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The Incidence and Circumstances of Needle Sticks Injury (NSI) Among Arab Nurses Students: Comparative Study

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Abstract

Background: Needle stick injuries (NSIs) are considered a major problem facing healthcare workers, especially, nursing students who are more vulnerable to the risks of NSIs. The study aims to identify the incidence of NSIs and evaluate its circumstances among university nursing students in four Arab countries.

Method: A cross-national study employs a descriptive comparative design. Five universities in four Arab countries, two in Egypt and one each in three Arab countries: Jordan, Iraq, and Kingdom of Saudi Arabia (KSA) were conducted. Undergraduate nursing students (1,320) from second to fourth year were participated in the study. Self-administered questionnaire were provided and indicating NSIs at clinical settings; frequency (number, nature and reason); and other circumstances including the places where the NSIs occurred.

Results: There were significant relationships indicating that there is a high incidence of NSIs due to lack of knowledge toward needle sticks among university nursing students. Data shows that the students are vulnerable to contracting infections and are at risk. Percentage of those who have been exposed to injury was 40%. About half of the study subjects answered that they did not notify anyone of their NSI experiences.

Conclusion: Universities should emphasize on evidence-based regulation and standards of infection control, occupational health and safety, to promote student awareness and prevention of NSIs. Infection control standards and nursing regulatory issues must be inculcated in the training and education programs of nursing students especially in dealing with needle sticks incidents. Nursing

students' should undergo mandatory vaccination program prior to enrolment.

Keywords: Infection; Needle stick injury; Incidence; Arab nurses

Introduction

Needle stick injury (NSI) has become a major problem and most researches have focused on nurses, doctors, and other healthcare workers. It must be considered that nursing students in clinical duties are also at high risk of NSI [1]. Needles cause more than 70% of sharps related injuries and are considered the second most common cause of occupational injury [2]. It is estimated that out of 35 million healthcare workers (HCWs) worldwide, 3 million experience NSIs every year [3,4].

Hepatitis B, hepatitis C, and HIV are some of the biological hazards threatening the health of thousands of HCWs. The most common mode of transmission of these diseases is via NSIs [5]. NSI prevalence according to studies made in Egypt, Jordan, and Kingdom of Saudi Arabia (KSA) were 68%; 75.5%; and 46.9%, respectively [6-9].

Nursing students are sensitized to these risks from the outset of their training. The safety of a workplace environment plays an important factor in preventing accidents at work among HCWs [10]. Nursing educators are in part responsible for the actions of their students as they provide inadequate supervision of students in the clinical setting [11]. In addition, enhanced awareness on occupational safety among nursing students is expected to reduce the risk of NSIs [12,13].

The Neuman Systems Model serves as the theoretical framework for this study. For the purpose of this study, the client has been identified as the nursing students in 4 Arab countries. The Neuman Systems Model also focuses on interventions on the primary, secondary, and tertiary stages [14]. The outcomes of these levels of prevention can lead to decreased risk of NSIs, as well as, reduced blood borne infections, **Figure 1** explains the model.

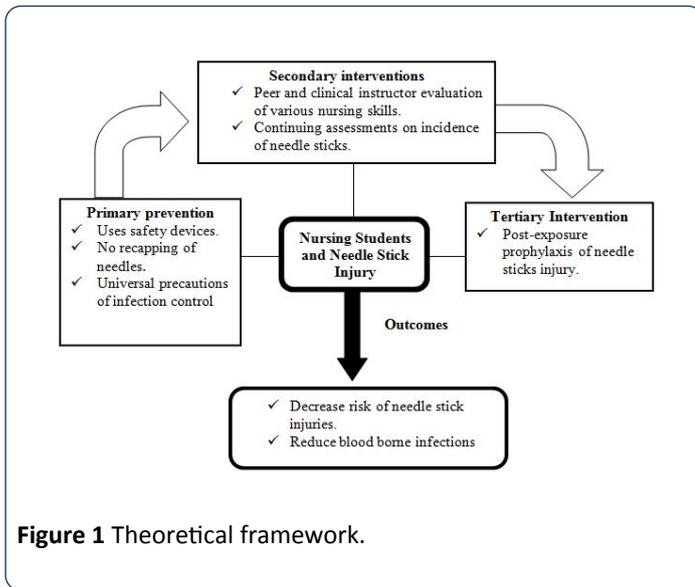


Figure 1 Theoretical framework.

Significance of the study

NSI is a critical problem for nursing students as it increases the risk of spreading infection and the risk of the incidence of NSIs continues to increase. Nurses' clinical instructors are accountable for their students' training and they should have an obligation to ensure that their practice is safe. Students might have lack of training and awareness on the importance of safety, specifically among the first and second year nursing students. This places a definite responsibility on the nurse educators and mentors in the clinical setting. Thus, the study aims to identify the incidence of NSIs among nursing students in selected Arab countries including Jordan, Egypt, Saudi Arabia and Iraq and to evaluate the circumstances around such incidents.

