



Major article

Prevalence of and risk factors for needlestick and sharps injuries among nursing students in Hong Kong

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Key Words:

Biological hazards
Reporting behaviors
Predictors
Novice
Cross-sectional study
Occupational health

Background: Although nursing students are at greater risk for needlestick injuries (NSIs) and sharps injuries (SIs) than staff nurses, there is a lack of research on NSIs and SIs in students, especially in different years of study. The purpose of this study was to identify the risk factors for and prevalence of NSIs and SIs among nursing students in different years of study.

Methods: This was a cross-sectional survey study using a questionnaire confirmed to be valid and reliable, with a content validity index of 0.96 and reliability index of 0.82.

Results: A total of 878 nursing students (response rate, 76.61%), participated in the study. NSIs/SIs, NSIs, and SIs were significantly increased by year of study ($P < .001$) in both the study period and 12-month prevalence. Four predictors for NSIs/SIs were final-year study (odds ratio [OR], 11.9; 95% confidence interval [CI], 3.9-36.7), perception of not receiving prevention training (OR, 2.8; 95% CI, 1.1-7.5), perception of not using a kidney dish to contain used needles and sharps (OR, 4.2; 95% CI, 1.7-10.3), and perception of not immediately discarding used needles and syringes into a sharps box (OR, 2.9; 95% CI, 1.2-7.4).

Conclusions: Preclinical training, reinforcement of kidney dish use, immediate discarding of used needles, and adequate clinical supervision are essential elements in reducing the risk of NSIs and SIs.

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Lack of clinical experience and insufficient attention to personal safety put nursing students at high risk for occupational exposure to blood-borne pathogens through needlestick injuries (NSIs) and sharps injuries (SIs). Nursing is a practical profession, and thus nursing education comprises both classroom teaching and clinical practice.¹ Unlike staff nurses, nursing students “work” in clinical settings only during their clinical placement. But even though nursing students have less experience in clinical settings, they, like staff nurses, are required to perform various types of nursing procedures, such as administration of subcutaneous, intramuscular, and intravenous injection; and handle different types of instruments, such as syringes with needles and pill cutters.

When performing these nursing tasks, the only difference between staff nurses and nursing students is in the level of proficiency in the acquisition and development of the necessary skills. According to Benner,² staff nurses should be at least at a competent,

proficient or even expert level, depending on years of experience. To achieve the competent level, the nurse should be “on the job in the same or similar situation two or three years” (p. 25).² However, nursing students start at the novice level and then move to the next level of advanced beginner. Novices and advanced beginners devote most of their efforts to remembering the rules that they have been taught²; consequently, they might not be able to adequately manage their own safety when handling needles while giving injections to patients.

A review of the literature found that nursing students are at high risk for NSI and SIs. In France, nursing students even ranked first in the number of formally reported NSIs, surpassing staff nurses and other health care workers in one hospital.³ In India⁴ and Singapore,⁵ nursing students ranked third after medical staff and staff nurses. Despite these known risks, however, only a few studies to date have examined the risk for NSIs and SIs in nursing students.⁶⁻¹² Most previous studies focused on final-year nursing students in their internship.^{8,11,12} Nursing students in their internship function almost like staff nurses, and thus would be expected to have similar rates of NSIs and SIs (range, 50.1%-100%)^{8,11,12} as staff nurses (range, 46%-82%).^{9,13-16} There is a lack of research on NSIs and SIs in different years of nursing study. The aim of the present

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Funding for this study was provided by The Hong Kong Polytechnic University.

Conflict of interest: None to report.

study was to identify the prevalence of NSIs and SIs in different years of study, and the risk factors for these injuries among nursing students in Hong Kong.

METHODS

In this cross-sectional survey study, participants were recruited by convenience sampling from a university with the largest number of nursing students among the 4 universities providing nursing education in Hong Kong.¹⁷

Participants

Nursing students in either the 4-year full-time Bachelor of Science in Nursing (FT BSN) and the 3-year full-time Higher Diploma in Nursing (FT HD) program were recruited in May 2008. All nursing students, including those in their first year of study, had some previous clinical experience. Ethical approval for the study was obtained from the university.

