

Needle-Stick Injuries Among Healthcare Workers in a Teaching Hospital

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Abstract

Background: Needle-Stick Injuries (NSIs) are among the hazards and problems that can expose health workers to infections.

Objectives: This study aimed to determine the rate of NSIs in a teaching hospital in Tehran, Iran.

Materials and Methods: This cross-sectional, analytical and descriptive study was conducted at one of the teaching hospitals in Tehran, Iran, in 2013. The study population was 344 employees in various occupational groups selected via census. Data were collected using a researcher-made questionnaire. The collected data were analyzed using some statistical tests, including independent-samples t-test with SPSS software version 21.0.

Results: The results showed that only 50.2% of injuries had been reported; 67.8% of all participants (n = 211) had at least one NSI. Most NSIs had been reported in the emergency department (33.5%). Most participants mentioned the injection syringe needles as the main cause of their injuries (71.1% of all NSIs). Among NSIs, those caused by insulin syringe needles (6.2%) were the second cause. In this study, females had NSIs more than males. There was a statistically significant relationship between sex and the rate of NSIs (P < 0.05).

Conclusions: Considering the high rate of occupational injuries, further preventive measures should be implemented to prevent these injuries from occurring. Providing initial and continuing training for employees is very important. Directing special attention to emergency department employees may be effective in reducing occupational injuries.

Keywords: Needle Sticks Injuries (NSIs), Healthcare Workers, Hospitals, Iran

1. Background

Needle-Stick Injuries (NSIs) are among the hazards and problems that can expose health workers to infections (1). Hepatitis B and C and HIV are some of biological hazards threatening the health of thousands of healthcare workers. The most common mode of transmission of these diseases is via needle stick injury (2). In America, it is estimated that 600,000 to one million needle sticks occur annually among which about 16,000 of these needles are infected with HIV. According to the Centers for Disease Control only 10% of such injuries are reported (3). Of each 6 NSIs, one person is infected with hepatitis B, of each 10 injuries, one person is infected with hepatitis C, and in every 300 injuries, a person is infected with HIV (3). Also, based on the World Health Organization report, 2.5% of healthcare workers around the world have been infected with AIDS and 40% have been infected with hepatitis B and C due to occupational exposure (4).

The results of several studies have shown that different healthcare workers have had various rates of NSIs

among which the proportion of nurses has been higher than others (5, 6). The rates of NSIs in Egypt, Germany, Pakistan, Turkey, and Australia were 66.2%, 31.4%, 45%, 45%, and 51%, respectively (7-11). In addition, the results of studies conducted in different provinces of Iran showed that the rates of NSIs in the hospitals of Mazandaran, Kurdistan, Yasuj, Shiraz, and Kashan were 57.3%, 64.9%, 39.3%, 38%, and 71%, respectively (12-15). In another similar study conducted on nurses in Iran, this rate was 45.9% (16). However, most of NSIs occur when recapping the syringe needles and the centers for disease control and prevention of America estimated that 80% of these injuries were preventable (17). In 1987, this center recommended the body substance isolation guideline and after a while, the universal precautions protocol was provided. The most important precaution in this protocol was avoiding recapping needles (18). Heeding the prevention protocols helps managers and employees create a safe workplace for providing healthcare services (16).

2. Objectives

This study aimed to determine the rate of NSIs in one teaching hospital in 2013 in order to assess NSIs.

3. Materials and Methods

This applied, cross-sectional, and analytical-descriptive study was conducted in one of the teaching hospitals in Tehran, Iran, in 2013. The study population was 344 workers in various occupational groups, including physicians, nurses, midwives, interns, practical nurses, nursing assistants, and operating room and anesthesia technicians selected using the census method. Data were collected using a researcher-made questionnaire which consisted of two sections. The first section included questions about demographic data, and the second one included questions about NSIs, their causes and the related wards where the injuries had occurred during the first 6 months of 2013, as well as the reasons for reporting or not reporting these injuries. The validity of the questionnaire was confirmed through getting the opinions of five experts. Moreover, its reliability was confirmed using the test-retest reliability method ($\alpha = 0.82$). The questionnaire was completed through face to face interviews and the studied employees were asked to express the events and injuries they were faced with during the first 6 months of 2013. Participation in the study was voluntary for all participants and an informed consent was obtained from all employees participating in this study. The collected data were analyzed using an independent-samples t-test with SPSS software version 21.0. P value < 0.05 was considered statistically significant.

4. Results

The response rate was 90%. The mean age of the participants was 37 years (SD = 9) and 58.8% of them were female. Among the employees participating in this study, there were 12 specialists (3.9%), 14 midwives (4.5%), 135 nurses (43.4%), 49 practical nurses (15.8%), 45 nursing assistants (14.5%), 4 operating room technicians (1.3%), 2 anesthesia technicians (0.6%), and 50 interns (16.1%). Therefore, the most and least participants were, respectively, nurses and anesthesia technicians. Among different occupational groups, the nurses (91 cases) had the highest rate of NSIs.

Among the studied employees, 178 cases (57.2%) had recapped the contaminated syringes after using them and had thrown them in a safety box, and 126 cases (40.5%) had thrown the syringes in a safety box without recapping. Five persons had recapped the syringes and then thrown them in a safety box along with other devices. Two persons (0.6%) also had thrown them in a safety box along with other devices without recapping.

