

Factors Associated with Work Related Sharp Injuries among Nursing Interns in Medical Surgical Units in Damanhur National Medical Institute

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Abstract: Sharps injuries are a serious hazard in any health care agency among all health care staff including nursing interns. Sharps injuries can result in the transmission of serious infectious diseases and unintentional injury with its regular complications with negative drawbacks on health care staff, the institution as well as the entire community. This study aimed to: assess factors associated with sharp injuries among nursing interns. **Research Question:**What are the factors associated with sharp injuries among nursing interns? **Research design:** An exploratory descriptive research design was used. **Setting:** This study was conducted at Damanhour National Medical Institute, El Behaira Governorate in hemodialysis unit and operation units. **Subjects:** convenience sample of 100 nursing interns who are working in hemodialysis unit and operating departments (66)in hemodialysis unit and 34 in operating departments) were include in the study out of 110 nurses, the other 10% (eleven) nursing interns were included in the pilot study.

Tools: Two tools were used: Tool I: nursing interns' characteristics and clinical training questionnaire and Tool II: Factors associated with work related sharp injuries among nursing interns. **Results:** The present study revealed that the majority of subjects had sharp injury while closing needle tip after use due to inadequate supply of barrier products/specialized PPE. The most factors affecting accident/risk related to handling healthcare sharps was while separating needle from the injector followed by provision of the required PPE adequate for use all the time. **Conclusion:** There are no clear work procedures/guidelines or standard guidelines for handling used disposable healthcare sharps in the unit. **Recommendations:** provide each unit in the agency with simple, clear and complete guide protocol for handling of all types of sharps and provide health care agency with adequate and complete PPE needed in each unit with manual of perfect use.

Keywords: sharp injuries, nursing interns.

1. INTRODUCTION

Sharps injuries are a serious hazard in any medical care situation among each health care staff including nurses and nursing interns. Needle-stick and sharp injuries (NSSIs) are "accidental skin penetrating wound caused by hollow-bore needles such as hypodermic needles, blood-collection needles, Intra-venous catheter stylets and needles used to connect parts of IV delivery system, scalpels and broken glass"(Sahmsulddin., 2015; wilburn2014).

Another definition for NSSIs mean the introduction into the body of healthcare workers, during performance of their duties of blood or other potentially hazardous material by a hollow bore needle or sharp instruments, including, but not limited to, needles, lancets, scalpels, and contaminated broken glass (Siddique., et al. 2008; kommogldomo., 2016).

Data estimate that among the 35 million health care workers worldwide, approximately 3 million experience percutaneous exposures to blood borne viruses each year (2 million HBV; 900,000 HCV and 300,000 HIV). These injuries are estimated to result in 66,000 hepatitis BV; 16,000 hepatitis CV and 2000 to 5000 HIV infection. More than 90% of these infections are occurring in low-income countries although they most preventable through simple guideline or protocol (Ahmed et al., 2008; Dorgahm and Obied., 2016; Lakbala and Sobhani., 2014).

Needle stick and sharp injuries can result in the transmission of serious disease to nursing staff including students, interns and staff such as HIV, hepatitis B and hepatitis C from contacts with body fluids and blood. The risk of being infected following a single needle stick from patient with blood borne infection ranges from as low as 0.3% for human immunodeficiency virus (HIV), and 3% to 10% for hepatitis C to as high as 40% for hepatitis B (Hanaf et al., 2011; Abd El-Hay., 2015; Wafula., 2012). It also causes unintentional injury with its regular complications. Thus, injuries may cause negative drawbacks not only on the affected health care staff but also the institution as well as the entire community. Consequently, the affected health care staff will be changed into health care seeker and may leave his job with burden of the treatment on the organization (Santos et al., 2016).

Preventing sharps injuries requires the combined effort of government agencies, employers, and equipment manufacturers, educational institutions, as well as health care workers themselves where prevention is better than treatment (Wafula., 2012).

Needle stick injuries most frequently occur during drawing blood, administering an intramuscular or intravenous drug, or performing other procedures involving sharps where the needle can deviate and injure the nursing intern during their training (Ahmed et al., 2008; Abd El-Hay., 2015).

Other important causes of NSSIs were high workload, working hastily, fatigue and a crowded work environment, also performing some un careful activities as two-handed recapping, unsafe sample collection, disposal of sharps waste and washing contaminated instruments. Needle stick and sharp injuries usually cause some risks such as; bleeding, minor surface scratches and minor visible skin injuries, although the main risk is transmission of viral (blood born) infections but scalpel-caused wounds need more attention in comparison with needle stick injuries (Adejumo and olatunji., 2014; Abd El-Hay., 2015).