Research objectives

- To describe the incidence of NSIs among Arab Nursing Students.
- To identify the circumstances associated with incidents of NSIs.
- To identify the reasons for the NSIs incidents.
- To assess nursing students who have experienced NSIs in clinical areas.

Materials and Methods

Design

A descriptive comparative design was used to explore the incidence of NSIs among Arab nursing students and evaluate the circumstances around their situation. Survey study was

conducted on the 2nd semester 2014 through self-administered questionnaire given out to 1320 undergraduate nursing students from second year, third year and fourth (final) year levels. The questionnaire was developed by the researchers based on the researcher's observation in the clinical training of students and the extensive review of literatures [14,15].

Setting

The study was conducted in five Arab universities located in four (4) Arab countries, two Nursing Faculties from Egypt: Aswan University and Assiut University; Princess Aisha Bint Al-Hussein Faculty of Nursing and Health Sciences, Al -Hussein University in Jordan; Babylon University in Iraq; and, Al-Maarefa Colleges in Saudi Arabia.

Instrument

A self-administered questionnaire with two parts was developed by the researchers. The first part presented socio-demographic questions such as level of education and gender. The second part included questions about Incidences and circumstances of needle stick during clinical practice, NSIs frequency (including number, nature and reason), the places where NSIs occurred and whether the event was reported. Reasons/causes of NSI, Safety measures practiced after NSI incidence and circumstances.

Ethical considerations

Ethical approval was sought from Al-Hussein Bin Talal University Research Ethics Committee and complying with the local ethical rules and regulations within each university. A permission to conduct the study was obtained from the Dean of the Faculty of Nursing in each university. Teaching staff were informed prior to administering the survey. The students were informed by their respective faculty professors about the study aims and the content of the questionnaire. They were instructed on how to fill out the questionnaire completely and truthfully.

Pilot study and procedure

A pilot study was carried out after the development of the questionnaire on 10% of the students from each faculty to test the applicability and visibility of the questionnaire. Necessary modifications on the questionnaire were done according to the results of the pilot study. The reliability of the study questionnaire was ($\alpha=0.85$) and the content validity was measured by a jury of experts consisted of five professors from the Medical and Surgical (Adult Nursing) Department and Nursing Administration Department.

Statistical analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (Version 16.0, SPSS, Inc.) software. Results were expressed as means \pm SD (standard deviation). A descriptive analysis of the statistics was used based on frequency, percentage, and parametric variables using students test analysis was conducted for non-parametric variables. All

reported P values were made on the basis of 2-sided tests and compared to a significance level of 5%. The differences were considered statistically significant at $P < 0.05$.

Results

Demographic characteristics of the subjects

Table 1 illustrates the demographic profile of the study subjects with a total number of 1,320 nursing students. Most of

the subjects were females representing 81%, mostly from Assiut University (60%). The distribution of the number of respondents by student level was observed at 44% third year level students; 34% second year level students; while, the proportion of participants studying at the fourth year level was 22%. Significant relationship in terms of gender was found between the level of education and the university participants.

Table 1 Demographic characteristics of study subjects; n=1,320 (%)

Characteristics		Egypt n (%)	Jordan n (%)	Iraq n (%)	KSA n (%)	Total n (%)
Gender	Male	0 (0)	38 (16)	68 (30)	124 (54)	230 (19)
	Female	790 (73)	124 (11)	132 (12)	44 (4)	1090 (81)
Academic Year	Second year	320 (71)	53 (12)	53 (12)	23 (5)	449 (34)
	Third year	320 (55)	37 (6)	146 (25)	82 (14)	585 (44)
	Fourth year	150 (52)	72 (25)	1 (1)	63 (22)	286 (22)

Incidence and circumstances of NSIs

Table 2 shows that the percentage of those who have been exposed to injury was 40%. The highest percentage of respondents registered from the University of Babylon, Iraq with 44% university students injured; while, the lowest was in Al Maarefa Colleges, KSA at 27%, which was statistically significant. Survey showed high probability of infection as 52% of respondents experienced NSIs once and 27% twice. The ratio was reasonable, and repetition of cases indicated lack of experiences of the students. More than two thirds of the respondents reported that they did not do blood test after the injury.

