

How are nurses at risk?¹

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Abstract. The effectiveness of occupational health and safety management systems (OHSMS) can be understood through analysis of surveys such as the experiences of exposure to occupational hazards by Australian nursing occupations. How effectively OHSMS are implemented in the Australian health industry is unclear as few studies describe current hazard exposure patterns or the impact of OHSMS in the Australian health industry. This paper concludes from the analysis of an Exposure Survey of Australian nursing occupations that nursing occupations perceive themselves to be “at risk” of injury and/or management of OHS risk in work duties is affected by the patterns of hazard exposure, occupation group as well as employee attributes, perceptions, patterns and situations of work. The results highlight the top-rated hazards and imply that the perceptions of hazards in the workplace are different to actual risk experience (e.g. injury patterns). There is an unacceptable level of exposure to diverse hazards in Australian nursing occupations workplaces in regard to regulatory and performance obligations. Stronger strategies to achieve more effective risk treatment, integrate with hospital accreditation and quality programs are discussed to benefit system performance and the welfare of those in nursing occupations.

Keywords: hazard, exposure nursing, safety, systems

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1. Introduction

This paper provides a current picture in the Australian health sector for nursing occupations. There are at least 222 133 people^{2a} in nursing occupations in the Australian workforce, typically between the ages of 30-49, and female^{2b}. Nursing occupations perform a diverse range of work in Australia in complex socio-technical situations [8, 14, 20, 26, 27]. In their work, people in nursing occupations are exposed to a broad range of hazards.

Our understanding of exposure can benefit from large sample surveys such this study which reports findings from self-reported experiences of nursing occupations and their exposure to occupational hazards. Using a National Exposure survey subset, analysis of the data draws conclusions to compare hazard exposure across nursing occupations against the perceived implementation of Occupational Health and Safety management system (OHSMS) and options for improved performance and systematic risk management in the health sector are discussed.

2. Method

2.1. Literature search

Peer-reviewed literature was sought from searches using Web of Science database for terms including nurses, perception, safety, system, hazard, exposure, NIOSH, survey. Although there was no limit on the publication date, more recent articles (published from 2000), meta-analysis and literature reviews were preferentially selected.

2.2. Analysis of self-reported experiences data collected by national exposures at work survey.

Data was analysed from the results of a standardized survey tool, the National Exposures at Work Survey (provided by Safe Work Australia).. The Exposure Survey was based on the NIOSH - National Exposure at Work Survey. One of these instruments – The National Exposures at Work Employee Core Module - was adapted by the Office of Safe Work for use in Australia to target health workers, with links to other related modules that

cover specific exposures depending on tasks and area of work. The survey is a mixed forced choice and free response design and delivered by electronic media (the internet).

The survey tool is considered valid for the Australian context and a full set of questions in the survey was published in 2008 [6].

2.3. Sample of data

As reported elsewhere [6], participants were all members of the Australian Nursing Federation (ANF) the peak representative body for Australian Nurses as “a trusted friend. A return of 955 replies was accepted into the study sample (representing at least 0.43% Australian nursing workforce). The ANF profile is approximately 55% of Australian registered nurses or RNs), 60-65% from public sector employees, which reflects the employment distribution for all nurses in Australia; and mainly female (males have a slightly higher representation - 10-15% compared with 9% of the general nursing workforce) [6]. This sample is similar to other survey studies of nursing occupations [2, 30].

2.4. Analysis

Analysis was performed with SPSS version 16.0 GP. Selective data was tested for confidence intervals and Spearman's rho test for significance; comparison of data within the groups and categories (as percentages); and cross-tabulations. Not all the analysed data from the survey is presented in this paper.

2.5. Study constraints

The analysis was limited to non-parametric correlation and precludes determining any causality. Further, there are other variables may affect ratings that are not controlled in this study, such as workers characteristics (e.g. education, risk appetite), a manager's incentives; organizational policies (e.g. human resource model; salaries, monetary incentives, and employee's promotion), and attitudes and interventions by jurisdictional OHS authorities. Due to the nature of the survey, external factors could not be distinguished in the data analysis. Any interpretation of the results is to be discussed with respect to these constraints.

² Data sourced from (Global Atlas of Health Workforce (WHOSIS database) as at 2001 (a. for clinical nurses only) on 27/9/09; b. total number of Australian Nurses as at 2006 (all nurses).

3. Literature review

Despite broad search terms, few recent papers specifically addressed OHS management and employee surveys of safety for nursing occupations in Australia (or in general for the health industry sector).

