

# The pattern of sharps injury to health care workers at Witbank Hospital

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## Abstract

**Background:** The aim of this study was to identify procedures, areas of activity, occupational groups and other variables that carry a high risk of transmission of bloodborne infections from patients to healthcare workers (HCWs) at Witbank Hospital.

**Method:** This was a descriptive cross-sectional study, conducted among HCWs of Witbank Hospital who were directly involved in patient care over the two-year period under consideration (1.01.03 – 31.12.04). A directed questionnaire was used to carry out the study.

**Results:** A total of 435 HCWs completed the questionnaire.

1. A total of 46.7% of respondents had suffered from either needlestick/sharps injury (74.47%) or contamination of skin/mucous membranes (25.53%).
2. A total of 76.9% of all needlestick/sharps injuries were inflicted by injection needles.
3. Taking blood was the most dangerous procedure/activity: it was responsible for 29.56% of all injuries.
4. A total of 44.61% of injured HCWs reported one injury, 45.59% reported two to three injuries and 9,8% were injured more than three times.
5. The youngest interviewed group (20–29 years old) was injured most frequently (61.9%).
6. Professional nurses, who are the largest professional group employed at the hospital, were involved in 41.38% of all reported injuries.
7. House doctors reported the highest rates of injury: 84.37% of them were injured at least once.

**Conclusion:** This study showed that there is a well-defined pattern of injuries that can lead to transmission of bloodborne infections from patients to HCWs at Witbank Hospital. The areas of activity, procedures and occupational groups that result in a high risk of transmission of bloodborne infections to HCWs were identified, and will be used to design the preventive strategies.

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## Introduction

Healthcare workers (HCWs) always have been at risk of contracting infections from their patients. During the past two decades this risk has become even more significant as the HIV epidemic has been growing and the prevalence of Hepatitis B and C has increased significantly. Each percutaneous injury, where contamination with patient's blood occurs, can be a source of an acute/chronic disease, which may lead to disability or death of HCWs. It is estimated that in the USA alone 600 000 – 800 000 needle stick injuries occur every year.<sup>1</sup> According to UK data, there were 813 cases of exposure of HCWs to bloodborne viruses between July 1997 and June 2000.<sup>2</sup> (How accurate these statistics are is difficult to establish.) According to Pirwitz et al<sup>3</sup> and Holodnik and Barkaukos<sup>4</sup> the estimated underreporting rate can be between 64% and 96%.

The researcher started working at Witbank Hospital in 1991 and since then many of his colleagues and co-workers (including himself) have experienced sharps injury while performing their duties. Many of these injuries could have been easily avoided if suitable preventive measures had been introduced earlier.

Factors associated with an increased risk of occupational exposure can differ from place to place. While developed countries are busy designing new protective devices and improving their policies, the developing world still struggles with the lack of basic equipment, inadequate policies and poor adherence to them. In Tanzania (Iringa district), traditional birth attendants use plastic bags to protect themselves from HIV exposure, as rubber gloves are not available.<sup>5</sup> In Nigeria, a shortage of gloves is observed even in the operating room (OR).<sup>6</sup> A cross-sectional study conducted in a teaching hospital in Enugu (Nigeria) reported that 53% of surgeons experienced percutaneous injuries in the three months preceding the survey.<sup>7</sup> In South Africa, healthcare facilities are in an incomparably better situation, but occupational exposure to bloodborne pathogens still remains high and shows a growing tendency. A study carried out in the maternity unit of King Edward VIII hospital in Durban between 1999 and 2003 showed that the rate of HIV exposure among HCWs of the unit was high, and is still increasing.<sup>8,9</sup>

In the past, the main preventive efforts were directed at discouraging recapping needles and improving the design of sharps containers. Today there are many sharps safety devices on the market, but unfortunately they are expensive and the value of some of them has been questioned.

Education seems to be an effective tool in reducing the incidence of sharps injury. A study conducted by Fisman and colleagues among HCWs in the USA revealed that there was significantly increased risk of injury associated with rushing, anger, distraction and multiple attempts to perform a procedure.<sup>10</sup> According to Parsons, in an article in the *Journal of Association of periOperative Registered Nurses* (August 2000),<sup>11</sup> there was a 59% drop in reported OR nursing exposure as a result of educational action only. The total cost of this project was 251 US dollars and 75 cents, which is less than the cost of a single follow up of one high-risk exposure.

