

Nursing Staff's Professional Experiences Related to Dealing with Sharps in Intensive Care Units



Amira Reda Hamid Ebrahim¹, Mostafa Mohamed Zanaty² Samar Elhoseiny Abdelraouf³

¹BSc.N, Faculty of Nursing, Mansoura University, Egypt, ²Lecturer of Critical Care and Emergency Nursing, Faculty of Nursing, Mansoura University, Egypt and ³Professor of Community Health Nursing, Faculty of Nursing Mansoura University, Egypt

1.ABSTRACT

Sharp injuries are incidents or accidents that occur as a result of a needle, blades such as scalpels, or other medical instruments that penetrate the skin. They are the most common workplace injuries among healthcare professionals. Sharp injuries can expose healthcare workers to the risk of communicable disease infection. This study aimed to assess nursing staff's professional experiences related to dealing with sharps in intensive care units, through a cross-sectional study design. The study was carried out on a convenience sample of 60 nursing staff at intensive care units, at Specialized Medical Hospital, Mansoura University. Using three tools to collect the nursing staff's socio-demographic and occupational characteristics, and assess the professional history of needle stick injuries and sharp injuries as well as experiences related to dealing with sharps. Results illustrate that 78.3% of the nursing staff were exposed to needle sticks/ sharps injuries. 60.0% reported handling syringe needles 10 to fewer than 15 times per day in the previous three months. Accordingly, on-duty education and regular training programs are recommended for nursing staff about occupational health hazards of sharp injuries, protective measures, the importance of reporting incidents, and sharp management.

Keywords: Experience, Intensive Care Unit, Needle sticks, Nursing Staff, Sharp Injuries,

2.Introduction

Sharp injuries are (SIs) defined as penetrating skin injuries caused by sharp medical instruments contaminated with potentially infectious materials from the patient, such as blood or other body fluids, regardless of the presence of a bleeding wound (Yang et al., 2020). SIs are the most common occupational injuries among healthcare workers (HCWs), who account for approximately 12% of all working people worldwide. According to World Health Organization (WHO, 2019), more than 35 million HCWs are suffering from occupational needle stick injuries (NSIs) and SIs every year. Nurses have been reported to have the highest incidence of these injuries among HCWs (Abadiga, Mosisa & Abate, 2020).

The most common causes of SIs are a lack of personal protective equipment (PPE), safety devices, and sharps disposal containers; manipulating used sharps (bending, braking, or cutting needles); and a lack of SIs reporting procedures (Dulon, Stranzinger, Wendeler & Nienhaus, 2020). Infection rates from NSIs range from 6-30% for HBV, 0-7% for HCV, and < 0.3%

for HIV (Centers for Disease Control and Prevention [CDC], 2021). NSIs cause 16,000 cases of HCV, 66,000 cases of HBV, and 1,000 cases of HIV among HCWs each year (Mengistu, Tolera and Demmu, 2021; WHO, 2016).

According to CDC and the European Union's Information Agency for Occupational Safety and Health, over 385,000 and one million NSI cases are reported annually among HCWs working in hospitals in the United States and Europe, respectively (CDC, 2019). Around three million HCWs were percutaneously exposed to blood pathogens worldwide, with two million exposed to HBV, 0.9 million exposed to HCV, and 170,000 exposed to HIV, with more than 90 percent occurring in developing countries (Mengistu, Tolera & Demmu, 2021; WHO, 2016).

Wherein, needle stick injuries now transmit at least 20 different pathogens, including HBV, HCV, and HIV. Furthermore, NSIs can transmit diseases such as tuberculosis, diphtheria, herpes, malaria, Ebola, the plague, and Ebstein-Barr disease to HCWs (Bouya et al., 2020).

Intensive care units (ICUs) have different staffing requirements. Nurses working in ICUs experience high levels of job demands, overload, and end-of-life care issues. Therefore, they are more exposed to occupational hazards, especially sharp injuries because of the hard nature of their work (Bae, 2021).