The results showed that 98.7% of the studied employees had received hepatitis B vaccine. Only 1.8% of them had used protective barriers, including goggles, gloves and gowns during blood sampling, while 8.7% of these

employees had never used the protective barriers. Also, 67.8% of all participants (n = 211) had at least one NSI. The frequency rates of NSIs in intensive care unit, emergency department (ED), operating room, obstetrics and gynecology, coronary care unit (CCU), neonatal intensive care unit (NICU) and wards were 47 (22.2%), 71 (33.5%), 17 (8%), 22 (11.3%), 2 (0.75%), 1 (0.2%) and 52 (24.1%), respectively.

Moreover, the results showed that only 50.2% of the injuries had been reported. Most participants mentioned the injection syringe needles as the main cause of their injuries (71.1% of all NSIs). Among all NSIs, those caused by insulin syringe needles (6.2%) were the second cause (Table 1).

In this study, females had NSIs more than males. Overall, the syringe needles were known as the major cause of NSIs (P < 0.05).

The results showed that the rate of NSIs did not have any significant relationship with the studied occupational groups, types of training and types of devices causing injuries (P > 0.05). However, the relationship between the employees' sex and the rate of NSIs was significant (P < 0.05).

Table 1. Distribution of Injuries in the Studied Employees by the Causes^a

The Causes of Injuries	Values ^b
Injection syringes needles	150 (71.1)
Insulin syringes needles	13 (6.2)
Suture needles	12 (5.7)
Phlebotomy needles	16 (7.6)
Lancets	7 (3.3)
CVP needles	7 (3.3)
Angiocath needles	6 (2.8)
Total	211 (100)

^aAbbreviation: CVP, Central venous pressure.

^bData are presented as No. (%).

5. Discussion

In the present study, about half of the studied employees stated that they had not received any training in handling sharp objects such as needles. The results of a study conducted in India showed that employees' awareness about preventive behaviors was at a low level (14), which is somewhat similar to the results of the present study. The results of the current study indicated that 67.8% of the studied hospital's employees had NSIs at least once. Chen and colleagues in their study conducted in China concluded that 71.3 % of healthcare workers had NSIs at least once a year (19). The results of other similar studies have shown different prevalence rates of NSIs in various countries, including 55% in India (20), 55.5% in Thailand, 57% in England, and 72.4% in Canada (21, 22). In the similar studies have been conducted in Iran on NSIs, differ-

ent rates have been reported (such as 38.8%, 53%, 52%, 39%, 55.2%, 52.9, and 41%) (12, 13, 15, 16, 23-25) which are different from and less than that in our study. Comparing the results of the present study with other studies, it seems that the prevalence rates of NSIs are high in all personnel as a whole. Also, in the present study, only 50.2% of injuries had been reported. In studies conducted in the Philippines and Malaysia, the rates of reported injuries were 57% and 2.49 %, respectively (26, 27). Overall, reporting rates of NSIs include a wide range from 2.26% to 97% (28). It seems that the reporting rate of injuries among healthcare employees in the present study was low which can be due to the lack of employees' awareness of the necessity for reporting or the lack of employees' knowledge of and familiarity with the procedure. The mentioned results show the need for improving the type and amount of training among employees which, in turn, can result in the decrease of injuries and related transmitted diseases. Most participants in the current study mentioned the injection syringe needles as the main cause of their NSIs (71.1%) and insulin syringe needles as the second (6.2%), which is consistent with the results of Smith and colleagues' study (29). In most studies, injection syringe needles have been common causes of NSIs, which can be due to their extensive use at the patients' bedside because it reduces the amount of attention during use. However, the results of the present study showed that most NSIs had occurred in the ED and inpatient wards whereas in some other studies, most of the injuries had occurred in the inpatient wards and during the intravenous sampling (13, 30). It seems that the employees of the ED are at greater risk because of the need for acting quickly. Therefore, hospital officials and heads should provide a special training program for the employees of ED to reduce their risk of injuries. It has been recommended to avoid recapping needles to reduce the rate of injuries (25). Furthermore, the routine audit of sharps management, employees training and increasing their awareness have great effects on reducing risk and injuries (31).

Also, the results of the current study showed that 98.7% of employees had received hepatitis B vaccine. The vaccination coverage rate for hepatitis B in Azadi and colleagues' study was 95.5% (16). However, the results of studies conducted in Pakistan, Saudi Arabia, India and Egypt showed that the vaccination coverage rates for hepatitis B in the healthcare staff were 45%, 84%, 82%, 66% and 82.45%, respectively (32-35). Therefore, the vaccination coverage in the present study, compared to other studies, was at a high level indicating that the hospital had paid great attention to the immunization of their healthcare personnel and the staff had been required to receive the hepatitis B vaccine. It should be noted that although the vaccination rate was at a high level in the studied hospital, vaccination alone cannot fully guarantee immunity against infectious diseases and it is required for employees to periodically check and control their antibody levels of dangerous pathogens (36). In comparison with

other studies, the rate of hepatitis B vaccination coverage among the studied healthcare employees in the present study was acceptable. It can be due to that vaccination and receiving vaccines was free for staff members and this could be an encouraging factor to receive vaccines. The current study had some limitations. This study was conducted only at one hospital; therefore, its findings cannot be attributed to all hospitals in Iran. Also, the required data were collected through asking questions from the studied employees and therefore, the findings can be influenced by recall bias because they may not be able to vividly recall their NSIs during the first 6 months of 2013. Overall, the results showed the necessity for paying great attention to training all employees of occupational groups. One of the most important ways to prevent and control occupational injuries is training employees, particularly the personnel of ED; because the ED employees perform more diagnosis - treatment procedures and deal with crowded and emergency situations more than other occupational groups. All of these factors increase the hazards and risk of injuries.

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