Needlestick injuries in a healthcare setting in New Zealand

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Abstract

Aim The aim of this study was to quantify the extent of needlestick underreporting, to examine factors which may contribute to underreporting, and to optimise the relevant risk management strategy.

Method An 11-item structured postal questionnaire was adapted from an existing CDC design.

Results The survey results showed that 9% of respondents had experienced at least one needlestick injury in the past year, and three practitioners had five or more injuries in the same period. The overall underreporting rate for needlestick injuries was 33%, which is consistent with internationally-reported figures. More than one in six respondent doctors (17.8%) had sustained one or more needlestick injuries in the past year, compared with nurses (7.6%) or midwives (6.7%).

Conclusion The survey identified the level of underreporting and the factors that influence needlestick reporting. This has resulted in a series of recommendations that will help our DHB to formulate an appropriate strategy to manage needlestick incidence and impact.

Needlestick injuries are a potential risk to health professionals who use needles and syringes in their clinical work. The New Zealand Health Strategy includes a framework and action plan to reduce the incidence and impact of infectious disease in an occupational setting.1 Needlestick prevention protocols are an important element of the action plan since they aim to reduce the incidence and impact of blood borne virus (BBV) transmission in the healthcare setting.

Exposure to a BBV such as Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and the Human Immunodeficiency Virus (HIV) are of concern due to the potentially serious consequences of contracting an infection.2 The incidence of occupational transmission following percutaneous exposure from an infected source for HIV, HCV and HBV are 0.3%, 3%, and 30% respectively.3 The Waikato DHB implemented a needlestick injury prevention program consisting of staff education, safe work practices, point of use sharps disposal units, and the implementation of needle safe devices. Despite these interventions statistics showed that the needlestick injury reporting rate had stayed relatively consistent over the last 5 years. There was anecdotal evidence that some needlestick injuries went unreported by health professionals at Waikato DHB, however, the magnitude of the problem was unknown.

Underreporting of needlestick injuries are estimated at between 30-51%.4, 5 Furthermore, there are suggestions of cultural differences in reporting behaviours.
between disciplines. Nurses were more likely to report, whereas the medical culture favoured ‘in-house’ incident management.

The aim of this study was to quantify the extent of needlestick underreporting, to examine factors which may contribute to underreporting, and to optimise the relevant risk management strategy.

**Method**

A postal questionnaire, adapted from an existing CDC design, was sent to all staff within Waikato DHB to be returned anonymously through internal mail. Five new questions were added and piloted before the final questionnaire was agreed. The questionnaire contained 11-items, with close-ended questions seeking dichotomous, multiple, and numeric responses.

The objective of the questionnaire was to establish the number of needlestick injuries sustained in the past 12 months, and the level of reporting. Respondents who had a needlestick injury which had not been reported had the option of identifying the reasons for not doing so. The questionnaire also asked about occupational group, age, gender, total number of years working with needles, types of needles that they are currently exposed to, and knowledge of the organisational policy.

The study population (N=2734) included all doctors, nurses and midwives employed at Waikato DHB in June 2007. Nurses and midwives were identified separately as they are recognised as different disciplines and identify with independent registration associations. At that time, the Waikato DHB employed doctors (n=576), nurses (n=2058), and midwives (n=100).

A sample-size analysis determined that a minimum of 521 nurses, 71 midwives and 133 doctors were needed to be surveyed to show disparity between reported and actual incidence of needle-stick injuries based on a 50% rate of non-reporting. However, the response rate from postal questionnaires can be as small as 5% to 30%, particularly for doctors. Therefore, a decision was made to sample the full population of medical, nursing and midwifery staff employed by the Waikato DHB.

Data were checked and edited before analysis. Descriptive data were analysed by profession. Logistic regression was used for the likelihood of needlestick injuries by years of working with needles and gender. Analyses were performed in Microsoft Excel (Microsoft, 2003) and SAS v9.1 software. Ethics approval was provided by the University of Auckland Human Subjects Ethics Committee.

**Results**

In total, 2734 questionnaires were sent out. The total number returned was 1346, a response rate of 49.2%. By profession the response rate was: midwives 75% (95% CI: 66.5, 83.5), Doctors 36.8% (32.8 - 40.7) and nurses 51.4% (49.52 - 53.57).

The age of respondents ranged from 20-60+ years. The median age was 44 years. 84% of respondents were female. By profession, the majority of nurses (94%) and all midwives were female while 34% of doctors who responded were also female.

**Familiarity with the needlestick policy**—In total, 95.9% of respondents claimed an awareness of the Waikato DHB policy for reporting blood and body substance exposure. 2.6% were not aware of the policy and 1.5% did not know. The response by profession demonstrated that over 1 in 10 doctors (10.8%) were not familiar with or did not know about the policy compared with 2.9% of nurses and 1.3% of midwives.