## Methods

This study was a descriptive cross-sectional study, which was conducted among HCWs at Witbank Hospital. Data acquisition for this study was obtained from a directed questionnaire administered by the researcher with the aid of a translator when necessary. The questionnaire was applied to over 80% of HCWs, who gave informed consent and who were involved directly in patient care over the two-year period analysed (01.01.03 – 31.12.04). The 53-item structured questionnaire was developed based on the review of world literature. Confidentiality of the HCWs participating in the study was protected by coding each questionnaire. The study concentrated on needlestick/sharps injuries (NS/SI) but also included contamination of skin/mucous membranes (CS/MM) with patient's body fluids.

A total of 435 HCWs from Witbank Hospital took part in the study, which included more than 80% of all personnel directly involved in patient care during the study period. The researcher was unable to interview the remaining 20% of HCWs for purely logistic reasons (sick leave, annual leave, shift rotation, etc).

## Results

### Frequency of NS/SI and CS/MM in the Witbank Hospital

Injury was defined as: (a) NS/SI or (b) CS/MM.

- 204 of all participants (46.7%) reported injury. The overall risk of injury per year was 23.35% ( $p = 0.2335$ ).
- 156 of all injured reported NS/SI (74.47%).
- 48 of all injured reported CS/MM (25.53%).
- 31 injuries were inflicted with clean (not contaminated) instruments, but they were nonetheless taken into consideration in order to estimate the potential risk.

### Number of injuries per HCWs during the study period

The following numbers of injuries were reported: 1 injury 44.61% ( $n = 91$ ), 2–3 injuries 45.5% ( $n = 93$ ) and > 3 injuries 9.8% ( $n = 20$ ).

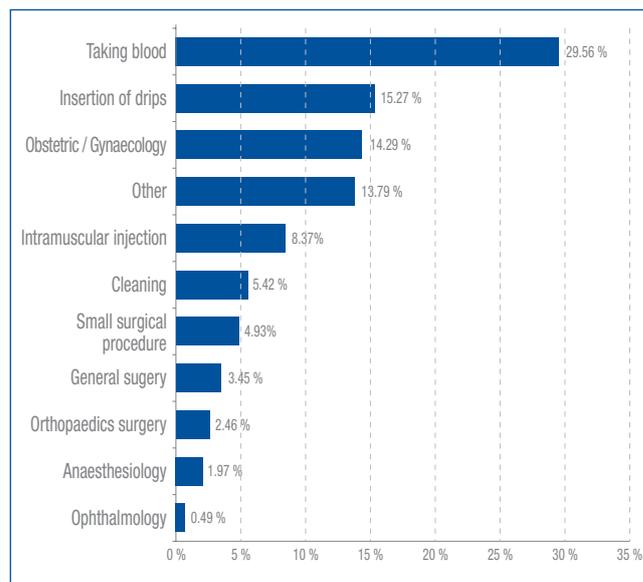
### Instruments involved in injuries

Injection needles caused most of the NS/SI injuries (76.92%). The second most dangerous instruments were suture needles (12.82%), while blades were the least dangerous (7.05%). Other surgical instruments were responsible for less than 5% injuries (3.21%).

### Type of procedure/activity being performed when injury occurred

Figure 1 shows the type of procedure/activity that was being performed when injury occurred.

Figure 1: Type of procedure/activity being performed when injury occurred



As can be seen, taking blood was the activity carrying the highest risk of injury (29.56% of all injuries), followed by the insertion of drips (15.27%) and Obstetrics and Gynaecology (Obs/Gyn) procedures (14.29%). Of the 29 injuries that occurred during Obs/Gyn activity, 22 were due to CS/MM (75.87%). Handling (61.40%) and stab injuries (29.82%) were responsible for about 90% of all injuries that occurred during the taking of blood.

Injuries that occurred during the insertion of drips were due to: stab injuries (37.93%), handling instruments/needles (34.48%), CS/MM (24.14%) and inappropriate disposal of sharps (only 3.45%).

### Cause of injury

Inappropriate handling of instruments/needles was responsible for most of the injuries (47%). The second most important cause of injuries was CS/MM (22%), followed closely by stab injuries (21%). Incorrectly disposed needles/sharps were responsible for only 7% of all injuries, while passing instruments/needles and using hands as instruments were responsible for 2% and 1% of all injuries, respectively.