The first line of prevention of infection including sharp injuries related infection is using the universal precautions. Universal Precautions (UPs) can be defined as recommended work practices to protect Health Care Workers (HCWs) from exposure to blood borne pathogens and prevent nosocomial transmission. The implementation of UPs helped to prevent direct contact with blood, and other body fluids. Accordingly, it significantly decreased the number of incidental exposure by using protective barriers (including gloves, face mask, protective eyewear, overhead cap, gowns and overshoes), hand washing after gloves disposal, un-recapping needles, hygienic disposal of medical wastes, and sterilization of surgical instruments (Ahmed et al., 2008).

Nursing interns (NIs) are newly graduated nursing students, require be training and supervising by experienced nurses through different health care settings to function independently and competently. NIs should spend an internship year in teaching hospitals, but those hospitals face serious shortage and cost reduction issues, thus NIs are obligated to function as professional nurses, while they still lacking skills and experience and need real situation training and experience . Additionally, previous studies reported that NIs experienced Needle Stick Injury (NSI), thus they are more prone to blood transmitted diseases, while they have to keep patient safety using SPs to protect self, patients, agency and the entire community(Dorgahm and Obied., 2016; Foluso and Makuochi., 2015).

Prevention of sharp injuries mainly depending compliance with SPs all the time which is to some extent not always done. Factors associated with nurses' noncompliance with standard precautions may include personal habits, carelessness, and discomfort with PPE, shortage of time, staff and supplies. Inadequate reporting system, absence of staff safety policies and management disregard of nurses' safety are additional factors hinder nurses compliance with standard precautions (Abd El-Hay., 2015; Amukugo, et al., 2018).

Moreover inappropriate practices by health care givers such as needle recapping, and use PPE according to patient diagnosis make nursing interns more at risk as they imitate study aimed those models of the older and experienced staff. So it is vital to explore factors associated with work related sharp injuries among nurses intern to enable healthcare

managers to design more effective strategies to raise their compliance and keep their future staff safe and well protected which will accordingly decrease staff illness and to be a burden on the agency instead of being a healthy manpower (Kommogldomo., 2016).

Aim of the study:

The current study was conducted to assess factors associated with work related sharp injuries among nursing interns in Medical Surgical Units in Damanhour hospital

Research questions

- What are the types of incidents/accidents/risks/ that the nursing interns exposed to?
- What are the factors associated with sharp injuries among nurse interns?
- What are the types of procedure or activity did the incident /accident in which the injury occurs?

2. MATERIALS & METHOD

Materials

Design

An exploratory descriptive research design was used in the current study.

Setting

The current study was conducted at Damanhur National Medical Institute, El Behaira Governorate. This institute is a central and educational hospital in Damanhur for medical and nursing internship practice with a supervision of faculty members (preceptors' supervision daily). It contains different medical and surgical specialties. The data of this study were collected from the hemodialysis unit and operation departments. These units are the only specialties in Medical-Surgical internship training experience in Faculty of nursing, Damanhur University and the researches where in the same specialty.

Subjects:

The study comprised a convenience sample of 100 nursing interns who are working in hemodialysis unit and operating departments (66)in hemodialysis unit and 34 in operating departments) were included in the study out of 111 nursing interns, the other 10% (eleven) nurses intern were included in the pilot study.

Tools:

Two tools were used in the current study.

Tool (I): nursing interns' characteristics and clinical training questionnaire, this tool was used to collect information about nursing interns age, gender, training about handling sharps during academic years, how often they use the required personal protective equipment/ material and clinical area.

Tool (II): Factors associated with work related sharp injuries among nursing interns

This tool was developed by Wafula (2012) and was modified by the researchers. It is self-administered questionnaire used to identify factors associated with work related sharp injuries among nursing interns. It consisted of 18 questions and was divided into four parts then nursing interns were asked to rate their responses from multiple responses.

Part one: Incidence of sharp injuries; this part consisted of four questions regarding nursing interns involvement in any accident/risk related to handling healthcare sharps, how many times they experienced the accidents/risks, during what procedure or activity did the incident /accident occur and from their point of view what would they consider as the contributing factor(s) to the sharp incident/accident.

Part two: Unit characteristics and protocol of handling sharp; this part consisted of three questions regarding presence of clear work procedures/guidelines in the unit, presence of standard guidelines for handling used disposable healthcare sharps and what measures has the unit management put in place to control occupational related infections caused by HBV, HCV and HIV?