3.1. Efficacy of testing OHSMS by survey

Employees' reported perception of safety has been used to effectively identify the status and experience of safety system elements [4, 15, 25]. Significant correlation has been made between self-reported ratings of management system elements to worker compliance with safety requirements [4, 15, 28]; and perceptions of organizational support [25]. Employees' reported perception of safety has also been used to effectively identify the status and experience of safety system elements [4, 25]. However, organizational climate surveys (which also collect data at the individual level) are considered to provide limited information about the actual activities of an organization [31] in regard to risk management.

Self-reported injury information is analyzed in the context of the confidentiality of the information (as preserved in this survey). For example, in a US study, 46% of nurses, aides, orderlies, and attendants report back injuries, as opposed to 26% in private industry - the disparity is likely due to job security concerns [31]. Understanding of how much is known about the hazards to which one is exposed to and their injury potential - i.e. their risk - can also affect reporting rates.

3.2. Relationship of management systems to risk control

In Australia, a regulated objective is to systematically manage occupational health and safety (OHS) risk. To meet regulatory obligations, employers need to achieve reasonable OHS risk management. It could therefore be anticipated that Australian health industry employers demonstrate compliance to elements of occupational health and safety management systems (OHSMS) and legal obligations - both of which support an employer to achieve the objective of safe work and safe workplaces. In this regard, OHSMS [24] play an important contextual role [9, 28] to provide organ-

ization's with structure to address OHS risk and to motivate behaviour for employees to comply with safety procedures. The role of an OHSMS is considered to be similar to the effect of social support at the individual level in an organization [28; 29]. As a benchmark, a US study conducted by the NIOSH reported that only 8% of 3686 hospitals surveyed met all of NIOSH's basic components of an effective occupational safety and health program for hospital employees [31].

In the health sector, service delivery outcomes can be critical to safety of clients (i.e. patients). The impact on business of poor OHS performance (through reputation impact, losses in productivity and regulatory penalty) should provide employers with incentive to apply systematic OHS risk management (at organizational level) which is shown to reduce business risk by benefits of productivity and retention; and support well-being of employees [7, 16, 17].

An effective OHSMS requires that employees be adequately trained to understand hazards and risk controls in their work. The competency (i.e. knowledge and skill) of an employee to apply OHS risk controls in a work situation will affect the quality of their decision-making to engage in either an activity that applies the required or known OHS risk controls (i.e. compliance to safety procedures); or activity without applying required controls i.e. "at risk" behaviour.

3.3. Hazards for nursing occupations

Key hazards identified in literature and by regulators include:

- a) Biologic and infectious hazards: infectious and biologic agents, such as bacteria, viruses, fungi, or parasites, which may be transmitted through contact with infected patients or contaminated body secretions or fluids (e.g. needle-stick injuries);
- b) Chemical hazards: various forms of chemicals that are potentially toxic or irritating to the body system, including medications, solutions, and gases;
- c) Environmental and mechanical hazards: factors encountered in the work environment that cause or potentiate accidents, injuries, strain, or discomfort (e.g. poor equipment or lifting devices, slippery floors);

- d) Physical hazards: agents within the work environment, such as radiation, electricity, extreme temperatures, and noise that can cause tissue trauma; and
- e) Psychosocial hazards: factors and situations encountered or associated with one's job or work environment that create or potentiate stress, emotional strain, or interpersonal problems e.g. shift work, organizational management hierarchy, decision control, remote or isolated workplaces

3.4. *What injures people in nursing occupations?*

Common agencies of injury for hospital employee in the US [21, 31] include:

- a) needle-stick injury;
- b) communicable diseases;
- c) toxic and hazardous substances;
- d) dermatitis (caused by handling cleansers, medicines, antiseptics, and solvents); and
- e) thermal burns (primarily in food service, laundry, and sterilizing areas).

From Australian data³ the most common compensation claims (as a percentage of all claims) include: musculoskeletal stressors (sprains and strains) (56%); and slips, trips or falls (16.9%); and an increasing trend of mental stress (8% of all claims).

4. Analysis of survey data

The analysis is principally confined to address the following:

- a) What are the relationships between areas that nursing occupations work in and their perceived exposure to hazards?
- b) What are the relationships between reported management of hazards, work patterns and perceived safety?

4.1. *Respondent Occupations and Experience*

From the survey sample, the typical (on median values) person in an Australian nursing occupation is described as follows: a female registered nurse 40 years old, who is working in a medium sized

³ From the Safe Work Australia Online Statistics Interactive National Workers' Compensation Statistics Databases for financial year 2005-06 as at October 2009.

metropolitan hospital (77%) in aged care; spent 57% (SD 35) of their time in direct patient care, has an average of 15 years of working experience; is likely to stay in the job and continue to either work mixed shifts or move to day shifts if the employer supports; is likely to continue working into middle age unless an injury prevents. Injury experience, gender and size of the organization did not appear to affect the factors as described in this study.