### Place where injury occurred

The highest number of injuries occurred in the wards (69%), followed by in the casualty department (Casualty) (16%), in the theatre (Theatre) (0) and the laboratory (Laboratory) (2%). In the wards, injection needles caused 89.42% of all NS/SI. In Casualty 37.5% of all NS/SI were caused by suturing needles, 25% by injection needles, 25% by blades and 12.5% by other instruments. In Theatre 75.86% of all NS/SI were caused by injection needles and the remaining 24.14% by suturing needles. (No blade caused any injury reported in Theatre.)

### The risk of injury for different age groups

The highest risk of injury occurred in the group aged 20–29 (61.9% injured). It declined in the groups 30–39 (47.8%) and 40–49 (34.2%), but increased again in the group 50–65 (44.8%).

### Distribution/risk of injury among different professional groups

The distribution of injuries among professional groups is shown in Figure 3, and the risk of injury among different professional groups is given in Table I.

Figure 2: The risk of injury for different age groups – age in years

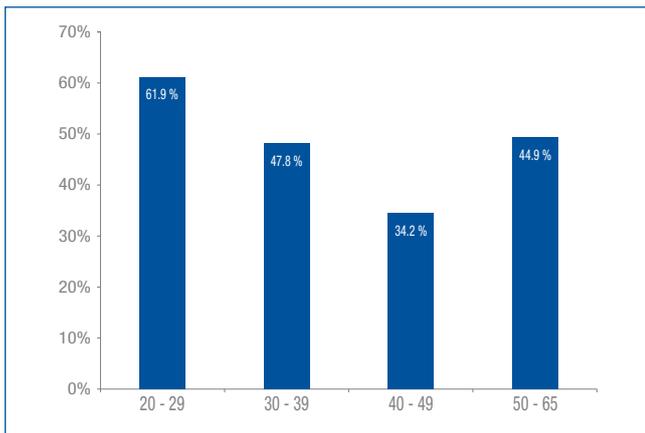


Figure 3: Distribution of injuries among professional groups

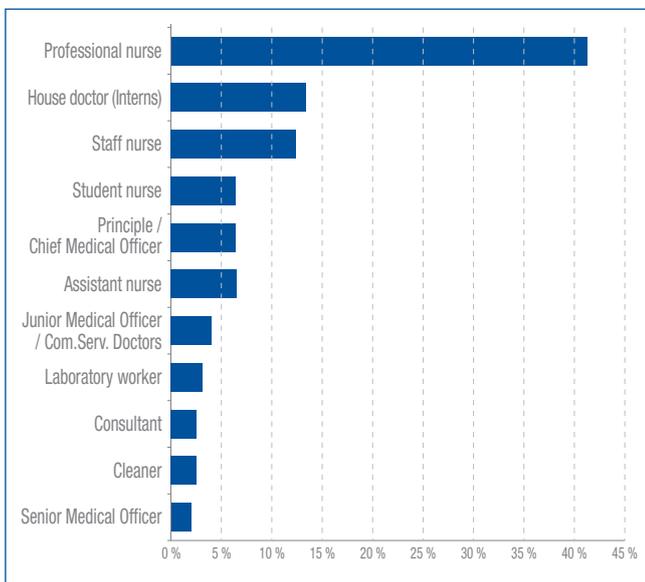


Table I: Risk of injury among different professional groups

Rank	Total number of HCWs in the rank	Number / (%) of HCWs of the rank who were injured
House doctor	32	27 (84.37)
P/CMO	17	13 (76.47)
JMO	13	8 (61.15)
Professional nurse	158	84 (53.16)
Staff nurse	51	25 (49.01)
Consultant	12	5 (41.66)
SMO	10	4 (40.00)
Laboratory worker	16	6 (37.5)
Student nurse	46	13 (28.26)
Assistant nurse	57	13 (22.80)
Cleaner	22	5 (22.72)

## Discussion

This survey has shown that there is a high incidence of injuries that can lead to the transmission of bloodborne infection to HCWs at Witbank Hospital: 46.7% of respondents reported at least one injury over a two-year period.

### Groups of HCWs who are at high risk of recurrent exposure to bloodborne pathogens

Analysis of the number of reported injuries per HCW during the study period revealed that slightly more respondents were injured two or three times (45.59%) than only once (44.61%). From a purely statistical point of view, being injured two to three times over a given period of time is less likely than being injured once. It clearly indicates that there is a group of HCWs who, due to their attitude, habits, psychomotor characteristics, etc, are particularly prone to getting injured.