Part three: Type of sharps and adequacy of required protective equipment and its disposal; this part consisted of five questions regarding common types of sharps that handled in the unit, personal protective equipment/ material that the unit provide for use, availability of adequate personal protective equipment for use all the time, the availability of syringes with the auto-retractable needles, the available disposal methods for healthcare sharps after procedures.

Part four: Type of accident /incident of injury and practice after injury; this part contained six questions as regard type of incidents/accidents/risks, nursing interns involvement in incidents/accidents in the course of their work, type of sharp instrument caused the accident/injury, their practices after injury, seeking post exposure prophylaxis, reporting the incident /a accident that occurred and their vaccination against Hepatitis B.

Method

The study was implemented according to the following steps:

1- Administrative process: Official letter clarifying the purpose of the study was obtained from the Faculty of Nursing, Damanhour University and forwarded to the concerned persons at Damanhour National Medical Institute as an approval for data collection.

2- Tools Validity and reliability:

- Tool I was developed by the researchers after reviewing relevant and recent literature. Content validity was assured by a jury of 5 experts in Medical Surgical Nursing field and consequently, the needed modifications were done.
- Tool II (Factors associated with work related sharp injuries among nursing interns) was modified after reviewing relevant literature and checked for content validity by a jury of 5 experts in Medical Surgical Nursing field.
- **Reliability of tool (II)** was checked by Cronbach's Alpha test. Its result was 0.869, which indicates an accepted reliability.

3- Pilot study was conducted by the researchers to test the clarity and applicability of the tools on 10% (11 nursing interns out of the sample). According to the results of the pilot study, the tools were put in its final form.

4- Data Collection:

- The data was collected over a period of approximately ten months during training year 2018-2019. Data was collected through self-administered questionnaires that were distributed among the nursing interns during their training in the involved units at their rest period.
- Each questionnaire took approximately from 10 to 15 minutes/ nursing interns.
- The researchers were available (at the morning, afternoon shift) and we're staying with the nursing interns to clarify any questions as needed.

5- Ethical considerations:

-All nursing interns were informed about the purpose of the study and given brief explanation; oral informed consent was obtained from each of them.

-The right to refuse to share or withdraw from the study was highlighted. Data anonymity and confidentiality were respected.

Statistical analysis

The collected data were coded and analyzed using PC with the Statistical Package for Social Sciences (SPSS version 25) and tabulated frequency and percentages were calculated. Descriptive statistics as frequency, distribution, mean and standard deviation were used to describe different variables. For analytics statistics Chi square test, Monte Carlo, Fisher Exact were used to determine significance difference between variables and multivariate regression was used to determine most factors affecting accident/risk related to handling healthcare sharps.

*: Statistically significant at $p \leq 0.05$

3. RESULTS

Table (1): Distribution of the studied nursing interns according to their characteristics and clinical training (n = 100)

Nursing interns characteristics and clinical training	No	%
Age (years)		
22 – 25	96	96.0
25 – 30	4	4.0
Min. – Max.	20.0 – 30.0	
Mean ± SD.	23.50 ± 3.68	
Gender		
• Male	12	12.0
• Female	88	88.0
Training in handling sharps during academic years		
• Yes	88	88.0
• No	12	12.0
How often do you use the required personal protective equipment/ material		
• Always	48	48.0
• Occasionally	27	27.0
• Rarely	23	23.0
• Not at all	2	2.0
Clinical area		
• Hemodialysis unit	66	66.0
• Operation unit	34	34.0

Table (1): shows distribution of the studied nursing interns according to their characteristics and clinical training; it can be noticed that the mean *age* of the study subjects was 23.50 ± 3.68 years. Regarding gender, the majority (88.0%) were females. The majority of them (88.0%) got training in handling sharps during academic years. Nearly, half of the candidates always use the required personal protective equipment/ material (48.0%), more than one fourth (27.0%) use it occasionally, while more than one fifth (23.0) of them rarely use it. In relation to the clinical area, the percent of nursing interns in hemodialysis unit were higher than operation unit (66.0% versus 34.0%).

