HIV/AIDS has made the problem an even more worrisome one.[17]

3.1 Incidence and reporting of needlestick injuries

This study shows an incidence rate of 1.050 needlestick injuries per person per year, with 34% of respondents having had at least one needlestick injury in the 12 months preceding the study. It appears that work habits, systems and practices have not resulted in rigorous needlestick preventive measures following the rising prevalence of the HIV/AIDS problem. Some studies performed in Africa in the late eighties to early nineties showed proportion of study participants incurring needlestick injuries in one year of 27% in Nigeria[18] and 41% in the Democratic Republic of Congo.[33] It should be noted that these studies were among all health workers, while this thesis was among doctors and nurses only. It is difficult to draw a conclusion here regarding trend over time with needlestick injury results using findings from different sites in different countries. Results from different environments often vary significantly.[34, 35] This study and another South African study performed three months apart, showing percutaneous exposure to HIV infected blood in 33% of interns in one year[19], at least show that there is no evidence of abatement of the problem of needlestick injuries.

Some studies in the United States indicate a preponderance of needlestick injuries in nurses.[36, 37] Another study conducted in Nigeria suggests that doctors are more affected.[18] There is no statistically significant difference in the injury rates among doctors and nurses and among the different levels of hospitals in this study. Local and regional factors in health care delivery may affect the relative occurrence of needlestick injuries in doctors and nurses. More information is needed to explain the equal occurrence of needlestick injuries in this study, and whether there is a pattern of doctors sustaining more injuries relatively in developing country environments.

In this study, administration of intravenous therapy or injections (32%) and venepucturing (16%), suturing or assisting in suturing (26%) are the most important activities preceding needlestick injuries. This finding is consistent with those of previous studies cited.[18, 34, 35, 36, 37] Needle recapping plays a much less role in this study and the Nigerian study, with the proportions of needlestick injuries preceded by recapping being 12% and 18% respectively, compared to figures ranging from 25% to 60% in the other studies. Differences in spatial and temporal circumstances surrounding injuries highlight the need for ongoing local and facility surveys for prevention and monitoring of measures. The role of unexpected patient movement in the occurrence of needlestick injury has been described. [18] It is interesting that this study shows that a good proportion of respondents (15%) think that proper restraint of patients or procedure sites would have prevented their needlestick injuries. The role of restraint devices in

developing countries where patients might not understand and appreciate instructions prior to needlestick procedures needs to be investigated further.

This study shows a very low reporting of needlestick injuries, with only 3.8% of all injuries reported in the relevant hospital records. The reporting rate using claims made by respondents rather than figures on hospital records for reported incidents which stands at 14.43% is slightly higher, but yet very low for the purpose of effective prevention and post-exposure prophylaxis and immunisation measures. A much higher needlestick injury reporting rate of 64% was observed in a study among interns in Chris Hani Baragwanath and Johannesburg Hospitals.[19] In the Baragwanath and Johannesburg study however, needlestick injuries were from patients known to be HIV-positive, and reporting is according to respondents' claim and not using hospital reporting records. It appears that some respondents do not understand the reporting procedure in the hospitals, and would consider something like simply telling a superior about needlestick injury as reporting. This would explain the disparity between reporting rate of 3.8% (using reported incidents on record) and 14.43% (using claims of reporting). Other studies conducted in the United States showing that up to 70%[35] to 75%[38] of needlestick injuries are not reported (under-reporting of 25% – 30%), while equally poor, represent much better results than the finding of this study. This is particularly so, if consideration is given to the fact that the prevalence of HIV is higher in South Africa.

Various reasons such as not having enough time; ignorant of the reporting procedure; under-estimation of the occupational risk of exposure; breach in confidentiality; discrimination; fear or anxiety over knowing ones HIV status, and sterile needle are important reasons for not reporting.[35, 38] This study revealed similar reasons, however, an interesting result that did not feature in the other studies was patients' was HIV negative status (15% of respondents) being the reason given for not reporting. The danger here is that other blood-borne infections are over-looked, especially, hepatitis B, which is more infectious, but fortunately has effective passive and active immunisation regimens. It appears that most of the reasons for not reporting can be easily clarified through staff education.

The rate of approximately one needlestick injury per person per year, assuming a risk of 0.3%[3, 13] after needlestick injury and HIV prevalence of 50%[39] among Gauteng hospital patients, translates into about 5% lifetime risk (30-year career) of nosocomial HIV acquisition for doctors and nurses.

