

Original Article

NEEDLESTICK INJURIES AMONG SIXTH-YEAR PHARM. D STUDENTS DURING PHARMACEUTICAL CARE CLERKSHIPS: A SURVEY STUDY

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ABSTRACT

Objective: This study aimed to evaluate the prevalence of needlestick injuries and the activity related to needlestick injuries among the pharmacy students. It also explored the knowledge source of needlestick management.

Methods: Sixth year pharmacy students being trained for 6 clerkships from March to December 2013 were surveyed using a self-administrating questionnaire.

Results: Among totally 138 clerkships of 23 pharmacy students, 4 cases (17.4%) had actual events of needlestick injury and the prevalence of injury per clerkship was estimated to be 2.9% (n=138). Specifically, the prevalence of injury with high risk of bloodborne diseases (n=2) was 8.7% per person and 1.4% per clerkship. Out of the 138 rotations, there were 45 rotations that were associated with needlestick. 28 activities were classified as activities with high risk of bloodborne diseases (62.2%), including a fingerstrip capillary blood glucose monitoring (n=22) and insulin injection demonstration (n=6). Only 3 cases out of 23 students (13.0%) reported that they had knowledge of needlestick injury obtained from literatures or preceptors prior to the practice.

Conclusions: The fingerstrip blood glucose monitoring and insulin administration were the activities mostly related to needlestick injury. Therefore, the pharmacy students should be trained and educated on the occupational injuries prior to the clinical clerkships.

Keywords: Clerkship, Needlestick injuries, Pharmacy students.

INTRODUCTION

Needlestick injury occurs frequently among healthcare workers during clinical practice. Previously, it was reported that approximately 37% of nurses in the United States had experienced the needlestick injuries. The risk of injuries was also estimated to be between 600,000-800,000 times per year, or 30 times of injuries for every 100 patient-beds. Additionally, the incidence of needlestick accident ranked second (17%) among occupational accidents in the United Kingdom [1]. In Thailand, the prevalence of needles injuries ranked second in sharp injuries (SIs) among nurses (52.8%) [2].

Besides high prevalence of occupational injuries, blood-contaminated needle injuries were also harmful. It might account for 0.3 percent of HIV infection and the risk of hepatitis B and C infections at 3 and 30 %, respectively. This injury was clearly assured to be a route of HIV infection as confirmed by 55 and 35 cases in the United State and Europe, respectively [3]. Moreover, it caused not only virus infections but could also result in bacterial and parasitic infections [4]. Therefore, the needlestick injury management is the best way to prevent the bloodborne diseases and occupational accidents among healthcare workers [5].

According to risk awareness medical personnels, especially those who have close contact with needles must be aware of a risk of serious infections. There was a previous study showing that nurses, physicians and phlebotomists were the medical personnels with the greatest risk of injuries, as much as 91, 6 and 3%, respectively [1]. Since pharmacists had little chance of utilizing any needle in the past, the study of their risk of injury was scant. Nevertheless, current practice has been gradually evolved and the pharmacist has become one of the needlestick victims.

Currently, in the US, Canada and France, the community pharmacists play a central role as immunization providers in drugstores. This provides patients a convenient access to vaccines and thus increases the number of immunized patients in these countries [6-8]. Therefore, the new dimension of professional skill has enhanced the risk of needlestick injuries in the pharmacists. de Perio et al. showed that pharmacists who worked in drug chain stores throughout the

United States experienced 33 times of injuries or at the rate of 0 to 3.62 per 100,000 vaccinations [9].

As mentioned above, not only doctors, nurses, pharmacists and other healthcare workers are at risk for needlestick accidents, but health science students are also often injured by needlesticks. Previous studies showed that the prevalence rates of injury were 21.4 and 6.9 in medical and nursing students, respectively [10, 11]. However, the injury report of pharmacy students has not been determined.

In Thailand, the undergraduate pharmacy curriculum of all faculties of pharmacy was extended from a five- to a six-year program (also called, Doctor of Pharmacy; Pharm. D). Especially, the curriculum of pharmaceutical care program, one of the programs in the Doctor of Pharmacy, emphasizes the role of pharmacy students in a healthcare team for an appropriate medication use. The students in this program are required to gain experience in the pharmacy practice via professional clerkships during the final academic year. Even though pharmacy students are not directly allowed to perform any medication injection, but in some circumstances, some patients need pharmacy students to demonstrate an insulin injection or to measure blood glucose using a finger-stick device. These activities might prompt the students to be at risk for needle exposure.

