OCCUPATIONAL EXPOSURE OF NURSES WORKING IN HIGH RISK AREAS: AN AUSTRALIAN STUDY

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ABSTRACT

This study aimed to explore the incidence, reporting and management of occupational exposure among nurses working in high-risk areas in two major hospitals in the western suburbs of Sydney, Australia. A structured questionnaire with a mixture of open and closed ended questions was developed to survey the nurses. The responses to each question was analysed using either a quantitative approach for closed ended questions, or a qualitative approach that compared frequency of themes for the open-ended questions. Under reporting of exposures, concern following an exposure and dissatisfaction of nurses with the reporting process were identified. This paper emphasises the need for organisations to have user-friendly protocols for immediate reporting and management of exposures by knowledgeable assessors.

INTRODUCTION

Exposure to the blood and body fluids of other people is a significant occupational risk for health care workers and nurses in particular. Occupational exposure is the term used to describe inadvertent exposure in the workplace to the blood or body fluid of a patient. Such exposure may put the person at risk of acquiring blood borne infection. Of greatest concern is the possibility of exposure to one of the three blood borne viruses, Human Immunodeficiency Virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV). Each of these can be transmitted following a needle stick or mucous membrane exposure.

Although the rate of transmission of blood borne viruses to health care workers in Australia is low, the social and emotional cost of perception of risk is reported as high (Central Sydney Area Health Service, CSAHS, 1992).

Australian studies examining nurses' experiences with occupational exposure are scarce with only one study found examining nurses' perceptions and practice of blood and body fluid precautions (Knight and Bodsworth 1998). The large body of overseas literature is mostly concerned with knowledge and attitudes to 'standard precautions' or blood borne viruses, with few studies describing in the nurses' own words the experience of reporting and management of occupation exposures (Levin 1995; Roup 1997; Burke and Madan 1997; Leliopolou et al 1999).

The practices to prevent or minimise the exposure of health care workers at risk of transmission of HIV or other blood borne viruses are legislated in Australia under the WorkCover Code of Practice (WorkCover 1996). Further guidelines and responsibilities of area health services are set out under New South Wales Department of Health (NSW DOH) circulars. The management of health care workers who have had an occupational exposure was extensively reviewed in 1997/98, culminating in NSW DOH Circular 98/11, setting out best practice in this area.

This paper reports a survey of nurses working in higher risk areas in two hospitals in outer western Sydney after a subsequent review of policy and practice to reflect the new guidelines articulated in NSW DOH Circular 98/11 (NSW DOH 1998). The survey took place six weeks after the official launch of the revised area health service occupational exposure policy.

LITERATURE REVIEW

'Standard precautions' is the term used to describe the personal protective equipment and practices that are available for health care workers to use where exposure to blood or body fluids of a patient is anticipated (Australian National Council on AIDS, ANCA, 1996). This includes gloves, masks, goggles, gowns, safety needles and cannulas, and the strategic positioning of sharps containers. 'Standard precautions' were originally termed 'universal precautions', a phrase invented by the Centers for Disease Control (CDC 1982) in the United States of America (USA) while they were developing strategies to prevent the spread of the newly discovered HIV (Parsons 1995). Because of the long three-month window period from exposure to seroconversion to HIV, it became impractical to test all inpatients for HIV. In addition, as the epidemic was increasing, confining people with HIV/AIDS to specialised units was not feasible. The shift to isolating the body substances that are implicated in the transmission of the virus, such as blood, semen, vaginal fluids or other blood-tinged body fluids, rather than the isolation of the person, was a much more practical solution (Parsons 1995).

In 1996, the Australian National Health and Medical Research Council (NHMRC) and ANCA jointly reviewed the *1988 Infection Control Guidelines* to bring them in line with new terminology adopted by the CDC. While it was acknowledged that 'universal precautions' had provided a high level of protection from transmission of blood borne viruses, there was some concern the term 'universal precautions' was ambiguous in its application and should be changed to a two-tiered infection control approach which uses 'standard precautions' as a first line approach and 'additional precautions' where 'standard precautions' might not be sufficient to prevent transmission of infection (ANCA 1996, p.1). 'Additional precautions' are used for patients known or suspected to be infected with potentially highly transmissible pathogens that cause infections and are applied in addition to 'standard precautions' (ANCA 1996).