Applying the above model to hepatitis B, and assuming a seroconversion rate of 12%[6] and prevalence of Hepatitis B surface antigen of approximately 9.6%[2], lifetime risk (30-year career) of nosocomial HIV transmission will stand around 35%. Active Hepatitis B virus immunization will improve this outlook by more than 95%, leaving only about 4% of susceptible individuals at risk if the necessary policies and programs for hepatitis B immunization are in place.[7]

3.2 Incidence and reporting of other exposures

Accidental inoculation, not only with needlestick injuries, but also with mucous membrane exposures and non-intact skin exposures are recognised modes of transmitting blood-borne infections.[40, 41] Skin, non-intact skin and mucous membrane exposures were also very frequent in this study. About 64% of respondents reported at least one intact skin exposure, 13% had non-intact skin exposure and 18% had mucous membrane exposures. Of a total of 61 individuals who had non-intact skin and mucous membrane exposures, only 5 persons (8% of respondents) reported non-intact skin and mucous membrane exposures in terms of claims made by respondents. The above results represent worse findings than the mucous membrane exposure rate of 10.46% among housestaff; and reporting rate of 38% in some San Francisco teaching hospitals, with a HIV prevalence of only 15% among patient population.[35]

3.3 Health policies, protocols and practices

Articulate health policies in the broader health system are known to impact positively on health status.[42, 43] The differences in efficiency and quality of care between Central and Eastern Europe where there is lower health system performance compared to Western Europe has been attributed partly to the national health policies in the two regions.[44] Comparing the primary health care policies of Botswana, Cote d' Ivoire, Zimbabwe and Ghana, despite lower per capita GNPs, both Zimbabwe and Ghana outperformed Cote d' Ivoire in health

sector using under 5 mortality rate, infant mortality rate and life expectancy as indicators.[45]

The assemblage of plans, procedures and practices as policies or guidelines to solve health problems assist in realising health and occupational health objectives. At the facility level, personnel health policies or guidelines incorporating the different elements of personnel health and safety is essential for reducing the incidence of needlestick injuries and prevention of blood-borne infection among hospital personnel.[46]

The broad South African policy directives place the importance of health of workers very high. The Occupational Health and Safety Act of 1993 requires every employer to provide and maintain as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees.[32] This Act further states that it is the employers' duty to provide such information, instruction, training and supervision as is necessary to ensure the health and safety of its employees. The Constitution of South Africa sums up the priority accorded to health of the citizenry in the bill of rights, which enshrined that everyone has the right to have access to health care services.[47] This primacy attached to occupational health in the broad government policies and legislative documents does not seem to have filtered through to the health facilities. Comparing with eight category IA recommendations for hospitals, based on findings of well-designed experimental or epidemiological studies[28], 5% of

hospitals (1 hospital) had all the category IA recommendations in place, 31% (6 hospitals) had 75% of the recommendations and 47% (9 hospitals) had 50% to 60% of the recommendations. The rest 16% (3 hospitals) had less than 50% of these strongly recommended policies and practices. These findings are based on claims made by the hospitals that they had the respective policies or practices in place.

The category IB recommendations are strongly recommended for all hospitals and reviewed as effective by experts in the field and a consensus of Hospital Infection Control Practices Advisory Committee members on the basis of strong rationale and suggestive evidence, even though definitive scientific studies have not been done. [28] In this category, About 90% (17) of hospitals met 50% and above of the recommendations. These findings are also based on claims made by the hospitals that they had the respective policies or practices in place.

When all the recommendations were grouped into a list of 12 policy documents or records. Only 2 hospitals (10%) had up to 6 of the 12 policy documents or records recommended. One hospital had none. Only 3 out of the total of 19 hospital had a written protocol on managing latex allergy.

The association between policies and health outcome has been traced. Articulating appropriate personnel health and safety policies on blood-borne infections impact on the occurrence of occupational diseases and injuries, such as

needlestick injuries. Policies also help to clarify how they are managed in the facilities, like instituting the necessary post-exposure prophylaxis and immunisation as needed. As a cross-sectional study, this work cannot credibly make a direct association between the needlestick injuries and the policies in the facilities. However, some of the findings provide corroborative evidence that are in agreement with the claim that the presence of the relevant personnel health policies reduce occurrence of injuries in facilities.[46] There is no statistically significant association between number of policies and practices in the category IA in the respective hospitals and the incidence of needlestick injuries. However, the correlation was on the expected side, with more policies in place, the less ANI.