Intensive care units are often fast-paced crises and codes requiring high-intensity therapies and rapid interventions are common in this environment. Critically ill patients require more procedures, tests, and blood draws performed on a daily basis than patients in other settings, and these, in turn, require the use of more sharps (Bae, 2021). Thus the investigator felt the need to take up the study to assess the nursing staff's professional experiences related to dealing with sharps so that effective measures can be taken as required and thus reduce cross-contamination of diseases not only from patients to nurses but also from nurses to patients (Bharati & Natekar, 2018).

The aim of this study was to assess the nursing staff's professional experiences related to dealing with sharps in ICUs.

Research Questions

1. What are the nursing staffs' professional history of needle sticks and sharp injuries in ICUs?
2. What are the nursing staff's professional experiences related to dealing with sharps in ICUs?

3. Method

3.1 Study Design. A cross-sectional study design was utilized in the current study.

3.2 Setting. This study was conducted at ICUs affiliated with Specialized Medical Hospital, Mansoura University.

3.3 Participant and Sampling. All on-job ICU nursing staff in the above-mentioned setting, and fulfilling the following criteria: both gender, assigned to give direct care to patients, different qualifications, and at least one year of experience. The researcher enrolled 60 nursing staff conveniently.

3.4 Tools of the study: After reviewing the relevant works of literature the researcher developed three tools used in this study for data collection.

Tool I: Nursing staff's socio-demographic and occupational characteristics self-administrated structure questionnaire. This part included the socio-demographic and occupational characteristics of the nursing staff, which were composed of 11 questions (four open-ended and

seven closed-ended questions), covering gender, age, marital status, residence, education level, year of experience, attendance at training programs, and vaccination status.

Tool II: Nursing staff's history of needle sticks and sharps injuries self-administrated structure questionnaire.

It consisted of eight questions (one open-ended and seven closed-ended) about nursing staff's prior exposure to NSIs and SIs, and the action taken in response to the injuries.

Tool III: Nursing staff's professional experiences related to dealing with sharps self-administrated structure questionnaire.

It consists of ten questions (three open-ended and seven closed-ended) designed to elicit nursing staff's professional experiences with sharps, such as the number of injections and sharps handled per day in the previous three months and how to handle needles and sharps after use.

3.5 Phases of the Study

The researcher completed the study in three main phases, as follows:

The preparatory phase

Administrative stage. The responsible authorization, the Faculty of Nursing issued an official letter to the director of ICUs affiliated with Specialized Medical Hospital, Mansoura University, to permit the researcher to conduct the current study. The letter informed the director about the aim of the study and its process in order to gain their cooperation and support during the data collection.

Ethical considerations. The Faculty of Nursing Research Ethics Committee, Mansoura University approved the study. The researcher obtained written informed consent from the participants. The researcher introduced herself and provided the participants with a brief explanation of the study's aim. The researcher assured the participants that their participation was entirely voluntary and the information gathered would be kept confidential and used to improve healthcare services. The researcher informed the participants that they had the right to ask any question related to the study and withdraw at any time from the study without any responsibility, and without giving any reason.

Literature review. The researcher used scientific published articles, internet searches, and textbooks, and a review of national and international literature on the various aspects of SIs and their control measures was conducted. This

review served as a guide for creating the study tools.

Tools' face and content validity. The researcher submitted the study tools to a jury panel of five professors in Community Health Nursing and Critical Care and Emergency Nursing at, the Faculty of Nursing, Mansoura University. To achieve the criteria of trustworthiness, the professors evaluated these tools for appropriateness and relevance and elicited responses that either agree or disagree for face and content validity.

The pilot study. The researcher conducted the pilot study with 10% (6 nursing staff) of the study sample to assess the clarity and applicability of the tools as well as to estimate the time required for response. Nursing staff involved in the pilot study was included in the main study sample.

Implementation phase

The researcher collected data three days per week (Saturday, Monday, and Wednesday), from March 2021 to the end of April 2021. The researcher collected the nursing staff's socio-demographic and occupational characteristics, nursing staffs' professional history of needle sticks and sharp injuries, and professional experiences of the nursing staff related to dealing with sharps using tools (I, II, and III)

The researcher distributed self-administrated structured questionnaires (I, II, and III) to nursing staff on their units and collected them immediately after completion, tools take about 15 to 20 minutes, to be fulfilled per each nursing staff.