Despite the introduction of 'standard precautions' practices almost two decades ago, studies of health care workers continue to reveal varying levels of adherence to the use of equipment such as gloves, gowns, masks or eye goggles designed to prevent or reduce exposure to the blood or body fluids of patients (Levin 1995; Gershon et al 1995; Burke and Madan 1997). Knowledge of either blood borne virus transmission or 'standard precautions' does not reflect levels of adherence to 'standard precaution' practice (Gershon et al 1995; Knight and Bodsworth 1998).

Adherence to 'standard precautions' is associated with a wide variety of factors such as the type of patient contact, the emergent nature of the situation (Levin 1995), the perception that a patient is in a lower risk group for HIV, HBV or HCV (Williams et al 1994; Kim et al 1999), the appearance of the client (Henry et al 1992) or a belief that using 'standard precautions' interferes with the practitioner-patient interaction (Willy et al 1990; Burke and Madan 1997). Contrary to legislation in Australia, a common finding in the literature is the belief by health care workers that they have the right to know the HIV status of their patients. This is reflected in the expressed statements of nurses in a number of studies that they would definitely use 'standard precautions' if they knew the person was HIV, HBV or HCV positive (Willy 1990; Levin 1995; Roup 1997; Leliopoulou et al 1999; Beltrami et al 2000).

Knight and Bodsworth (1998) reported that only 50% of nurses in Australia, at an inner city hospital with a high prevalence of HIV, always wore gloves to take blood samples or remove cannulas. It could be expected that nurses who are aware of their higher risks of exposure would be more diligent, yet a study about the rates of adherence to 'standard precautions' in critical care nurses, by Roup (1997) in the USA, found levels of adherence at around 67% with a range of 25% to 100%. Other groups considered at high risk of exposure to blood and body fluids include midwives and nurses working in emergency departments. However, a large study of midwives in the USA reported only 55% of the 1784 respondents used 'standard precautions' routinely in their work, and of those 55% (n=9812), 13% (n=128) reported recapping needles (Willy et al 1990). Needle recapping was also high in an observational study by Henry et al (1992), which found rates of 51% in a hospital emergency department. These researchers observed that of the needles that were recapped, 73% were recapped by the use of two hands, a technique that puts the health care worker at highest risk of exposure (ANCA 1996; NSW DOH Circular 98/11).

Staff in emergency departments have cited numerous reasons for non-adherence to 'standard precautions' and these include: the emergency of a situation (eg lack of time to don protective apparel); occupational exposures are to be expected when working in emergency situations; 'standard precaution' apparel is bulky; glove use and other safety devices interfere with dexterity (Henderson 1995; Kim et al 1999; Evanoff et al 1999; Moran 2000). Staff have also stated there is a practice of selectively applying 'standard precautions' based on patient demographics and/or appearance (Henry et al 1992).

A common feature of the Australian studies, which have examined occupational exposures, is the low rate of

exposure reporting (CSAHS 1992; Mallon et al 1992; Bowden et al 1993; MacDonald et al 1995). Knight and Bodsworth (1998) found in their study that of 192 nurses surveyed, 76% (n=146) had an exposure in the prior six months with only 27% of those exposed reporting the incident. Although the risks of becoming infected with HIV, HBV and HCV are small, the consequences of infection are extreme and hence organisations must not only insist on the use of 'standard precautions', but must also provide a confidential, time efficient procedure to encourage workers to report their exposures promptly (Mallon et al 1992).

Gershon et al (2000) found a lack of research in the area of health care workers' experiences of post occupational exposure management. In their descriptive study of 150 health care workers in the USA who had recently sustained an occupational exposure they found many health care workers perceived a lack of support during the lengthy follow up period, wanted faster assessment following the initial exposure and felt sometimes they (the health care workers) were better informed about the management of an exposure than the person doing the assessment.

AIMS OF STUDY

This study aimed to explore the incidence, reporting and management of occupational exposure among nurses working in high-risk areas in two hospitals in outer western Sydney.

METHOD

This study was a descriptive survey utilising a structured questionnaire. For the management of occupational exposures a 24-hour system exists in both hospitals for the immediate reporting of incidents. This is done either by using a 24-hour pager at the 420-bed tertiary hospital (held by Staff Health Monday to Friday 8am-4pm and a senior nurse manager after hours) or to the director (or assistant director) of nursing at the smaller 95-bed hospital. All members of staff have the procedures to follow on a laminated tag attached to their identification label if an occupational exposure occurs.