Four out of five respondents (80.7%) were familiar with the process for reporting exposures, while 1 in 5 were not (19.3%). By profession, doctors (46.9%) were over three to five times less likely to be familiar with the process than nurses (14.5%) and midwives (9.3%).

When asked who their first line of contact would be following a needlestick injury which exposed them to blood or body fluid, the majority of respondents reported to
their supervisor or manager (55.7%) followed by Health and Safety (23.9%). The emergency department (11.1%) and others (9.2%), including infection control, made up the remainder.

According to the relevant policy in 2007, the first point of contact after an exposure to blood or body fluid is the Health & Safety Service. Only 24% of all respondents were aware of this, despite 81% of respondents being familiar with the process for reporting exposures.

**Needlestick frequency**—A total of 123 out of 1346 respondents reported one or more needlestick injuries in the past 12 months (positive responders). By profession, 65 needlestick injuries occurred in 38 of 213 doctor respondents, 97 needlestick injuries occurred in 80 of 1058 nurse respondents and 6 needlestick injuries occurred in 5 of 75 midwife respondents.

This showed that the percentage of individuals that sustained a needlestick injury by profession was greatest for doctors at 17.8% (38/213), compared with nurses or midwives at 7.6% (80/1058) and 6.7% (5/75) respectively. This equated to over one in six respondent doctors sustaining one or more needlestick injuries in the past 12 months.

Of these 123 positive responders, a total of 168 separate incidents were recalled. These ranged from 1-6 needlestick injuries per person (Figure 1). The majority of positive responders had only one needlestick injury in the 12-month period (93/123, 76%).

**Figure 1. Number of needlestick injuries by respondents in a 12-month period**

![Figure 1](image)

**Underreporting by profession**—Underreporting varied according to profession with 50% of needlestick injuries being unreported by midwife respondents compared with 40% of doctor respondents and 26% for nurse respondents. (Table 1). In total, one-third of the needlestick injuries (55/168, 33%) were not reported.
Table 1: Rate of underreporting by profession

<table>
<thead>
<tr>
<th>Profession (n=total responders)</th>
<th>Total number of needlestick injuries (n=168)</th>
<th>No. of needlestick injuries unreported (n=55)</th>
<th>Percentage of needlestick injuries not reported by profession</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midwife (n=75)</td>
<td>6</td>
<td>3</td>
<td>50%</td>
</tr>
<tr>
<td>Doctor (n=213)</td>
<td>65</td>
<td>26</td>
<td>40%</td>
</tr>
<tr>
<td>Nurses (n=1058)</td>
<td>97</td>
<td>26</td>
<td>27%</td>
</tr>
</tbody>
</table>

**Reasons for not reporting**—Reasons for not reporting included a lack of time to carry out the reporting procedure which was cited by 16% of respondents. The perceived low risks of contracting a BBV from a patient or from using a particular procedure were cited by 16% and 11% of respondents respectively. Other reasons such as lack of importance, unaware of procedure, blame or trouble, ‘nothing more can be done’, and confidentiality concerns were also given.

**Multivariate analysis**—Logistic regression analysis revealed that females have an almost 50% lower likelihood of experiencing a needlestick injury in any particular year. There was also a reduction in the risk of needlestick injury of 18% for every 10 years of experience with handling needles.

**Discussion**

This study reports on the rate of non-reporting of needlestick injuries within a large District Health Board. The sample population included all of the doctors, nurses and midwives employed at Waikato DHB as of June 2007. There was no sub-sampling from this population, consequently the results are more likely to be transferable to other, similar settings within the health industry.

This study used a questionnaire that was adapted from a proven CDC design with demonstrated external validity. The overall response rate of this questionnaire was just over 49%. This compares to reported response rates as low as 5% to 30% for mailed questionnaires.

The relatively high response rate in this particular case is probably due to a combination of several factors:

- The questionnaire was short, with only eleven questions that took 2–3 minutes to complete.
- Departmental managers were informed of the questionnaire and its purpose in advance, and were asked to remind their staff to complete it.
- The subject matter involved personal safety in an area of recognised risk.
- The questionnaire was circulated in personalised envelopes with a typed name.
- All responses were anonymous.

It is interesting to note the high response from the midwifery group (75%). The majority of Midwives employed by the Waikato DHB are managed from a single central point, which may have helped to secure a good response rate. The response rate from nurses and doctors was 51.4% and 36.8% respectively.
Despite review by peer groups, a face validity test and a pilot trial, the questionnaire contained an ambiguity that was revealed during data analysis. While 123 individuals responded to having sustained any type of needlestick injury in the past 12 months, an additional 44 respondents who did not have a needlestick injury in the past 12 months, responded to the question which asked the reasons for not reporting their injury. These 44 ‘extra’ responses were excluded from the analysis.