3.6 Statistical Analysis

Standard for Statistical Product and Service Solutions (SPSS) for Windows version 25.0 was used for all statistical tests the frequency and percentage of categorical data were expressed.

4. Results

Table (1) shows that 55.0% of the nursing staff is women and 35.0% aged from 20 to less than 25 years, with a mean age (of 28.5 ± 11.365). Fifty percent and 73.3% of the nursing staff were married and residents of rural areas, respectively. Concerning the educational level, 40.0% of nursing staff graduated from a technical nursing institute. Concerning the ICU specialty, 36.7% and 38.3% of nursing staff were working at the hepatic ICU with work experiences ranging from 5: to < 10 years, respectively. Sixty percent of the nursing staff had attended a training course about preventive practices for needle sticks/ sharps injuries, and 35.0% of attendances were over nine months ago. Fifty percent of the nursing staff was fully vaccinated against HBV.

Table (2) illustrates that 78.3% of the nursing staff were exposed to needle sticks/ sharps injuries. One injury in the last three months, by syringe needle and in the right hand, was reported by 31.7% and 60% of the nursing staff, respectively. As well, 38.3% and 56.7% of nursing staff reported that urgency and performing any nursing procedure on the patient were risk factors and procedures during which injuries occurred, respectively. 95.0% of the nursing staff washed the site of the injury with soap water and 20.0% reported the injury to the infection control team.

Table (3) indicates that 60.0% of the nursing staff reported handling syringe needles 10 to fewer than 15 times per day in the previous three months, and 46.7% reported handling sharp instruments five to fewer than 10 times. As well, 56.7% and 88.3% of the nursing staff did not recap needles after use, dispose of single-use sharps immediately in a safety box, and placed reusable sharps in a tray and washed them with soap and water after use, respectively. The hospital had policies in place to handle and report needle sticks and other sharp injuries, according to all nursing staff (100%).

Table 1 Nursing staffs socio-demographic and occupational characteristics

Items	n=60	%
Gender		
Woman	33	55.0
Man	27	45.0
Age group		
20: < 25 years	21	35.0
25: < 30 years	19	31.7
≥ 30 years	20	33.3
\bar{x} (SD)	28.5 (11.365)	
Marital status		
Single	24	40.0
Married	30	50.0
Widower	6	10.0

Residence		
Rural	44	73.3
Urban	16	26.7
Educational level		
Nursing school	19	31.7
Technical nursing institute	24	40.0
Baccalaureate degree (BSc)	15	25.0
Post graduate (Master degree)	2	3.3
ICU specialty		
Hepatic	22	36.7
Diabetic	20	33.3
Cardiac	18	30.0
Years of experience		
1 :< 5 year	19	31.7
5 :< 10 year	23	38.3
≥ 10 years	18	30.0
Attendance previous training courses		
Non	17	28.3
One	36	60.0
Two	4	6.6
Three	3	5.0
Last course date		
< 3 months	10	16.6
3: < 6 months	6	10.0
6: 9 months	6	10.0
+ 9 months	21	35.0
HBV vaccination status		
Fully vaccinated	30	50.0
Non vaccinated	17	28.3
Not sure	13	21.7

Table 2 Nursing staff's history of needle sticks/ sharps injuries

Items	n=60	%
Previous exposure to needle sticks/ sharps injuries	47	78.3
Number of injuries the last 3 months		
One	19	31.7
Two	17	28.3
Three	11	18.3
Type of instrument causing the injuries*		
Syringe needle	36	60.0
Glass ampoule	16	26.7
Skeptical	12	20.0
Scalpel	4	6.7
Suture needle	3	5.0
Scissor	3	5.0
Most vulnerable hand		
Right	49	81.1
Left	11	18.3
Sharp injuries risk factors*		
Urgency	23	38.3
Carelessness	19	31.7
Collision	16	26.7
Untrained procedure	10	16.7
Poor quality of sharps	8	13.3
Procedure during which injuries occurred		
During performing any nursing procedure on the patient	34	56.7
Needle recapping	12	20.0
Cleaning instruments	6	10.0