Instrument

Based on an analysis of reported NSI and SI data,¹⁸ focus group interviews, and a literature review, we developed a questionnaire to solicit information on NSI and SIs among nursing students. The questionnaire consists of 4 sections with 22 items. Section I solicits demographic information, including age, sex, dominant hand, program of study, and year of study. Section II contains 4 items related to the history of NSIs and SIs during the participant's period of study and also the previous 12 months. Only nursing students who reported sustaining an NSI and/or SI were required to proceed to Section III, which contains 12 items asking about the experience during the last NSI or SI, with questions on where, when, how, and why the injury occurred; body part injured, device involved, and postinjury response. Section IV contains 4 items that collect information about training received and recommendations for the prevention of NSIs and SIs. The questionnaires were distributed to nursing students in classroom setting.

A panel of 4 local and overseas experts in occupational health was invited to rate the relevancy of each item in the questionnaire. The questionnaire's was determined to have a content validity index of 0.96. Two-week test-retest reliability was assessed with 9 nursing students and was calculated as 0.82.

Data analysis

SPSS version 17 (SPSS Inc, Chicago, IL) was used for all statistical analyses. Descriptive statistics, including frequencies, means, standard deviations, and percentages, were examined for all variables studied. Bivariate statistical tests (eg, χ^2 tests) were used to estimate the associations between independent and dependent variables (ie, the 12-month prevalence of NSIs and/or SIs among nursing students). A multivariate logistic regression model was then applied to relate those statistically significant independent variables with a binary indicator (yes or no) for the 12-month prevalence of NSIs and/or SIs. The exponentiation of the coefficients of this model was used to estimate odds ratios (ORs) for each independent variable. A *P* value <.05 was considered to indicate statistical significance.

RESULTS

A total of 1,146 questionnaires were distributed and 878 were returned, for a response rate of 76.61%. The response rate was 95.57% for first-year students, 87.17% for second- or third-year

Table 1

Characteristics of nursing students who participated in the study

Characteristic	
Sex, n (%) (n = 877)	
Female	674 (76.8)
Male	203 (23.1)
Program, n (%) (n = 878)	
BSN	587 (66.9)
HD	291 (33.1)
Year of study, n (%) (n = 878)	
1	345 (39.3)
2	261 (29.7)
3	106 (12.1)
4	166 (18.9)
Dominant hand (n = 803)	
Right	772 (96.1)
Left	31 (3.9)
Age, years, mean \pm SD, range (n = 851)	21.22 \pm 1.57, 19–31

students, and 58.87% for final-year students. Questionnaires were distributed to students in class on weekdays on their usual study days, except for final-year students. The final-year students had clinical placement during weekdays and were scheduled to attend a 2-hour seminar on one particular Saturday, a possible reason for their relatively low response rate.

Characteristics of the participants

Participants included 878 nursing students in different years of study, ranging in age from 19 to 31 years (mean age, 21.22 \pm 1.57 years). The group was predominately female (76.8%; n = 674); this was consistent with the sex ratio of students enrolled in the programs (77.98% female, 22.02% male). Approximately two-thirds of the participants (n = 587; 67%) were studying for a bachelor's degree, which was also consistent with the proportion of students studying for bachelor's degrees (67.58%) versus higher diplomas (32.42%) (Table 1).

Prevalence of NSIs/SIs, NSIs, and SIs

During the study period, the reported prevalences of NSIs/SIs, NSIs, and SIs were 8.8% (n = 77), 6.9% (n = 61), and 3.2% (n = 28), respectively. Of the participants reporting injury, ~85% had 1 NSI/SI, and only 3.3% (n = 2) had 3 NSIs. In contrast, the reported 12-month prevalences of NSIs/SIs, NSIs, and SIs were 5.9% (n = 52), 4.4% (n = 39), and 1.9% (n = 17), respectively, with >90% of participants experiencing 1 NSI/SI in the 12-month period. Both the study period and 12-month prevalences of NSIs/SIs, NSIs, and SIs increased significantly with year of study (*P* < .001) (Table 2).

Characteristics of NSI occurrence

Participants who reported sustaining NSI were asked to provide more information about their most recent NSI. The NSIs occurred predominately in medical (n = 25; 53.2%) or surgical wards (n = 14; 29.8%) of acute care hospitals (n = 42; 89.4%) during the participants' clinical placement (n = 40; 67.8%), and during the morning shift (n = 32; 69.6%). The left index finger (n = 24), left thumb (n = 15), and right index finger (n = 13) together accounted for 63.4% (n = 52) of the total body parts injured. Devices causing NSIs were predominately injection needles (n = 42; 75.0%) and insulin needles (n = 11; 19.6%). Following the NSIs, participants reported cleaning the puncture site with running water while squeezing blood out (n = 36; 62.1%) or cleaning with an alcohol pad (n = 33; 56.9%). Approximately 12% (n = 7) of needles were classified as

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