Table (2) Distribution of the studied nursing interns according to incidence, causes and contributing factors of sharp injuries (n = 100)

Incidence of sharp injuries	No	%
Have you been involved in any accident/risk related to handling healthcare sharps		
• Yes	86	86.0
• No	14	14.0
How many times in the course of internship practice have you experienced the accidents/risks		
• 1-2	60	60.0
• 3-4	33	33.0
• 5-10	5	5.0
• >10	2	2.0

During what procedure or activity did the incident /accident occur?		
<ul style="list-style-type: none"> • While closing needle tip after use • While breaking the ampoule/ diluting medicine • While separating needle from the injector • During treatment • While inserting intravenous cannula// taking blood sample • By accident while in the hand of a colleague • While throwing the waste bin/safety box) 	47 24 10 15 14 4 0	47.0 24.0 10.0 15.0 14.0 4.0 0.0
What would you consider as the contributing factor(s) to the sharp incident/accident mentioned before?		
<ul style="list-style-type: none"> • Fatigue • Work overload • Overuse of medical sharp/ Unsafe medical sharps/careless • Inadequate supply of barrier products/specialized PPE • Unclear work procedures • Lack of guidelines on handling healthcare sharps • Unsafe practices 	21 23 24 33 6 5 6	11.0 23.0 24.0 33.0 6.0 4.0 6.0

Table (2): clears distribution of the studied nursing interns according to incidence, causes and contributing factors of sharp injuries; It is observed that, most of the study subjects reported their involvement in any accident/risk related to handling healthcare sharps (86.0%). In addition, nearly two thirds (66.0%) experienced the accidents/risks 1-2 times, while about one third (33%) experienced it 3-4 times. As for the ranking of the procedures or activities that the incident /accident occurred, the nursing interns reported the following; closing needle tip after use, breaking the ampoule/ diluting medicine, during treatment, while inserting intravenous cannula/taking blood sample, while separating needle from the injector, by accident while in the hand of a colleague (47.0%, 24.0%, 15.0%, 14.0%, 10.0%, and 4.0% respectively). In addition, the table clarified that the contributing factor(s) to the sharp incident/accident ranking as follows; inadequate supply of barrier products/specialized, overuse of medical sharp/ unsafe medical sharps/careless, work overload, fatigue, unclear work procedures, and lack of guidelines on handling healthcare sharps(33.0%, 24.0%, 23.0%, 11.0%, 6.0%, 6.0%, and 4.0% respectively).

Table (3) Distribution of the studied nursing interns according to unit characteristics and protocol of handling sharp (n = 100)

Unit characteristics and protocol of handling sharp	No	%
Are there clear work procedures/guidelines in the unit?		
<ul style="list-style-type: none"> • Yes • No 	65 35	65.0 35.0
Are there standard guidelines for handling used disposable healthcare sharps?		
<ul style="list-style-type: none"> • Yes • No • Don't know 	60 37 3	60.0 37.0 3.0
What measures has the hospital put in place to control occupational related infections caused by HBV, HCV and HIV?		
<ul style="list-style-type: none"> • Eliminating unnecessary sharps • Vaccination of hepatitis B • Providing post-exposure testing • Providing post-exposure prophylaxis • Providing barrier products specialized PPE • Conducting education and awareness on occupational safety and infection prevention control 	4 14 27 28 8	4.0 14.0 27.0 28.0 8.0 7.0

<ul style="list-style-type: none"> Developing and availing guidelines on precautions 	7	12.0
<ul style="list-style-type: none"> Proper management of medical sharps 	12	5.0
<ul style="list-style-type: none"> Establishing a needle stick committee 	5	7.0
	7	

Table (3): displays distribution of the studied nursing interns according to unit characteristics and protocol of handling sharp; about two thirds of the nursing interns(65.0%) reported that there are clear work procedures/guidelines in the unit. In addition, nearly two thirds (60.0%) clarified that there are standard guidelines for handling used disposable healthcare sharps. Moreover, the highest percentages of the nurse interns(28.0%, and 27.0%) reported that, measures has the hospital put in place to control occupational related infections caused by HBV, HCV and HIV are; providing post-exposure prophylaxis and providing post-exposure testing respectively. On the other hand, the least percentages (4.0%, and 5.0%) mentioned measures were; eliminating unnecessary sharps, and proper management of medical sharps respectively.