Since there was no previous study illustrating this harmful issue, this study aimed 1) to evaluate the prevalence of needlestick injuries among the pharmacy students, 2) to explore the knowledge source of needlestick management and 3) to survey activities related to the needlestick injury. The benefit of this study will help establish the campaign of needlestick awareness among the pharmacy students.

MATERIALS AND METHODS

This study was a survey study collecting the pharmacy students' data by using a self-reporting questionnaire. The survey was carried out over 6 rotations of clerkship (1.5 week per clerkship). The authors included the sixth-year pharmacy students of Silpakorn University, Nakhon Pathom, Thailand, who were trained in the 6-clerkship from March to December 2013. This protocol was

approved by the ethic committee of the Faculty of Pharmacy, Silpakorn University, with a waiver for informed consent.

The participants were the pharmacy students in the Faculty of Pharmacy, Silpakorn University. The inclusion criteria were that 1) the pharmacy students enrolled in Pharmaceutical Care program of Doctor of Pharmacy, with a sixth-year curriculum and 2) the students were completely trained throughout six clerkships. Students who failed to complete their questionnaires or denied to participate in the study were excluded.

The author defined terms in this study as the following. *Pharmaceutical care clerkship* is a training program that provides the final year pharmacy students with an opportunity to experience the provision of pharmaceutical care in clinical settings. The students will improve their professional skills via required and elective clerkships. *Required clerkship* refers to a rotation which each pharmacy student has to pursue in order to graduate. There are four required clerkships including 1) Acute care (in-patient care at the primary, secondary, tertiary or university hospitals), 2) Ambulatory care (out-patient care, such as diabetic counseling, warfarin clinic counseling and asthma clinic etc.), 3) Drug information service and 4) Community pharmacy (drug stores). *Elective clerkship* refers to a rotation that can be chosen by pharmacy students based on their interests, and two rotations are required. Generally, the settings of these two elective clerkships involve the management of specific diseases or specific pharmaceutical care activities including cardiology, infectious disease, primary care (family pharmacist), nephrology, total parenteral nutrition, therapeutic drug monitoring, clinical research assistance, drug system and health care management. Nevertheless, if the student prefers, the required clerkship could be selected again in these elective rotations.

Prevalence of needlestick injuries mean the number of actual cases or events of injury that occurs during the 6-clerkship period per student or the number calculated based on activities that have a risk of bloodborne diseases or an exposure of non-blood contaminated needles. The activities related with a non-blood contaminated needle included total parenteral nutrition (TPN), intravenous admixture and chemotherapeutic drug preparation.

A self-reporting questionnaire was developed by the author and was validated by three experts. The questionnaire consisted of age, gender, type of clerkship throughout 6 rotations, source of knowledge about needlestick injury management, number of events, type of clerkship in which the events occurred and needlestick injury management.

Descriptive statistics are used to analyze needlestick injury prevalence, clerkship type, knowledge source and injury management. Analysis and data interpretation were processed via PSPF free software at $\alpha = 0.05$ for statistical significance.

RESULTS

Twenty three participants with 138 rotations, in the academic year 2012 were included in this study. Among the interviewed students, 15 cases (65.2%) were female and the average age was 23.83 years old (SD \pm 0.89). Only three cases (13.0%) reported that they had knowledge of needlestick injury from literatures or an introduction prior to the practice by preceptors. Among 138 rotations, the clerkships with or without activities related to needlesticks were 45 and 93 rotations, respectively. Focusing on the 45 clerkships related with needlestick, there were 28 activities (62.2%) with high risk of bloodborne diseases which were classified into the fingerstrip capillary blood glucose monitoring (n=22) and the insulin injection demonstration into patients (n=6) (Table 1).

Table: 1 Total number of clerkship, activity in clerkship related to needlestick with high risk of bloodborne diseases or non-blood contaminated needles and no activity in clerkship related any needlestick.

| Clerkships | Frequency n (%) | Activity in clerkship associated with non-blood contaminated needle n (%) | Activity in clerkship associated with needlestick with high risk of bloodborne diseases n (%) | No activity in clerkship associated with any needlestick n (%) |
|--|--------------------|--|--|---|
| Required clerkships | | | | |
| Acute care | 24 (17.4) | 3 (2.2) | 1 (0.7) | 20 (14.5) |
| Ambulatory care | 26 (18.8) | 11 (8.0) | 5 (3.6) | 10 (7.2) |
| Community pharmacy | 23 (16.7) | - | 18 (13.1) | 5 (3.6) |
| Drug information services | 24 (17.4) | 2 (1.4) | 1 (0.7) | 21 (15.3) |
| Elective clerkships | | | | |
| Cardiology | 11 (8.0) | - | - | 11 (8.0) |
| Infectious disease | 11 (8.0) | - | - | 11 (8.0) |
| Primary care | 3 (2.2) | - | 3 (2.2) | - |
| Nephrology | 4 (2.9) | - | - | 4 (2.9) |
| Total parenteral nutrition | 1 (0.7) | 1 (0.7) | - | - |
| Therapeutic drug monitoring | 3 (2.2) | - | - | 3 (2.2) |
| Clinical research assistance | 5 (3.6) | - | - | 5 (3.6) |
| Drug system and management health care | 2 (1.4) | - | - | 2 (1.4) |
| Alternative medicine | 1 (0.7) | - | - | 1 (0.7) |
| Total | 138 (100) | 17 (12.3) | 28 (20.3) | 93 (67.4) |