The level of injury occurring mostly among the second level nursing students at 72%, which is normal due to the lack of experience by the students at this phase of their study. It was noted that there were three (3) main reasons for the NSI incidents. The preparation of medications was presented at 24%; recapping the needle was presented at 17%; and, injection at 15%. It was observed that all these three causes accounted for 56% and confirmed the lack of experience among nursing students on how to properly deal with NSIs when administering to their patients. Also, the finding shows that the nursing students experienced NSIs in other clinical areas (32%) especially in the medical or surgical wards (31%) followed by the emergency centers (21%) and intensive care units (10%).

Table 2 Incidences, circumstances and hospital areas where NSI usually occurred by country (%)

Characteristics		Egypt n (%)	Jordan n (%)	Iraq n (%)	KSA n (%)	Total n (%)
Experience of NSI	Yes	310 (59)	75 (14)	98 (19)	45 (8)	528 (40)
	No	480 (61)	87 (11)	102 (13)	123 (15)	792 (60)
	Mean scores	0.39	0.46	0.49	0.27	0.4
Times of NSI	Once	182 (66)	43 (16)	30 (11)	19 (7)	274 (52)
	Two	78 (56)	17 (12)	35 (25)	10 (7)	140 (27)
	Three	26 (38)	7 (10)	30 (44)	5 (8)	68 (13)
	Four	10 (67)	2 (13)	0 (0)	3 (20)	15 (3)
	Five or more	15 (52)	6 (21)	1 (3)	7 (24)	29 (5)
Did you recap the needle	Yes	178 (52)	68 (20)	72 (21)	25 (7)	343 (65)
	No	133 (73)	7 (4)	24 (13)	19 (10)	183 (35)
	Mean scores	0.57	0.91	0.75	0.74	0.35
Did you tell about NSI	Yes	175 (61)	43 (15)	53 (18)	18 (6)	289 (55)

	No	133 (57)	32 (14)	43 (19)	24 (10)	232 (45)
	Mean scores	0.57	0.57	0.54	0.43	0.55
Who did you tell about NSI	Teacher	42 (45)	10 (11)	34 (37)	7 (7)	93 (30)
	Friends	89 (68)	20 (15)	19 (15)	3 (2)	131 (41)
	Head Nurse	23 (59)	14 (36)	0 (0)	2 (5)	39 (12)
	Nurse	39 (72)	9 (17)	0 (0)	6 (11)	54 (17)
	Pressure	80 (70)	16 (14)	0 (0)	19 (17)	115 (22)
What did you do after NSI	Squeeze the puncture site and then wash it	108 (69)	23 (15)	22 (14)	3 (2)	156 (30)
	Wash with soap and water	32 (43)	10 (13)	23 (31)	10 (13)	75 (14)
	Dry it with cotton ball	13 (27)	0 (0)	33 (67)	39 (6)	49 (9)
	Apply antiseptic solution	35 (60)	8 (14)	15 (26)	0 (0)	58 (11)
	Washing the site with running water	35 (79)	6 (14)	0 (0)	3 (7)	44 (8)
	Nothing	8 (28)	12 (41)	3 (10)	6 (21)	29 (6)
Have you done any blood test after injury	Yes	56 (64)	13 (15)	1 (1)	18 (20)	88 (15)
	No	326 (65)	62 (12)	92 (18)	26 (5)	506 (85)
	Mean scores	0.15	0.17	0.01	0.41	0.15
Hospital areas	Medical surgical	123 (74)	15 (9)	17 (10)	11 (7)	166 (31)
	ICU	8 (16)	10 (20)	26 (51)	7 (14)	51 (10)
	Laboratory	7 (33)	5 (24)	0 (0)	9 (43)	21 (4)
	Pediatric	7 (88)	0 (0)	0 (0)	1 (12)	8 (2)
	Emergency	15 (14)	34 (31)	50 (45)	11 (10)	110 (21)
	Other - Clinics	153 (91)	11 (7)	0 (0)	4 (2)	168 (32)

Table 3 depicts that about half of the study subjects answered that they did not notify anyone of their NSI experiences. Two basic reasons for not reporting were the student's lack of

knowledge of how to report and the fear of facing severe embarrassment for getting into trouble.

Table 3 Reasons for non-reporting NSI incidence by country (%).

Characteristics	Egypt n (%)	Jordan n (%)	Iraq n (%)	KSA n (%)	Total n (%)
Do not know how to report	46 (47)	9 (9)	20 (21)	22 (23)	97 (34)
Ashamed and worried about getting in trouble	33 (12)	10 (11)	43 (15)	1 (1)	87 (31)
Busy and do not want to be seen as having poor clinical skills	12 (52)	11 (48)	0 (0)	0 (0)	23 (8)
Afraid that reporting the injury would affect their grades	10 (63)	2 (12)	4 (25)	0(0)	16 (6)
Lack of awareness of the risks associated with contaminated needles or sharps	11 (92)	1 (8)	0 (0)	0 (0)	12 (4)
Others	25 (52)	59 (10)	12 (25)	6 (13)	48 (17)

Table 4 validates that there was no statistical difference between the risk and safety concerning NSI incidence and circumstances in terms of experiencing NSIs, reporting the

injuries, recapping the needle, and doing blood test after the injury.