Table (4) Distribution of the studied nursing interns according to adequacy of required protective equipment

Adequacy of required protective equipment	No	%
What are common types of sharps were handled in your unit?		
<ul style="list-style-type: none"> Needle 	79	79.0
<ul style="list-style-type: none"> Scalpel 	4	4.0
<ul style="list-style-type: none"> Slide 	8	8.0
<ul style="list-style-type: none"> Broken Glass 	22	22.0
<ul style="list-style-type: none"> Broken Thermometer 	3	3.0
<ul style="list-style-type: none"> Any other 	0	0.0
What personal protective equipment/ material does the hospital provide for your use?		
<ul style="list-style-type: none"> Masks 	35	35.0
<ul style="list-style-type: none"> Gloves 	84	84.0
<ul style="list-style-type: none"> Aprons 	18	18.0
<ul style="list-style-type: none"> Lab coats 	10	10.0
<ul style="list-style-type: none"> Safety boots 	4	4.0
<ul style="list-style-type: none"> Safety goggles 	0	0.0
<ul style="list-style-type: none"> Safety boxes in all rooms/units 	80	80
Is the required personal protective equipment provided adequate for use all the time?		
<ul style="list-style-type: none"> Yes 	89	89.0
<ul style="list-style-type: none"> No 	11	11.0
Are there available syringes with the auto-retractable needles?		
<ul style="list-style-type: none"> Yes 	17	17.0
<ul style="list-style-type: none"> No 	83	83.0
What are the available disposal methods for healthcare sharps after procedures?		
<ul style="list-style-type: none"> Safety boxes 	77	77.0
<ul style="list-style-type: none"> Plastic bags 	15	15.0
<ul style="list-style-type: none"> Left on the floor 	0	6.0
<ul style="list-style-type: none"> Plastic containers 	8	2.0
<ul style="list-style-type: none"> Left on the operating table 	0	0.0
<ul style="list-style-type: none"> Mixed with other wastes 	0	0.0

Table (4): illustrates distribution of the studied nursing interns according to adequacy of required protective equipment; as for the ranking of the **common types of sharps that were handled in unit by nursing interns were;** Needle, Broken Glass, Slide, Scalpel, and Broken Thermometer, respectively. (79.0%, 22.0%, 8.0%, 4.0%, 3.0%). In relation to, the ranking of the personal protective equipment/ material that were provided by the hospital to nursing interns were; gloves, safety boxes in all rooms/units, masks, aprons, lab coats, safety boots, and safety goggles (84.0%, 80%, 35.0%, 18.0%, 10.0%, 4.0%, and 0.0% respectively). The majority of the nursing interns(89.0%) reported that the required personal protective equipment provided adequate for use all the time. On the other hand, the majority of them (83.0%) reported no available syringes with the auto-retractable needles. As for, the available disposal methods for healthcare sharps after procedures, the highest reported percentages of the nursing interns were; safety boxes and plastic bags (77.0%, and 15.0% respectively).

Table (5) Distribution of the studied nursing interns according to type of accident /incident of injury and practice after injury (n = 100)

Type of accident /incident of injury and practice after injury	No.	%
Which of the following incidents/accidents/risks have you been involved in the course of your work		
• Needle prick	49	49.0
• Cut	10	10.0
• Bruise	4	4.0
• Abrasion	0	0.0
• Infection related to sharps injury	39	39.0
• Blood splash	6	6.0
• Glove tear while handling sharps	10	10.0
• Any other	0	0.0
What type of sharp instrument caused the accident/injury		
• Needle	70	65.0
• Blade	8	8.0
• Scalpel	6	6.0
• Slide	0	0.0
• Broken Glass	28	25.0
• Broken Thermometer	2	2.0
• Any other	0	0.0
What are your Practices after injury:		
• Washing with disinfectant	18	18.0
• Washing with water	66	66.0
• Dressing	13	13.0
• Drawing blood	6	6.0
• Notifying the infection committee	3	2.0
Did you seek for Post exposure prophylaxis?		
• Yes	0	0.0
• No	100	100.0
Did you report the incident /Accident that occurred?		
• Yes	70	70.0
• No	30	30.0
Have you been vaccinated against Hepatitis B?		
• Yes	65	65.0
• No	35	35.0

Table (5): shows distribution of the studied nursing interns according to type of accident /incident of injury and practice after injury; In relation to, incidents/accidents/risks nursing interns involved in the course of work were as follows; needle prick, infection related to sharps injury, cut, glove tear while handling sharps, blood splash, bruise, abrasion (49.0%, 39.0%, 10.0%, 10.0%, 6.0%, 4.0%, and 0.0% respectively). As for type of sharp instrument caused the accident/injury more than two third (70.0%) were needles and 28.0% were from broken glass. As for practices after injury, the nursing interns ranked the following practices; washing with water, washing with disinfectant, dressing, drawing blood, and notifying the infection committee (66.0%, 18.0%, 13.0%, 6.0, and 2.0% respectively). In addition, none of the nursing interns seek for post exposure prophylaxis. While, the majority (70.0%) of them report the incident /Accident that occurred. Moreover, nearly two thirds (65.0%) vaccinated against Hepatitis B.