Out of the 23 students, 4 cases (17.4%) experienced the actual events of needlestick injury and the prevalence of injury per rotation was estimated to be 2.9% (n=138). The clinical clerkships that the needlestick injuries occurred were ambulatory care (2 cases) and community pharmacy (2 cases). Specifically, the prevalence of injury with high risk of bloodborne disease was 8.7% per person and 1.4% per rotations. Most of the injured students did not receive any needlestick injury management. However, only one injured case was given an appropriate standard of care such as immediate hand washing followed by clinician consultation. Moreover, one of them

was tested for HIV, hepatitis B and C serology. The other cases only washed their injured fingers with soap and water because the events were not associated with a blood contaminated needle.

DISCUSSION

Needlestick injury among healthcare workers is one of the most concerning accidents in hospitals. There are several clinical evidences confirming that this injury is a cause of bloodborne diseases. HIV, hepatitis B and C viruses are the most causative pathogens that have a long term effect on healthcare providers'

health [3, 12]. In addition, communicable diseases that cause temporary illnesses, such as *Mycobacterium* species, *Neisseria gonorrhoeae*, *Treponema pallidum*, Rickettsial disease, Dengue, Herpes simplex 1, Varicella zoster virus, Leishmania species, Plasmodium species and *Toxoplasma gondii*, were reported worldwide [4]. Moreover, the needlestick injury does not only cause diseases but the risk of injury is also an economic burden. Oh *et al.* found that the average direct costs of post-exposure treatment per sharp injuries among healthcare workers were 129, 70, 28 and 10 USD for medication, laboratory tests, medical services and medical treatments, respectively [13]. Thus, the preventive management of needlestick should be considered by health policy makers, infectious control unit and occupational health unit as well as each healthcare worker, in order to reduce the disease burden and economic effects.

Focusing on the injuries among health science students, although there was no previous study in pharmacy students, the current study showed that 17.4 percent of students were injured from needlesticks. Interestingly, this number resembled other health science students. Lauer *et al.* studied needlestick exposure among medical students in Germany during 2007-2010 [10]. They found that the prevalence of needlestick injury occurred at 21.4% per year. Similarly, the prevalence of needlestick of nursing students in Hong Kong was 6.9% [11]. Cheung *et al.* showed that the procedures involving the needlestick injuries among nursing students (n=34) were giving an injection (64.7%), collecting urine specimen or removing an urinary catheter (26.5%) and checking blood glucose using a fingerstrip device (8.8%) [14]. Nevertheless, when compared to the pharmacy students, fingerstrip blood glucose monitoring and insulin administration were the major needlestick associated activities. Moreover, the ambulatory care and community pharmacy rotations, which involve needlesticks, were required clerkships for every pharmacy student. As a consequence, the pharmacy students must know how to avoid the needlestick injury. Therefore, a training prior to rotation practice by instructors at the faculty of Pharmacy might help reduce the incidents of needlestick accidents, especially for the fingerstrip blood glucose monitoring and the insulin administration. This is supported by a study by Cheung *et al.* which showed that nursing students who did not participate in a preclinical prevention training had an increased risk for needlestick injuries (OR, 2.8; 95% CI, 1.1-7.5) [11].

There are 3 major limitations of this study. First, since the survey was done via questionnaires and the data were only based on the participants' history, recall bias might be found. Second, the sample size of the study was small. The data were collected from only one class, which may not represent all students in the faculty. Lastly, the prevalence analysis in this study was calculated based on one institution and the activities in each clerkship were diverse. The multicenter for national surveillance to impel the policymakers must be further studied. In conclusion, the present study was the first report of needlestick accidents among pharmacy students. The fingerstrip blood glucose monitoring and insulin administration were the activities mostly related to the needlestick injury. Therefore, a pharmacy student should be trained and educated on the occupational injuries prior to clinical clerkships.

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