Sample

A purposive sample of nurses (247) was accessed from those working in the designated areas of the hospital considered at high risk for occupational exposure - intensive care unit (ICU), critical care unit (CCU), high dependency unit (HDU), accident and emergency department (ED), neonatal intensive care (NICU), delivery suite (DS), operating theatre (OT), sexual health unit (SHU) and maternity.

Questionnaire

The initial questionnaire was developed from the literature examining the complex problem of under-reporting of occupational exposure and the lack of adherence to 'standard precautions' (eg Bowden 1993; Burke 1997). The questionnaire developed had a mixture of open and closed-ended questions to encourage respondents to write about the experience in their own words. The questionnaire was trialled on 10 nurses and minor changes to text were made before the final questionnaire was distributed. The final questionnaire consisted of 35 items related to:

1. Nurse's position title and clinical department, number of occupational exposures sustained, length of time since last exposure, reporting of exposures, awareness of source, patients' blood borne virus status, whether exposure took place during a routine or urgent procedure, which were closed ended questions; and,
2. Experience of sustaining an exposure (thoughts that went through their mind, concern or lack of concern, how exposure was managed and how confident they felt with the management of their exposure) and any suggestions the nurses had that could improve the management of occupational exposures in the area health service, which were open-ended questions.

Data collection

Following ethical clearance in June 2000, data were collected over September and October 2000. Each ward or unit was visited by the researchers and where possible, a verbal explanation of the research given to the nurses at a ward meeting. A package consisting of the questionnaire, with a pre-labeled internal mail envelope for return, and an information sheet explaining the research and the guarantee of confidentiality was left with the nurse unit manager of each unit to hand out to as many staff as possible over a two-week period. The nurses were informed that return of the completed questionnaire was considered as consent to be involved in the study. All respondents were volunteers.

Data analysis

The quantitative data from the questionnaires were entered into SPSS Version 10.0 (SPSS Inc. 1999). Data were collated, frequencies and percentages calculated and cross-tabulation of variables performed. The written answers to the open-ended items were transcribed and the text content analysed for themes related to specific questions. The frequency of themes was collated and the themes compared and contrasted for each item to gain an overview of the nurse's opinions and comments. Descriptions of their viewpoints are included in the findings.

FINDINGS

Respondents

Of 247 questionnaires left in the wards and units which were all distributed either by the researchers or the nursing unit managers, 104 responses were returned, giving a 42%

Table 1: Cross-tabulation of nurses' areas of work and number of occupational exposures (n=65) reported by respondents

Area of work	Number of nurses (n=104) working in the area (number exposed, % exposed)	1-5 exposures	6-10 exposures	11-20 exposures	>20 exposures
ICU	25 (18, 72.0%)	11	3	1	3
OT	18 (17, 94.4%)	10	3	2	2
NICU	27 (9, 33.3%)	6		2	1
DS	7 (6, 85.7%)	5			1
ED	11 (5, 45.5%)	4		1	
Maternity	10 (5, 50.0%)	3			2
SHU	4 (4, 100%)	2			2
HDU	2 (1, 50.0%)	1			

ICU: Intensive Care Unit; OT: Operating Theatre; NICU: Neonatal Intensive Care Unit; ED: Emergency Department; SHU: Sexual Health Unit; HDU: High Dependency Unit

Table 2: Nurses' knowledge of patients at risk and blood borne status of source patients when occupational exposure occurred (n=65)

Nurses' knowledge of status	Any risk factor in source patient (% response)	HIV status of source patient (% response)	HBV status of source patient (% response)	HCV status of source patient (% response)
Always	12 (18.5%)	8 (12.3%)	13 (20.0%)	9 (13.8%)
Sometimes	35 (53.8%)	22 (33.8%)	25 (38.5%)	27 (41.6%)
Never	18 (27.7%)	35 (53.8%)	27 (41.5%)	29 (44.6%)

response rate. This is considered a reasonable response rate for a survey that includes a number of open-ended questions (de Vaus 1995).

Of the respondents, 102 (98.1%) were RNS and two (1.9%) ENs. Eighty-one percent of the nurses (84) stated they were aware of the current policy on occupational exposure. The findings reported here relate to those nurses who reported having an occupational exposure.

Nature of occupational exposures

Sixty-five (62.5%) of the respondents reported they had an occupational exposure and of these 28 (43%) had occurred in the last 12 months. Of those occurring in the last 12 months, seven (25%) had occurred in the last month. Table 1 depicts the cross tabulation of any occupational exposure and approximate number with the clinical areas in which the nurses were working. This table also shows the percentage of nurses exposed in each clinical area. The three work areas with high exposure rates over the past five years were NICU, ICU and OT with most occurring in ICU.