4. Recommendations

The importance of personnel health infection control being articulated in the form of policy documents with implementation targets cannot be over-emphasised. The results from this study show that most hospitals do not have the necessary policies and systems to deal with the issues. Lack of the necessary policies and records could pose a major problem in the fight against blood-borne infections, particularly the HIV/AIDS epidemic. The incidence of ANI is too high, especially in our high HIV prevalence environment. Reporting rate of needlestick injuries in the hospitals is extremely low, and the reasons given for not reporting are not justifiable. Well defined policies and protocols that are effectively marketed and monitored to ensure compliance with recommendations are essential to reducing the incidence of needlestick injuries and other exposures to body fluid of patients.

4.1 Accidental Needlestick Injury Prevention Measures

An intensive structured education of staff is needed to address compliance with recommended protocols and practices while performing procedures involving needles and sharps. This educational programme on infection control with special emphasis on blood-borne infections and needlestick injuries should encompass all categories of hospital workers, including doctors and nurses. The hospitals should keep records of persons who have attended the programmes, the objective being to ensure that every worker who comes in contact with patients attends and signs in for a minimum of one infection control session per year. The different facilities

should be made to report to the provincial authority on their infection control education program twice a year.

The objectives of the educational program should be to:

a. Provide information on the dangers of needlestick injury
b. Provide information on the remedies available post needlestick injuries, especially in instances where there are exposures to HIV, hepatitis B and syphilis
c. Inform participants on the statistics and epidemiology of needlestick injuries in the facilities concerned
d. Provide information on the recommended practices, protocols and policies geared towards reducing the chances of accidental needlestick injuries, and the approved process when an injury occurs, particularly the reporting process for needlestick injuries
e. Provide information on the requirements and processes for occupational compensation for nosocomial HIV infection among health workers

4.2 Skin and Mucous Membrane exposure prevention measures

The use of standard precautions which incorporates universal precautions, such as glove use and use of other personal protective equipment is poor among the study participants, hence the high incidences of cutaneous and mucous membrane exposures to patients' body fluid. Procedures that entail the possibility of contact with patients' body fluid must always be carried out with gloves, masks

and eye protection. Certain professional categories such as cleaners must use non-penetrable gloves at all times while performing their duty.

Each incident of contact with possible infected body fluids reported, if there is significant exposure and risk, must be fully investigated and discussed with the health care worker/s involved, and their supervisors, the occupational health practitioner and infection control staff. This exercise is primarily to have a debriefing session, to educate all involved, to promote compliance and to ensure the staff involved of the support of management.

The infection control nurse should conduct a structured inspection in different parts of the hospital to observe compliance among staff with the different recommendations on infection control. The items to check during the inspection should include use of gloves and other personal protective equipment. The inspection items will be agreed to by the health and safety committee. A report on compliance should be compiled monthly by the infection control nurse and submitted to the superintendent of the hospital. Compliance as contained in the report will be part of the epidemiology and statistics aspect of the educational program in the facility.

4.3 Policy Recommendations

The Provincial Health Authority should workshop the issue of personnel health policies for the hospitals and co-ordinate the writing of a comprehensive policy and protocol to deal with occupational health issues in the health facilities. The necessity to include all essential elements of personnel health and safety in a concise form, possibly in a single document, requires that a co-ordinated approach is followed, and that the province plays a supervisory role in the draft of such a document.

An assessment of the incidence of needlestick injuries and audit of the policies and practices in place to deal with infection control in the health facilities should continue on an annual basis. This assessment should take the form of a survey to determine the incidence of needlestick injuries and to compare it with the reported numbers. Policy audit should comprise of an evaluation of the policy documents and records and the needlestick and infection control reports. The results of this survey and audit should be co-ordinated and collated by the province and appropriate reinforcements and support made to the different health facilities based on the findings and conclusions.

A careful evaluation should be made of the reasons for not reporting, especially, how the reporting process could play a role in limiting reporting of incidents. Given the high prevalence of HIV in our environment, including among health workers, the issue of confidentiality needs to be paid careful attention to. The goal should

be to ensure that no one who knows a staff member, or is likely to know somebody who knows a staff member gets to know the HIV status as part of the reporting process. In other words, absolute unanimity is essential, but impossible in the existing process. An innovative system design to ensure absolute unanimity from the screening to prophylactic treatment is required, and as such, blinded treatment should be considered.