Table 4 Safety measures practiced after NSI incidence and circumstances.

Characteristics	Egypt	Jordan	Iraq	KSA	Total
Experience of NSI	0.46	0.39	0.49	0.27	0.4
Did you tell someone?	0.57	0.57	0.55	0.43	0.55
Did you recap the needle?	0.43	0.09	0.25	0.45	0.35
Have you done any blood test after injury?	0.15	0.17	0.43	0.43	0.15

Discussion

Globally, high percentage of nursing and medical students exposed to NSIs has reportedly been a serious indicator. NSI is a critical problem for nursing students as it increases the risk of spreading infection. The study showed that the risk of experiencing NSIs is high among nursing students in all the participating Arab universities. There were 40% who have been exposed to injury from a total number of 1,320 students. Similar findings were found in a Nigerian study where NSIs among HCWs in a multi-center hemodialysis unit had higher NSI incidence reportedly at 40.2% [16]. However, figures on NSI incidence varied among different countries with 26.05% having been reported among nursing students in China [13]; 33% in Turkey [15]; 17% was recorded on surveillance of NSIs amongst student nurses at the University of Namibia [17]; and with the effect of NSIs prevention intervention model on medical students in Melaka, Malaysia was reported at 19.9% [18].

The high NSI incidence among Arab nursing students confirms the lack of knowledge and experience among said students on recapping the needle, reporting the incidence, and doing a blood test after the injury. These students might need knowledge on preventive measures, safety devices, how to deal with the contaminated needle, and adhering to the practice of universal precautions as well as basic education on such precautionary methods to reduce the incidence of NSIs among nursing students.

This study revealed that recapping of used needle with heavy workload was behind the high NSIs incidence. Regarding the question of covering the needle after use, more than half of the studied subjects answered that they have to cover the needle after use, which further confirms their lack of experience and knowledge on how to deal with needle sticks after administering to their patient. Similarly, recapping of needles was also one of the main reasons of NSIs which was clear in different countries over the world [6,19-21].

Furthermore, the study revealed that the majority of nursing students who participated in the survey did not notify anyone about their injury due to fear and embarrassment. This high level of non-reporting suggests that student nurses may need a targeted prevention program to address the importance of

reporting any NSIs to ensure that every student nurse should be prepared and aware of the reporting mechanism in order to protect themselves against the NSIs. Nursing faculty also should pay more attention when nursing students start dealing with needles. Further, there is a need to provide the Arab Nursing Faculties with correct information about blood borne pathogens and how to deal with needles.

This study highlighted that medical and surgical departments are the places where nursing students were more exposed and at highest risk of NSIs. This may be due to the nature of procedures as well as the large number of patients in these departments, thus, creating a lot of load on students and posing unsafe medical practices.

This study also suggests that infection control standards must be included in the training and education programs of nursing students especially in dealing with needle sticks incidents.

Relevance to clinical practice

The study highlighted the following points as references of preventions in the clinical practices among nurses' student and the health care workers.

- Infection control standards must be inculcated in the training and education programs of nursing students especially in dealing with needle sticks incidences.
- A general workshop followed by practical training sessions on evidence-based regulation, patient safety and universal standard precautions should be conducted during the first semester of the first academic year by the Faculty of Nursing in all Arab countries.
- Nursing students should undergo mandatory vaccination program prior to enrolment.
- The universities and the educational health institutions policy maker should enforce the implementations of the infection control policy.

Conclusion

NSIs and sharps injuries are the most significant hazards threatening the nursing students and other HCWs inside the hospitals and health centers. NSIs are the most common cause by which blood borne pathogens are transmitted between patients, students, and HCWs. The high percentage of Arab university nursing students exposed to NSIs is a serious indicator of lack of knowledge and inexperience in recapping the needle, reporting the NSI incidents, and failure to do a blood test after the injury. Therefore, rigid steps to re-educate and train the nursing students are needed to promote a greater awareness of the evidence-based regulatory issues among all nurses to promote proper training on the dangers and prevention of NSIs and sharps injuries and addresses issues related to patient safety.

Limitation of the Study

- One of the major limitations of this study is the nature of the self-report survey. There is probability of reporting bias

especially when data has been collected based on the Faculty of Nursing summarized self-reports.

- Using closed-ended questions in the current study did not allow the researcher to investigate and explore further information about NSI incidences.

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