Table (6): Relation between male and female according to their characteristics, clinical training and incidence of sharp injuries (n = 100)

Nursing interns characteristics and clinical training and incidence of sharp injuries	Gender				χ^2	p
	Male (n = 12)		Female (n = 88)			
	No.	%	No.	%		
How often do you use the required personal protective equipment/ material					9.046	^{MC} p= 0.023
Always	4	33.3	44	50.0		
Occasionally	4	33.3	23	26.1		
Rarely	2	16.7	21	23.9		
Not at all	2	16.7	0	0.0		
Clinical area					6.485*	^{FE} p= 0.020*
Hemodialysis unit	4	33.3	62	70.5		
OR	8	66.7	26	29.5		
- Incidence of sharp injuries						
Have you been involved in any accident/risk related to handling healthcare sharps					2.220	^{FE} p= 0.208
Yes	12	100.0	74	84.1		
No	0	0.0	14	15.9		

Continue

During what procedure or activity did the incident /accident occur						
While closing needle tip after use	6	50.0	41	46.6	0.049	0.824
While breaking the ampoule/ diluting medicine	0	0.0	24	27.3	4.306	^{FE} p= 0.065
While separating needle from the injector	0	0.0	10	11.4	1.515	^{FE} p= 0.604
During treatment	2	16.7	13	14.8	0.030	^{FE} p= 1.000
While inserting intravenous cannula// taking blood sample	4	33.3	10	11.4	4.233	^{FE} p= 0.062
By accident while in the hand of a colleague	0	0.0	4	4.5	0.568	^{FE} p= 1.000
While throwing the waste bin/safety box)	0	0.0	0	0.0	-	-
What would you consider as the contributing factor(s) to the sharp incident/accident mentioned before						
Fatigue	0	0.0	11	12.5	1.685	^{FE} p= 0.351
Work overload	0	0.0	6	6.8	0.870	^{FE} p= 1.000
Overuse of medical sharp/ Unsafe medical	4	33.3	20	22.7	0.651	^{FE} p=

sharps/careless						0.475
Inadequate supply of barrier products/specialized PPE	6	50.0	27	30.7	1.782	^{FE} p=0.203
Unclear work procedures	0	0.0	6	6.8	0.870	^{FE} p=1.000
Lack of guidelines on handling healthcare sharps	0	0.0	5	5.7	0.718	^{FE} p=1.000
Unsafe practices	2	16.7	21	23.9	0.309	^{FE} p=0.728

χ^2 : Chi square test MC: Monte Carlo FE: Fisher Exact

*: Statistically significant at $p \leq 0.05$

Table (6) shows relation between male and female according to their characteristics, clinical training and incidence of sharp injuries. Regarding how often do they use the required personal protective equipment/ material in both male and females. The highest percentage was always among females than male (50%, 33.3% respectively). It was statistically significant (020*) regarding clinical area where in female it was higher in hemodialysis unit (70.5%) while it was 66.7% in male in OR. As for incidence of sharp injuries; it was nearly half while closing needle tip after use in both males and females (50%, 46.6% respectively). Regarding the contributing factor(s) to the sharp incident/accident mentioned before in males and females, it was higher (50%, 30.7% respectively) regarding inadequate supply of barrier products/specialized PPE

Table (7): Relation between training according to their characteristics, clinical training and incidence of sharp injuries (n = 100)

Nursing interns characteristics, clinical training and incidence of sharp injuries	Training				χ^2	p
	No (n = 12)		Yes (n = 88)			
	No.	%	No.	%		
How often do you use the required personal protective equipment/ material					7.369	^{MC} p=0.056
Always	2	16.7	46	52.3		
Occasionally	4	33.3	23	26.1		
Rarely	6	50.0	17	19.3		
Not at all	0	0.0	2	2.3		
Clinical area					7.025*	^{FE} p=0.007*
Hemodialysis unit	12	100.0	54	61.4		
OR	0	0.0	34	38.6		
- Incidence of sharp injuries						
During what procedure or activity did the incident /accident occur						
While closing needle tip after use	6	50.0	41	46.6	0.049	0.824
While breaking the ampoule/ diluting medicine	4	33.3	20	22.7	0.651	^{FE} p=0.475
While separating needle from the injector	2	16.7	8	9.1	0.673	^{FE} p=0.343
During treatment	0	0.0	15	17.0	2.406	^{FE} p=0.204
While inserting intravenous cannula// taking blood sample	2	16.7	12	13.6	0.081	^{FE} p=0.674
By accident while in the hand of a colleague	0	0.0	4	4.5	0.568	^{FE} p=1.000
While throwing the waste bin/safety box)	0	0.0	0	0.0	—	—