Thirty-four of the nurses (52.3%) reported that more than half of their exposures had occurred during routine procedures while only 15 (23%) nurses stated that more than half of their exposures had occurred during urgent procedures. The nurses' knowledge of the blood borne virus status of the source patients is depicted in Table 2. Twenty percent or less of the nurses reported always knowing of any blood borne virus risk for the source patient and 53.8% (n=35) sometimes knew of some source patient risk factor. While 27.7% (n=18) of the nurses reported they never knew of any source patient's risk factor, over 40% of the nurses reported never knowing the blood borne virus status of the source patient. When the status of the source patient was known the nurses were aware of this either from the patient's self disclosure, patient notes or a verbal report from the doctor.

Table 3 depicts the types of occupational exposure experienced by the nurses. The most common type was body fluids with non-visible or visible blood. Fifty-six nurses cited procedures in which the exposure occurred. Of these the most common were venepuncture or cannulation associated procedures (36%, n=20), operative procedures (23%, n=13), suture removal or attending surgical wounds (14%, n=8). Other procedures mentioned were resuscitation, cleaning up after procedures, delivery of a baby, and recapping needles. Sixty-nine percent (n=42) of the nurses reported they had been wearing gloves when exposure occurred. Ninety-one percent (n=47) of the nurses' last exposures occurred 10 or less minutes into the procedure. Reasons nurses gave for not wearing gloves were: they did not have the time to put them on; and, they felt it was not necessary; and, they did not anticipate coming into contact with blood or body fluids.

Table 3: Frequency of types of occupational exposure reported by nurses (n=65)

Type of exposure	Never (% responses)	1-5 exposures (% responses)	6-10 exposures (% responses)	11-20 exposures (% responses)	>20 exposures (% responses)
Needlestick - visible blood (n=60)	30 (50.0%)	28 (46.7%)	1 (1.7%)	1 (1.7%)	
Needlestick - nonvisible blood (n=60)	23 (38.3%)	36 (60.0%)	1 (1.7%)		
Penetrating skin injury – visible blood (n=57)	51 (89.5%)	6 (10.5%)			
Penetrating skin injury – nonvisible blood (n=55)	4 (80.0%)	1 (20.0%)			
Body fluids – visible blood (n=59)	22 (37.3%)	26 (44.1%)	3 (5.1%)	1 (1.7%)	7 (11.9%)
Body fluids – nonvisible blood (n=55)	17 (30.9%)	20 (36.4%)	6 (10.9%)	2 (3.6%)	10 (18.2%)

Reaction to occupational exposure

When the nurses were asked to rate their concern at being exposed to a potential infection risk 56 (35%) were very concerned or concerned. The nurses who were not concerned stated that their exposure was minimal or no risk. The thoughts that went through the nurses' minds (63 written responses) when exposure occurred were most frequently shock, with only one nurse feeling it was their own fault. Some nurses commented that dealing with an exposure was a nuisance and a waste of their time. The following statement typified their comments: *Shock, dismay. Oh no, I have to go to Cas…* [emergency department] *and sit there for ages, what a waste of time.*

Reporting

Of all the occupational exposures experienced 58.3% (n=35) of the nurses reported all or most of them. Seventy-four percent (n=48) of the nurses reported their last exposure. The nurses' reasons for not reporting the exposure included: there was insignificant risk; exposure happened so frequently it had become the norm; and, reporting the incident was a waste of time as there was no follow up. Fifty nurses nominated the person to whom they reported exposure. In most cases this person was their nurse unit manager (54%, n=27) with others reporting the incident to the senior nurse manager (40%, n=20), director of nursing (4%, n=2) and staff health (4%, n=2).

Management of occupational exposure

Following their last exposure 51 (78%) of the nurses were assessed for possible risk of infection with a blood borne virus by the end of their current shift. However, only 21 (44%) of the nurses were assessed within an hour of exposure.

At the assessment, many of the nurses felt that uninterested medical staff treated them and that the procedure was inadequate. During assessment most of the nurses (68%, n=44) had blood taken with 30 (46%) reporting that source blood was also taken. Few (5%, n=3) nurses reported they had pretest counselling. The nurses also commented that the health professional they consulted sometimes did not know the policy or procedures for occupational exposure.