4.4 Implementation structures, systems and cost

Health and safety committees have essentially been successfully constituted in facilities in the province. These committees, with a co-ordinating chairperson or infection control nurse, depending on the peculiar arrangements in the individual facilities, should serve as a vital implementation function for these recommendations. In fact, the result of this study makes it a legislative imperative for the committee to implement measures to mitigate against the very high incidence of accidental needlestick injuries. Members of committee are drawn from staff of the facilities and time spent on activities related to personnel health and safety is covered by hospital and as such, no significant additional costs, if any, will be incurred by the facilities to implement the systems and activities. It appears that what is needed is to define activities and agree on a set of priority programmes for the committees as well as for management, and this work and its results provide the information for prioritising the recommendations made here.

5. References

1 Pellizer G, Zamperetti N, Stroffolini T. Et. al. Serological survey of hepatitis B in Tanzania, Public Health 1994; 108:427-431

2 Prozesky OW, Szmuness W, Stevens CE. Et. al. Baseline epidemiological studies for a hepatitis B vaccine trial in Kangwane. SAMJ 1983; 64:891-893

3 Cardo DM, Culver DH, Ciesielski C. Et. al. A case control study of HIV seroconversion in health care workers after percutaneous exposure. N Eng J Med 1997;337:1485-90)

4 Centres for Disease Control and Prevention. Guidelines for Infection Control in Health Care Personnel. American Journal of Infection Control 1998;26:302-305).

5 Shappiro CN. Occupational risk of infection with hepatitis B and hepatitis C virus. Surg Clin North Am 1995;75:1047-56

6 Friedland GH, Klein RS. Transmission of the human immunodeficiency virus. N. Eng J Med 1987; 317:1125-35

7 Centres for disease Control and Prevention. Immunisation of health-care workers: recommendations of the Advisory Committee on Immunisation Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). MMWR Morb Mortal Wkly Rep 1997;46(RR-18):1-42

8 Chew SK. Risk of hepatitis and AIDS among health professionals. In: Chia KS, Jeyaratnam J, editors. Occupational health in national development. Singapore: World scientific; 1994. P.196

9 Zucherman J, Clewley G, Griffiths P. Et. al. Prevalence of hepatitis C antibodies in clinical health-care workers. Lancet 1994;343:1618-20

10 Mitsui T, Iwano K, Masuko K. Et. al. Hepatitis C virus infection in medical personnel after needlestick accident. Hepatology 1992;16:1109-14

11 Laufer FN, Chiarello LA. application of cost-effectiveness methodology to the consideration of needlestick- prevention technology. Am J Infect Control 1994; 22: 75-82

12 Schoub BD, Johnson S, McAnerney JM. Et. al . The role of sexual transmission in the epidemiology of hepatitis C virus in black South Africans. Trans Roy Soc Trop Med Hyg 86:431-433

13 Chamberland ME. Ciesielski CA. Howard RJ. et. Al. Occupational risk of infection with human immunodeficiency virus. Surg.Clin North Am 1995;75:1057-70

14 Marcus R, Bell DM, Occupational risk of human immunodeficiency virus. In: DevitaVT, Hellman S, Rosenberg SA, editors, AIDS: Aetiology, diagnosis, treatment and prevention. 4th ed. Philadelphia: Lippincott Raven; 1997. P. 645-54

15 McCormick R, Maki DG. Epidemiology of needlestick injury in hospital personnel. Am. J. Med. 1981; 70:928-32

16 Harrington JM, Gill FS, Occupational Health. 3rd ed. London: Blackwell Scientific Publications; 1992.p.222

17 National Department of Health. South Africa. 1998 National HIV sero-prevalence survey of women attending public ante-natal clinics in South Africa. Department of Health, Pretoria 1999

18 Adegboye AA, Moss GB, Soyinka F. The epidemiology of needlestick and sharp instrument accidents in a Nigerian hospital. Infect Control Hosp. Epidemiol 1994; 15: 27-31

19 Karstaedt AS, Pantanowitz L. Occupational exposure of interns to blood in an area of high HIV seroprevalence. S Afr Med J 2001; 91:57-61

20 Harrington JM, Gill FS, Occupational Health. 3rd ed. London: Blackwell Scientific Publications; 1992.p.219-34

21 Tan CC. Needlestick injury and back pain in nurses. In: Chia KS, Jeyaratnam J, editors. Occupational health in national development. Singapore: World scientific; 1994. 182

22 Tan CC. Needlestick injury and back pain in nurses. In: Chia KS, Jeyaratnam J, editors. Occupational health in national development. Singapore: World scientific; 1994. 183