Continue

What would you consider as the contributing factor(s) to the sharp incident/accident mentioned before						
Fatigue	2	16.7%	9	10.2%	0.447	FE p= 0.618
Work overload	0	0.0%	6	6.8%	0.870	FE p= 1.000
Overuse of medical sharp/ Unsafe medical sharps/careless	2	16.7%	22	25.0%	0.402	FE p= 0.725
Inadequate supply of barrier products/specialized PPE	2	16.7%	31	35.2%	1.645	FE p= 0.327
Unclear work procedures	2	16.7%	4	4.5%	2.751	FE p= 0.151
Lack of guidelines on handling healthcare sharps	0	0.0%	5	5.7%	0.718	FE p= 1.000
Unsafe practices	8	66.7%	15	17.0%	14.682*	FE p= 0.001*

χ^2 : Chi square test

FE: Fisher Exact

*: Statistically significant at $p \leq 0.05$

Table (7) shows relation between training according to their characteristics, clinical training and incidence of sharp injuries. There is statistical significant (0.007*) regarding training and clinical area, it was higher in hemodialysis unit than OR (61.4%, 38.6% respectively). Regarding training and what procedure or activity did the incident /accident occur, it was higher in while closing needle tip after use 50% had no training.

Table (8): Multivariate analysis regression for factors affecting accident/risk related to handling healthcare sharps

	p	OR	95% CI	
			LL	UL
Age	0.088	1.524	0.940	2.472
Training in handling sharps during academic years	0.202	11.418	0.272	480.13
During what procedure or activity did the incident /accident occur? (While separating needle from the injector)	0.001*	54.459	5.685	521.698
What would you consider as the contributing factor(s) to the sharp incident/accident mentioned before? Overuse of medical sharp/ Unsafe medical sharps/careless	0.072	7.196	0.835	61.988
What measures has the hospital put in place to control occupational related infections caused by HBV, HCV and HIV? Providing barrier products specialized PPE	0.096	8.764	0.680	112.931
Is the required personal protective equipment provided adequate for use all the time?	0.024*	17.153	1.460	201.581

OR= Odds ratio. Statistically significant at $p \leq 0.05$

Table (8) clarifies: multivariate analysis regression for factors affecting accident/risk related to handling healthcare sharps, from this table it noticed that, the most factor affecting accident/risk related to handling healthcare sharps was (While separating needle from the injector with p value = 0.001 then Is the required personal protective equipment provided adequate for use all the time with p value = 0.024).

4. DISCUSSION

Nursing interns are a vital part of health care staff in any health agency. Because they are still undertraining in the real situation and at the time prepared to be front line registered nurse; they face some risks at hospital environment including sharp injuries. Knowing factors that associated with this risk enable the agency to eliminate them as much as possible; consequently uninjured health care staff will provide better care, less missed workdays and less cost on the agency and community as well (Sharma , 2010).

As regard nurses intern involvement in any accident/risk related to handling healthcare sharps, the majority of them experienced it twice during closing needle tip after use (recapping). This result may relate to lack of experience of them specially when performing the most common procedure (injection) routinely almost daily. During this routine with the lack of enough barriers (safety box), they have to recap the needle after use which increase the risk of this injury, they perform recapping in faulty way by both hands but indeed it can be performed correctly to decrease risk of injury if performed by single hand on safe empty surface. This results was approved by Bekele, Gebremariam, Kaso, Ahmed, (2015) who stated that there is a universally recognition that healthcare workers should practice no two handed recapping of needles to eliminate the risk of sharp injuries.

Nearly the same percent (more than one third) of the study sample mentioned that there are no clear work procedures/guidelines in the unit nor standard guidelines for handling used disposable healthcare sharps. This may related to the fact that the agency consider the health care worker well trained and oriented with it, at the same time standard guidelines for handling used disposable healthcare sharps. This result is proved by Akyol, Kargin, (2016) who illustrated that guidelines on exposure exist and The Centre for Disease Control and Prevention (CDC) and The Occupational and Safety Health Administration have been developed guidelines for the prevention of sharp injuries including proper hand washing and gloving .

As for nurses intern practices after injury, washing with water in two thirds of them followed by washing with disinfectant in less than fifth. These practices by the nurses intern is correct and safe but incomplete according the post exposure protocol to each injury. This is reported by Baghcheghi N, Koohestani, Rezaei, Seraji, Abedi. (2011) who found that the most common actions performed were applying pressure and washing the area with soap and water.