4.2. *Perceived hazards;*

From responses to a set choice of 24 hazard types (and as a median rating on a scale where 1 is no risk and 5 is high risk), the top five rated hazards were plotted as percentage distributions by occupation group and by aggregated totals for ratings indicating agreement with exposure to hazard (as summed ratings 3-5 for each hazard). The five top-rated hazards across all occupation groups were:

- a) Workplace stress (88% of 955) – (in order) by nurse educators; registered psychiatric nurses, registered midwives; assistant nurses; RNs. The occupation groups who rated workplace stress highly in this study included: personal care assistants; assistants in nursing; registered midwives; and psychiatric nurses. Consistent with the literature, factors affecting this rating: large positive affect if higher general level of recent stress; if tasks were perceived to be placing them at risk of harm; repetitive exposure to work hazards; areas of critical and emergency care; extreme discomfort and fatigue ratings (moderate affect). Total work hours, compensation, length of service, or employment status had no affect.
- b) Punctures by needles sticks and other sharps – (in order) by midwives (60%); registered psychiatric nurses; RNs; other categories (of mixed roles); enrolled nurses and nurse educators; and nurse practitioners.
- c) Lifting and repositioning heavy objects - highly rated by all occupations - Patient care attendants and personal care assistants rated their exposure more highly than other occupations. Psychiatric nurses rated their exposure as the lowest.
- d) Blood borne pathogens - all rated highly except for small number of patient care attendants

who did not register any rating to this hazard type.

- e) Prolonged standing – (in order) by personal care assistants (86%), midwives (79%) and registered (65%) and enrolled nurses (63%). There was a small effect of the percentage of time indirect patient care.

All of these hazards could cause lost time injury and incapacitate a worker. The hazards rated as “no risk” included: anaesthetic gases; hazardous drugs; high level disinfectants, sterilants, ionizing radiation; machine safety; smoke from lasers; poor air quality; acts of bioterrorism. Although unable to be determined from this data, there is possibly either low likelihood of exposure in the respondent’s work and/or poor awareness of hazard or its potential risk. The latter is of concern as some of the above hazards can pose significant risk if exposure is not controlled.

4.3. Injury experience;

Of the 489 respondents who had lodged a worker’s compensation claim, the injury classically associated with nursing occupations - musculoskeletal injury - was the most common mechanism (71%). This sample is higher than both US and Australian figures for national work related musculoskeletal injury rates but at a similar level to self-reported discomfort levels in other studies [11, 21; 23]. In this sample, claims for mental stress (including psychological injury (20%) and bullying and violence (15%) are the next most prevalent type. This is higher than the national average of 15%. Considering the narratives in the data (Q71B in the Exposure Survey), for the category of “musculoskeletal disease/injury” respondents may have included all types of physical injury (e.g. hits, sprains and strains from falls) and this could have inflated the frequency. Needle-stick injury rates were at a much lower level than might be predicted based on the high level of perceived hazard rating. This may indicate that there is effective controls and awareness in place. There is alignment between the top-rated hazard topics and claims mechanisms. The exception is the injury mechanism of slips, trips and falls - the 2nd most frequent mechanism for compensation claims but rated 8th in this study as a hazard and not rated as an injury mechanism. Narrative responses on the nature of injury indicate other contributing factors of work-

load; interpersonal relationships; staffing levels and time pressures.

4.4. Perceptions of Safety and Relationships to OHSMS elements.

There is a high level of agreement (75% of 955) that “*The health and safety of workers is a major priority with top management*”. The main groups who disagreed were: RNs and those who had lodged a compensation claim –possibly an effect of their experiences of organizational support for injury management. Respondents agreed that they have the ability to report injury without negative response by employer (81.5%); managers follow safety procedures (84%); and they are able to discuss violence /bullying issues with their supervisor (83%).

Respondents (77%) agreed that the procedures in their organization were useful and effective. Those more likely to agree (significant effect) include those who: reported having adequate training; reported less dangerous work by colleagues; rated themselves as know how to use safety equipment and follow procedures; and, were more agreeable (80% of 955) that personal protective equipment was readily available to them. Areas of work with stronger relationship to agreement with procedural compliance included those in General Practice, Mental Health and OHS fields. There was no relationship in the response to length of service; if a claim had occurred; size of workplace; age or employment conditions. Respondents agreed workplace monitoring and improvement takes place. Activities included: regular workplace inspections (69 %); and timely response to correct unsafe working conditions (64%).