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Transit to disposal	2	3.3
The action was taken after the injuries		
Wash the site of injury with soap and water	57	95.0
Disinfect the site of injury	15	25.0
Report injury orally	9	15.0
Written Incident report	7	11.7
Squeezing site of injury	4	6.7
Report the injuries to		
Not report	45	75.0
Infection control team	12	20.0
Line manager	3	5.0

More than one answer was allowed

Table 3 *Nursing staff's experience of handling with needle sticks/sharp injuries*

Items	n=60	%
Rate of syringe needle handling during the last 3 months		
5 :<10	5	8.3
10 :<15	36	60.0
≥15	19	31.7
Rate of sharp instrument handling during the last 3 months		
5 :< 10	28	46.7
10 :< 15	18	30.0
≥15	14	23.3
Handling with needles after use		
Did not recap	34	56.7
Recapping	26	43.3
Handling with single-use sharps after use		
Disposed of immediately in the safety box	53	88.3
Disposed of in safety box after completing the nursing procedure	7	11.7
Handling with reusable sharps after use		
Place in a tray and wash with soap and water	53	88.3
Keep it to reuse	7	11.7
Hospital's policies for reporting sharp injuries		
The hospital has policies for needle sticks/ sharp injury reporting	60	100.0
The hospital has policies for dealing with needle sticks/ sharps injuries		100.0
Reading the hospital's occupational health and safety policies at joining the work	60	35.0
Reading the hospital's occupational health and safety policies a year ago	21	30.0

5. Discussion

Accidental NSIs and SIs to HCWs continue to have a significant problem in the healthcare system owing to the associated health risk of acquiring infections such as HBV, HCV, HIV, and other blood-borne pathogens (Bazie, 2020). Nursing staff among HCWs are the fundamental part of clinical services and take the main responsibility for patients' care with different health conditions in most of our healthcare settings. So, they are at high risk for occupational hazards and injuries including infectious disease, and environmental and psychosocial risks along the

course of their day-to-day activities in the healthcare environment (Kebede & Gerensea, 2018).

In the current study half of the nursing staff has been fully vaccinated against HBV. Abebe, Kassaw, and Shewangashaw, (2018), in Dessie referral hospital in Ethiopia, and Madhavan, Asokan, Vasudevan, Maniyappan and Veena, (2019), in Tanta, Egypt had a similar result; half of their participants were fully vaccinated against HBV. This highlights the importance to empower mandatory vaccination to HCWs including HBV.

In the present study, the almost majority of the nursing staff has previous exposure to NSIs, and SIs, occur once to less than one-third, these results come in agreement with the finding of Ashmawy, EL-Shafie and Rabo, (2017) revealed that the majority of the studied nurses had a history of NSI.

These results are also in agreement with Abd El Razek, Mohamed, Abd El Rahman and Mohamed, (2018) found that the majority of participating nurses were exposed to sharp injury due to the higher number of invasive interventions in ICUs units and lack of experiences and no updating of safety training or practice and also reported that less than one-third of workers had it once. On the same line, Abo El-enen, Soliman and Salem, (2020) and McDowall & Laher, (2019), in Johannesburg reported that more than one-fourth of nursing staff had two previous NSIs, and less than one-fifth of them had three previous.

Results of this study reveal that the syringe needle, and skeptical are the instruments causing NSIs to less than two-thirds, and one-fifth of the nursing staff, respectively. Bouya, et al., (2020) had similar results and reported that the most common causes of NSIs among HCWs were hypodermic needles representing less than two-thirds of studied nurses. As well, McDowall & Laher, (2019), in Johannesburg whose finding showed that one-fifth of the nursing staff had NSIs by finger prick for glucose testing. From the researcher's point of view, the higher prevalence of hypodermic needle-induced NSIs may be due to the fact that the riskiest procedures are performed using syringes. IV cannula and suture needles cause NSIs injury less frequently. Bouya, et al., (2020) had similar point of view.