23 Bolyard EA. Bell DM. Universal precautions in the Health Care setting. In: DevitaVT, Hellman S, Rosenberg SA, editors, AIDS: Aetiology, diagnosis, treatment and prevention. 4th ed. Philadelphia: Lippincott Raven; 1997. P. 655-64

24 Garner JS. Hospital Infection Control Practices Advisory Committee. Guideline for isolation precautions in hospitals. Infect Control Hosp Epidemiol 1996;17:53-80

25 Centres for Disease Control and Prevention. Evaluation of safety devices for preventing percutaneous injuries among health care workers during phlebotomy procedures-Minneapolis-St. Paul, New York City, and San Francisco, 1993-1995. MMWR Morb Mortal Wkly Rep 1997;46:21-5

26 Centres for Disease Control and Prevention. Evaluation of blunt sutures and needles in preventing percutaneous injuries among health care workers in gynaecologic surgical procedures-New York City, March 1993-June 1994. MMWR Morb Mort Wkly Rep 1997;46:25-29

27 Short LJ, Benson DR. Special considerations for surgeons. In: Devita VT, Hellman S, Rosenberg SA, editors, AIDS: Aetiology, diagnosis, treatment and prevention. 4th ed. Philadelphia: Lippincott Raven; 1997. P. 665-73

28 Centre for Disease Control. Guidelines for infection control in health care personnel. American Journal of Infection Control, 1998;26:292

29 Centre for Disease Control. Guidelines for infection control in health care personnel. American Journal of Infection Control, 1998;26:328

30 Centre for Disease Control. Guidelines for infection control in health care personnel. American Journal of Infection Control, 1998;26:339

31 National Department of Health. South Africa. White Paper on Transformation of the Health System in South Africa. Department of Health. Pretoria. 1997

32 Occupational Health and Safety Act 85 of 1993. Government Printers, Pretoria, South Africa. 1993. Chapter 19.p.22

33 Mann JM. Francis H. Quinn TC. Et al. HIV seroprevalence among hospital workers in Kinshasa , Zaire. Lack of association with occupational exposure. JAMA 1986;256:3099-102

34 McGeer A. Simor AE. Low DE. Epidemiolody of needlestick injuries in house officers. J Infect Dis 1990;162:961-64

35 Mangione CM. Gerberding JL. Cummings SR. Occupational exposure to HIV: frequency and rates of underreporting of percutaneous and mucocutaneous exposures by medical house staff. Am J Med 1991;90:85-90

36 McCormick R and Maki DG. Epidemiology of needlestick injuries in Hospital personnel. Am J Med 1981; 70:928-32

37 Reuben FL, Norden CW, Rockwell K et al.Epidemiology of accidental needle-puncture wounds in hospital workers. Am J Med Sci 1983; 286:26-30,

38 Harmony BH. Under-reporting of needlestic injuries in a university hospital. Am J Infect Control 1983; 11:174-7

39 National Department of Health. HIV/AIDS in South Africa. Impact and Priorities. Department of Health and the Department for International Development. Pretoria, South Africa. 1998

40 Hambrick G, Cox R, Senior J. Primary herpes simplex infection of the fingers of hospital personnel. Arch Dermatol 1962;85:583-5

41 Seeff LB, Wright EC, Zimmerman HJ, et al. Type B Hepatitis after accidental needlestick exposure: prevention with hepatitis B immunieglobulin. Final report of the veterans administration Cooperative Study. Ann Intern Med 1978;88:285-93

42 Davies R, Sanders D. Adjustment policies and the welfare of children: Zimbabwe, 1980-1985. In: Cornia GA. (Ed.), Adjustment with human face: Country studies. Oxford: Claredon Press. 1988. P. 297

43 World Bank. World Development Report. The Challenge of Development. New York: Oxford University Press 1991. p. 52-69

44 Feacham R, Preker A. Health and Health Care. In: Barr N. (Ed.), Labor Markets and Social Policy in Central and Eastern Europe: The Transition and Beyond. Oxford University Press 1994. p. 290-2

45 Dugbatey K. National Health policies: Sub-Saharan African case studies. Social Science and Medicine 1999; 49:223-39

46 Centres for Disease Control and Prevention. Guidelines for infection control in health care personnel. American Journal of Infection Control 1998;26:289-354

47 South African Government. Act 108 of 1996:Constitution of the Republic of South Africa. Government Printers. Pretoria, South Africa. 1996.Chapter 27.p.12