4.5. Perceived to be “At Risk” in Work Tasks

The risk context of occupational exposure is diverse due to factors including the: nature of the organization in which they work, e.g. metropolitan hospital or rural remote health centre; role they have e.g. registered nurse or patient care assistants; and nature of duties they perform e.g. in an operating theatre or in an aged care facility.

At odds with the general agreement with management priority for OHS, more than 35% felt they might be at risk of getting hurt in work tasks (that agree with survey Q1.7 *I am often asked to do a task that makes me feel I may be at risk of getting*

hurt). This question tests potential for an employee's exposure by their managers or work situation and their capacity to determine to risk in their tasks. Agreement with the statement was mainly by registered and enrolled nurses; and registered psychiatric nurses. These are occupational groups with higher patient direct care exposure (which showed a small positive effect). There was also a small effect from higher ratings of recent workplace stress but not length of service or lodging a Worker's Compensation claim. There is a large positive effect for perceptions that others are also at risk as well as discrete patterns for areas of work (particularly for small positive effects in the areas of: emergency, mental health and pathology/cannulation) and a large effect on ratings for survey Q1.8 *People in my department are frequently exposed to dangerous or risk situations* which possibly provides some context to the individual rating to Q1.7. The areas of work that had most effect have perceived lower job control or higher interaction with disturbed members of the public. A small effect of exposure ratings to hazards that might be predicted included: violence at work, workplace stress; lifting and handling; repetitive work; slips, trips and falls; blood borne pathogens.

5. Discussion

5.1. Are nurses at risk?

The results support that nursing occupations perceive themselves to be "at risk" of injury in both: literal exposure to occupational hazards and threats of other hazards arising from the context of their employment and OHS system implementation (such as position in hierarchy; access to safety training; management commitment, intra- and inter-personal attributes and workload. Inadequate system level controls and culture (safety behaviour) can both induce "at risk" behaviour.

The reported hazard exposure ratings show contemporary evidence that there is significant concern in the nursing occupations about their hazard exposure and risk controls in their workplaces. This is consistent with the broader context of the official and media representation of nurses' shortages; and OHS and service performance outcomes in the health industry. There is no comparative published literature for the Australian context.

Overseas studies of hazard profiles for nurses are somewhat dated to the current socio-technical work environment of health facilities.

5.2. Management of Hazard Exposure

While it is beyond the intent of this paper to describe strategies to address OHS risk in all top rated hazard categories, the following addresses the findings for identified groups that consider themselves most "at risk".

5.2.1. Work-related Stress

Interventions of improving management competency for identifying stressors (through risk assessment), acknowledgement, and education are accepted strategies to address workplace stress [5, 22]. A strong focus on the "people" part of OHSMS can reap also rewards [3, 12, 27]. Participative practices are recommended to reduce triggers for workplace stress.

5.3. Puncture wound injury from needle-sticks and sharps; Blood borne pathogens

Groups undertaking the "invasive" work of nursing professionals or phlebotomy tasks are more at risk. To eliminate the hazard, the risk controls should principally focus on design strategies for devices and system of work (including handling and disposal) to match critical clinical and safety requirements for situations (i.e. the type of work and its context and range of users). External factors affecting risk management of these hazards include: requirements patient safety outcomes (e.g. Public health protocols); supplier device manufacture and marketing; and organizational budgets. The employer-controlled system level interventions include:

- a) device and equipment supply lines;
- b) job design (workload and fatigue management); and competency support (i.e. induction and training) to avoid opportunity for human error or "at risk" behaviour through contextually related "short cutting" of procedures;
- c) supporting a strong reporting culture in the workforce (for early mitigation of exposure).

5.3.1. *Physical hazards: Manual tasks, Lifting and repositioning heavy objects (including patients); and Prolonged Standing*

The results suggest that manual tasks were not the “top of mind” hazard when completing the survey. Lifting and positioning objects is a daily task for all nursing occupations and as a hazard (and its associated risk) may be culturally normalized [18, 19]. Patient care attendants and personal care assistants rated their exposure to manual tasks more highly than other occupation groups. The lower rating by more qualified nursing occupations (RNs; psychiatric nurses) may reflect the changes in work practices from direct manual handling of patients and objects to using lifting and storage devices (i.e. the “no-lift” campaigns adopted by health centres). Equally patterns and areas of work for more qualified staff; and/or use of less qualified staff for health-related manual tasks in recent years (possibly as part of the organizational response to managing shortages of RNs) may also be a factor. Prolonged standing as a hazard is not unique to nursing occupations (e.g. similar hazards in manufacturing and retail industry work). Consistent with the reviewed literature, it is more likely that those working in situations of higher levels of direct patient care rate a higher exposure level (i.e. personal care assistants; midwives; and registered and enrolled nurses (63%).