### Age and frequency of injury of HCWs

A review of the age of injured HCWs shows that the youngest members of staff are at the highest risk (61.9% of HCWs of the age 20–29 were injured). The risk of injury first decreases with age, reaching the lowest level among the group 40–49 years (34.2%), but then starts increasing again among HCWs older than 50 years.

### Instruments, procedures/activities carrying a high risk of injury

Needles used for injection were involved in the majority of NS/SI (76.92%). Although this study was not designed to explore the current practices, it is obvious that the way that staff handle injection needles will need to be further investigated, and probably modified. (Incorrect handling was the cause of 47% of all injuries). Cumulatively, more than half of the injuries (53.2%) occurred during taking blood (29.56%), insertion of drips (15.27%) and intramuscular injections (8.37%). This confirms that practices involving handling needles for injection should be reviewed, and changed. Obs/Gyn procedures carry quite a high risk of injury as well (14.29%); 75.86% of all these injuries were due to CS/MM, and which usually is easy to avoid if proper protective clothes/devices are used.

### Cause/place where injury occurs

1. Handling of instruments/needles was responsible for 47% of all injuries, followed by CS/MM (27%) and stab injuries (21%). Although stab injuries, which are usually caused by uncooperative patients, are difficult to prevent, injuries caused by handling or CS/MM can clearly be avoided.
2. Inappropriately disposed needles/sharps were responsible for 7% of all injuries. This probably represents a significant improvement, but it is a cause of injury that can and should be completely eradicated.
3. The relatively low risk of injuries occurring in Theatre is in line with many other studies and may be due to underreporting.<sup>1</sup>
4. The low rate of injury in Theatre is even more surprising if one takes into consideration that 75.86% of NS/SI was caused by injection needles and the remaining 24.14% by suturing needles. (There was not one reported case of injury caused by a blade in Theatre!)
5. Casualty was the only place in the hospital where suturing needle injuries (37.5% of all NS/SI) were more prevalent than injection needle injuries (25% of all NS/SI). Casualty also has a relatively high level of injuries caused by blades (25% of all NS/SI). Being a quite unpredictable environment, Casualty probably will never be free of the risk of NS/SI or CS/MM, although additional research and modification of existing practices could reduce the risk.

### Rank/position and frequency of injury

When the number of injured MOs was compared to the number of all MOs in each rank who participated in the study, the following is evident: a very high percentage of house doctors sustained injuries (84.37%), the risk of injury was decreased among junior/senior MOs, and there was a high percentage of injuries among P/CMOs (76.47%)

Among nursing personnel, the risk of injury was the lowest among the most junior staff but increased with seniority, reaching a peak among professional nurses (53.16%). This possibly reflects their scope of duties.

Laboratory workers reported that, over the study period, 37.5% of them were injured, which places them at higher risk than staff nurses and assistant nurses. Out of six reported cases of injury, three were due to inappropriate handling and three were due to CS/MM.

### Recommendations

All newly employed HCWs, particularly the young and inexperienced, should be taught the correct techniques of handling/disposing sharps and using protective clothing/devices. It should be an ongoing process, with regular evaluation of its effectiveness. Similar measures need to be applied to all high-risk groups (as mentioned earlier).

There is a need for further study to evaluate existing techniques/practices involving the use of sharp instruments. Standards concerning techniques of taking blood, insertion of drips, allocation of sharps disposal containers, etc have to be developed. Warnings/information posters should be designed and distributed throughout the hospital. These should be particularly visible in the high-risk areas.

HCWs who report NS/SI or CS/MM should, after being counselled and prescribed post-exposure prophylaxis treatment, undergo a process of evaluation involving a review of their practices/techniques of handling sharps and protection against CS/MM. Circumstances of any injury should be carefully analysed to reveal any predisposing factors for injury. All this will have to be done in a tactful and friendly manner in order to avoid an increase of underreporting of injuries. Use of protective clothes/devices will need to be compulsory throughout the hospital, when/where appropriate, and it will have to be particularly strictly observed in the maternity ward due to the high risk of CS/MM there.

Further research is required in the Theatre situation in order to determine actual incidences of and trends in NS/SI and CS/MM. Further education of staff may then be required. The fear of being excluded from the OR if found to be infected with a bloodborne infection may be a factor contributing to underreporting by staff, and this will have to be addressed.

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