In the current study, the right hand is most vulnerable to the majority of nursing staff. These findings contradict the finding of Chadha and Verma, (2019), who mentioned that injuries were more in non-dominant hands during hand-to-hand passing of sharp instruments, suture needles, and other sharp device.

The present study indicates that NSIs, and SIs, occur during the performance of any nursing procedure on the patients, and needle recapping for more than half, and one-fifth of the nursing staff respectively. These results are in harmony with Fitria, Izati, & Martiana, (2020) suggested that HCWs often experience NSIs caused by negligence. Additionally, NSIs were also caused by the lack of compliance with standard operating procedures when conducting work activities using needles. From the researcher's point of view pre

and on-duty training is an important issue to achieve nursing staff competency.

Regarding, immediate action was taken after NSIs and SIs. The current study reported that most of the nursing staff washed the site of injury with soap and water which is similar to Abo El-enen et al., (2020) and Sandhya, (2019) reported that all of the nursing staff washed the site of injury with soap and water. While, the results of the present study disagreed with the finding documented by Gupta et al., (2019), who stated that nurses' awareness about the proper practice after NSIs, and SIs were limited and others appears not beneficial as the minority of them washed the site of injury with soap and water.

In the present study, three-fourths of the exposed nursing staff to NSIs and SIs do not report the incidences. Suliman et al., (2018) had similar results reported that, the majority of students who experienced NSI did not inform their clinical instructors. The researcher argues this to the complexity of reporting process, wasted time, and low risk of transmission of disease via NSIs and SIs as the nursing staff view; all contribute to inactivating the reporting incidence.

In this study, less than half of the nursing staff recaps the needle after injection. This result is similar to the result of Weldesamuel et al., (2019) reported that less than half of the respondents recap the needle after use. The researcher claims that nursing staff needs to be persuaded to reject this act, as supported by Ali, Athar, Zafar, & Siddiqi, (2020) who claimed that the first step in preventing NSIs and SIs should focus on efforts to eliminate the practice of recapping the needles. HCWs should use a recapping technique with one hand. A recapping technique using one hand is considered safer than using two hands.

Regarding dealing with single-use sharps after use, the researcher finds that the majority of nursing staff disposed of them immediately in safety boxes. This finding contradicts the finding of Asfour, Tayyib, Lindsay, Alsolami and Alshmemri, (2021) who mentioned that less than one-fifth place used sharp instruments immediately after used in approved puncture-resistant containers.

All the nursing staff in the current study reports that the hospital has policies for NSIs and SIs reporting and action in incident cases. McDowall & Laher, (2019) had similar results and reported that their hospital had a policy or standard operating procedure in place following NSIs. The researcher recommends utilizing visualization

methods to orient and remind the nursing staff about tipping issues.

6. Conclusion

The researcher concludes that the almost majority of the nursing staff has previous exposure to NSIs and SIs; the contributed risk factors are ordered decently from the highly reputed to less as urgency, carelessness, collision, untrained procedure, and poor quality of sharps. Most, and three-fourths of nursing staff wash the site of injury with soap and water, and do not report incidences of NSIs, and SIs, while all are aware of hospital policies for NSIs, and SIs reporting, and dealing with.

7. Recommendations

In light of the findings of the current study, the following recommendations are suggested:

- 1- Healthcare facilities should establish multidisciplinary injury-prevention teams with representatives of most departments such as administration, pharmacies, nursing unit management, staff safety, quality management, and infection control team.
- 2- Healthcare facilities should have a written exposure control plan; it should be reviewed and updated routinely.
- 3- All employees at risk for occupational exposure to NSI and SIs should receive interactive training about occupational strategy strategies.
- 4- Establish in-service training and education centers in the healthcare facilities for appropriate training in order to increase awareness of healthcare workers with regard to this preventable occupational health hazard.
- 5- Apply for an obligatory immunization program against the hepatitis B virus for all healthcare workers in healthcare facilities.

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