The narrative comments about injury scenarios indicate physical hazards are prevalent in most mechanisms. As an indicator of failed risk control, the national OHS injury data reinforces that physical hazards present the most common mechanisms for exposure for all occupation groups. Given the range of work environments, there may be less scope to control risk at individual level. Continued emphasis on higher order risk controls for manual tasks (safer design of work environment and technical solutions), job design, and skills for vigilance in personal risk management should be applied by employers. Safety in designing health care work environments has been promoted by OHS regulators and peak bodies over the last decade.

5.4. *Effectiveness of OHSMS system*

Most respondents were generally satisfied that their employer was committed to OHS management. However respondents’ perceptions of how this was demonstrated did not hold true, particularly where other factors occurred: the employer pro-

viding adequate access to safety training; those with higher time in direct patient care; levels of recent stress; specific areas of work; and ratings of management support to implement existing risk controls. Australian OHS legislations require that employers manage risk to as low as reasonably practicable and that employees are supported and trained to perform their work safely. The survey results shows these requirements may not be met.

5.5. *Are perceptions of risk leading to ‘at risk’ behaviour?*

This study demonstrates that perceptions of hazards in the workplace are different to actual risk experience (i.e. injury mechanisms) for the sample of respondents. This mismatch represents a challenge to managers and OHS specialists in the health industry to:

- a) improve information and education of employees in this workforce about their actual hazard exposure in their duties; and
- b) assure effectiveness of risk controls to support their employee’s health and safety outcomes in complex socio-technical work.

Despite business incentives to improve performance/ productivity; and meet regulatory obligations, this study shows examples of how the health industry has not achieved its regulatory obligations for nursing occupations, placing them “at risk”.

5.6. *Employee surveys are valid to test OHSMS*

The study confirms that the effectiveness of an occupational health and safety management system (OHSMS) can be understood through analysis of employee surveys. Accepting that the diversity in nursing occupations in Australia constrains comparison, this study is able to compare and derive conclusions from the analysis of the Exposure Survey.

5.7. *Systems integration*

Macro-ergonomics and systematic risk management models have the potential to provide an adaptable structure for health sector organizations to address OHS risk [9, 10, 31, 32]. Evidence in this study shows that perceptions of consistent actions of employers to risk control can result in support and implementation by employees. Some of the interventions currently used to improve

OHS risk management in the health sector are supported: job design (for productivity benefits as well as safety performance); personal safety strategies (e.g. well-being and “no lift” programs) and procedural safety compliance campaigns. Higher order controls such as work environment design and procurement of safer equipment (e.g. for cannulation tasks) will continue to support positive outcomes for nursing occupations.

6. Conclusions

6.1. Identifying and managing risk

This study provides contemporary evidence that there should be significant concern in the nursing occupations about their hazard exposure and risk controls in their workplaces. Australian nursing occupations have an unacceptable level of exposure to a wide range of hazards in their workplaces in regard to regulatory and performance obligations. While further analysis of the nature of hazard exposure is recommended, perceptions of hazards in the workplace are different to actual risk exposure and risk experience (i.e. injury mechanisms or the realised risk). Therefore interventions responding only to injury mechanisms are likely to miss the opportunity to control risks in every day work of nursing occupations.

6.2. Use of strategic approaches in health sector

Interventions including the implementation of macro ergonomic and integrated safety management systems approaches as part of hospital accreditation programs and to support workforce management could be considered. The cited literature supports associating the factors of: perceptions of organizational support; job satisfaction and retention, to compliance with safety requirements; injury rates and employee-reported experiences of workplace hazard exposure and management commitment to implement OHSMS. Consideration of other influential drivers working in Australian health sector may motivate administrators toward a more holistic risk management program. To contain injury costs and retain an already compromised workforce, this study confirms that the Australian community would be best serviced if employers and policy makers escalate intervention in the Australian health sector to address OHS risk

factors and support employees to address their occupational risk in practice. Suggested strategies include: address OHS risk factors to reduce employees occupational risk in practical access to higher order controls (versus training and personal safe approaches); or include safety criteria in hospital /health sector accreditation programs or integrate risk control criteria into the Quality Management - Australian Commission on Safety and Quality in Health Care which recommends that all health services comply with the Safety and Quality Healthcare Standards.

Intensive action was recently taken with the Australian construction industry (which has a lower rate of claims) to require safer design of work and systems— why not with nursing occupations in the health sector?

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