When asked what treatment options were discussed with them, most of the nurses reported that no information was given. Some of the few treatment options in the nurses' responses were: *'use condoms and wait for blood results, have a hepatitis booster, drug treatment, azidothymidine (AZT), all treatment options were discussed but until results come back they cannot do anything as per policy'*.

A typical response from the nurses in the questionnaire was: *'no options were discussed nor well counselled, no follow up. I had to ring and find out and they would not give me any answers, it was like nothing ever happened'*.

The nurses who normally reported an exposure, felt the management of the occupational exposure could have been improved by having experienced personnel doing assessment, being seen immediately and with better follow up. Immediate counselling and reassurance could have been better. The overall feeling of the nurses is typified by one of their responses to this question on management of the occupational exposure: *'The initial four hours after the injury was frightening and I felt a sense of abandonment in emotional terms. The staff were very clinical and objective, the nurse supervisor was mildly critical of my carelessness. I could have cried if only a hug or shoulder was provided'*.

DISCUSSION

Overall, this study has shown that the nurses under-reported occupational exposure, they were concerned afterwards and they were often dissatisfied with the post-assessment and treatment processes. It is of concern that only 81% (n=84) of the nurses were aware of the health area policy, despite the publicity surrounding its launch, the requirement that all staff attach an occupational exposure card to their identity tag, and more particularly as the nurses were working in high-risk areas for exposure to the blood and body fluids of patients. However, it has been found in previous studies that knowing policy makes health professionals comply (Gershon et al 1995; Knight and Bodsworth 1998).

Similar to earlier studies, (Kim et al 1999; Moran 2000) the nurses stated the reason they did not follow 'standard precautions' was that they did not have time to put gloves on, or the procedure was an emergency. However, in this current study the majority of exposures occurred during routine procedures, which suggests that further investigation of work practices and other risk factors is warranted. Audits of the placement of glove containers together with practical demonstrations of gloving up in a number of different situations could be useful strategies to decrease this perception.

Similar to the findings in a study of nurses in critical care by Roup (1997), for a majority of exposures, the source patients' risk factors or blood borne virus status was not known, yet only 69% of the nurses were wearing gloves when they had their last exposure. Reasons given for not wearing gloves are consistent with the 'standard precaution' dilemma (did not think it was necessary, did not anticipate coming into contact with blood). As suggested in the literature (Sulzbach-Hoke 1996), when the actual probability of acquiring an infection with a blood borne virus is low, despite the consequence of an infection, the risk tends to be discounted almost entirely.

The majority of the nurses in the study reported being concerned or very concerned following their last exposure. This again highlights the difficulties of occupational exposure practice and protocols - the nurses were concerned, yet did not always wear gloves or report their exposures. Anxiety following an exposure is a common occurrence, with fear of contracting HIV usually causing the greatest anxiety (Armstrong et al 1995).

The nurses stated that the reporting of occupational exposures was a major hassle for them and this was reflected by only 58.3% (n=35) reporting all or most of their exposures, although 74% (n=48) reported their last exposure. This is higher rate of reporting than Knight and Bodsworth (1996). The nurses suggested that sub optimal reporting occurred because of the perceived difficulty of the process (too time consuming, a waste of time). This has serious implications for effective and safe systems for the management of occupational exposures. Circular 98/11 (NSW DOH 1998) requires all exposures to be promptly reported to enable assessment of the injury type and source patient status, in the event that administration of prophylactic treatment to prevent an HIV infection is required (CDC 1998). Timely assessments (within one to two hours) were experienced by only 21 (44%) of the nurses and this rate is similar to that reported by Mallon et al (1992). The finding that many of the nurses reported being assessed by inexperienced staff who seemed to know less about the procedure than the exposed person also highlights the need to ensure access to appropriately trained staff.

CONCLUSION

Although this study provides insight into the reporting and experience of occupational exposures of nurses working in high-risk areas, the findings need to be interpreted with caution. The study took place relatively (and coincidently) soon after the introduction of the area policy and procedures. Much of the experience of the nurses had occurred in the 12 months previously. However, occupational exposures are not a new phenomenon and it is important organisations have in place evidence based protocols for the immediate management of staff, including knowledgeable assessors, assertive follow up and more accessible reporting procedures.

Further research into how nurses make a risk assessment at the time of exposure could provide insight into developing education strategies or exposure protocols. A follow–up study is being planned by the researchers to see if time has improved nurse and area health practices in the two years since introduction of the occupational exposure policy in the area health service.

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