Over 9% of the respondents (123 individuals) had experienced a needlestick injury in the past twelve months. The incidence rate varied according to profession, with around 17.8% of respondent doctors, 7.6% of respondent nurses and 6.7% of respondent midwives sustaining one or more needlestick injuries in the previous 12 month period. Doctors and midwives had a high underreporting rate (40% & 50% respectively) meaning both are an occupational group that are most at risk.

Of the 123 respondents who sustained a needlestick injury in the past 12 months, 93 experienced one event while 27 respondents sustained two or three needlestick injuries. A further 3 respondents sustained five or six injuries. The confidential and anonymous nature of the questionnaires makes it impossible to identify these individuals. However, follow-up dissemination of the data will provide encouragement for these particular individuals to come forward so that their individual risk factors can be better understood.

Our finding of a 33% non-reporting rate fits with current literature on this topic. Underreporting rates varied substantially between studies and occupational groups, however the consensus point to a rate of 30-35%. A lack of time for reporting is consistent with other studies, one which reported that only 9% of doctors reported their needlestick injuries and the main reason for not reporting was ‘too little time’. A sample-size calculation was undertaken prior to the study which determined that a minimum of 521 nurses, 71 midwives and 133 doctors were needed to be surveyed to show disparity between reported and actual incidence of needle-stick injuries based on a 50% rate of non-reporting. We achieved these targets yet there may be sampling bias in the design of the study. As an anonymous survey, we are not privy to reasons that may have motivated individuals to participate in this survey. We therefore cannot comment on whether there may be underestimation or overestimation of results.

An underestimation of risk has previously been identified: in one study, 52% of doctors underestimated their risk of acquiring HIV infection, and 70% underestimated their risk of contracting Hepatitis B. Furthermore, another study reported that 70% of doctors and 39% of nurses cited a perceived low risk of transmission of BBVs. Directed education to address the perceptions of staff about risks of BBVs and to highlight the health benefits of reporting needlestick injuries may increase reporting compliance.

A New Zealand study reported that the best predictors of reporting compliance were the perceived severity of acquiring a disease, the perceived efficiency of the reporting system and overall motivation to maintain their health. The needlestick-reporting process needs to be reviewed to ensure it is easy to access and risk assessments are carried out quickly. Only 24% knew that the first contact...
after an exposure is the Health & Safety department suggesting familiarity with the relevant DHB policy is quite poor.

One reason may be confusion caused by the existence of a different policy for incident management, which has the supervisor as the first point of contact. It is vital that a review of the current needlestick policy is undertaken to align the reporting responsibilities with the organisations operational systems.

When examining policy familiarity by profession, almost half (46.9%) of the respondent doctors did not know how to report a needlestick incident. This compares with nurses (14.5%) and midwives (9.3%). It is tempting to invoke poor organisational communication as a possible explanation for the lack of familiarity among doctors. However, issues such as non-familiarity with surroundings (i.e. locum) may be involved.

In addition, reasons for high injury rates and high underreporting for doctors has been linked to ‘the medical culture’ favouring ‘in-house’ incident management; citing a culture that is less transparent and less resilient to directives and protocols. For midwives who did not report, they felt resigned to the fact that nothing further could be done.

This study used logistic regression modelling to establish the impact of various exploratory variables on the incidence of needlestick injuries. The use of combinations of these predictors in different models has reduced the possibility of non-causality, but absolute causality is notoriously difficult to establish. Females are reported to have an almost 50% lower likelihood of having a needlestick injury.

A reduction in the risk of needlestick injury of 18% for every 10 years of experience with handling needles was also identified. In a survey of 11,516 nurses, it was found that nurses with less than 5 years experience, those performing venepuncture, and perioperative nurses were more likely to sustain a needlestick injury. In addition, nurses learning new skills and their lack of experience increase their risk of needlestick injury.

The critical factors involved in lowering the risk of exposure were, support for safe practices, and using specialised staff to perform high risk high frequency procedures. These studies support the hypothesis that the number of years of experience is a predictor in the incidence of needlestick injuries. Educational programmes will need to ensure that those learning new skills are able to obtain a level of competency and have appropriate supervision and support as skills are developed.

**Conclusions**

The level of underreporting was 33% for all respondents, which is consistent with internationally-reported figures. Both needlestick incidence and high levels of underreporting demonstrate that doctors are a group that will require priority attention of future risk management strategies. The perception of low risk by patient or procedure is another area that requires improved educational information.

Furthermore, ensuring that staff are familiar with processes and ensuring these are accessible and timely are fundamental to improving reporting. These processes must work adequately throughout the 24-hour day.
This study served to quantify the level and rationale for non-reporting of needlestick injuries. Results from the study will inform policy and enable targeted education to reduce the unnecessary burden on health resources within the Waikato District Health Board.

**Competing interests:** None.

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