Regarding gender and nursing interns characteristics and clinical training, it was significant regarding clinical area of training as it was about two third male nurses intern in operating room while it was slightly higher percentage in female in hemodialysis unit. This may be due to that the deceptive data showed higher percentage of females in the study and the higher percentage was in hemodialysis unit and trained on handling sharps during the academic years. Thus, the training is an effective way to reduce risk of sharp injuries among nurses intern which is forced in the internship year training in different units. This result was in line with (Abd El-Hay. 2015) who found that the educational intervention had a positive impact on knowledge and practice of undergraduate nursing students' toward needle stick and sharp injuries in his quasi-experimental study regarding sharp injuries.

As for what procedure or activity the incident /accident occur, nearly half of them experienced the incident /accident while closing needle tip after use (recapping) followed by almost quarter of them experienced the incident /accident while breaking the ampoule/ diluting medicine. They reported that these incident /accident related to inadequate supply of barrier products, overuse of medical sharp/careless and work overload. It may be related to new experience of nursing interns with real situation stress in hemodialysis and operating room units where handling of sharps as syringes and ampules are more frequent with the need of harrying and dealing with different tasks in short time so they perform these procedures many times during the shift. At the same time, barriers as safety box may not present all the time in each room. Lack of experience may give them some of carelessness till they had the enough experience as the training goes on. This result is in harmony with (Hajbaghery, Lotfi. 2013) who found in many previous studies that frivolity of the healthcare staff, work overload, and rushing were common risk factors for needle stick injuries among nurses.

As regards for relation between nursing interns and their characteristics, clinical training and incidence of sharp injuries, it was significant regarding training on sharp handling with higher percentage (more than half) of them had the training in

hemodialysis unit while about one third had it in OR unit. Training in handling sharps during academic years is a basic training but in indirect way; meaning the nursing students were trained on how to practice the procedure safely which mean with prevention of risks including sharp injuries. On the other hand application of training in OR training mostly by observation of different situation as the staff most of the time had different intraoperative continuous responsibilities, while in hemodialysis unit there is a longer chance of training where nursing tasks are more stable with certain consequences. This proof the training on handling sharp is a corner stone in prevention of sharp injuries. Which was constant with Hussain, Ram, Galinde & Jingade (2012) who illustrated that insufficient training can lead to sharp instrument injuries among health care students including dental students, medical students and nursing students.

The current study showed a significant relation regarding the most effective factors affecting accident/risk related to handling healthcare sharps; it was during separating needle from the injector. This factor is common for sharp injuries where nurses intern specially in emergency or quick situation can easily be injured by needles as the needle cannot be noticed easily to be placed properly to avoid accidental injuries as the needle is fine with silver not bright color to be easily observed. It was also consistent with the result that showed that closing needle tip after use is the higher percentage procedure or activity were the incident /accident occur in about half of the study sample. Mostly this may related to the fact that the nurses including nursing interns are responsible for medication preparation, administration and disposal as well as handling blood investigations which increase the risk of needle related injuries. This result was demonstrated by Ahmed (2014) who mentioned that in his study the prevalence of exposure to needle was 72.8% among nurses because they are responsible for various types of the injections and other procedures using needles with long duration that nurses directly contact with patients.

Another significant relation regarding the most effective factors affecting accident/risk related to handling healthcare sharps was the availability of personal protective equipment adequately for use all the time. This is quite meaningful because the majority of the nurses intern (more than one third) considered that the contributing factors to the sharp incident/accident was inadequate supply of barrier products/specialized PPE. This may be related to the fact of the availability of PPE and barrier products can decrease risk of accidents as gloves, specialized pads and safety box may reduce risk of injury. Proper use of these barrier products protect the nurses intern themselves (gloves and specialized pads) at the same time prevent risk of injury (safety box) to others in the unit. This result is in the same line with Cho, Lee, Choi, Park, Yoo, Aiken (2013) who found that in the logistic regression analysis of factors associated with needle stick and sharp injuries that safety containers for disposal of sharps and needles is significant.

Thus, identifying these risk factors of sharp injuries among nurses intern is very helpful not only for nursing interns but also for the health care agency, stakeholders, undergraduate nursing students as well as the entire community.

5. CONCLUSION

The majority of nurses intern in the current study involved in any accident/risk related to handling healthcare sharps at least once while closing needle tip after use from inadequate supply of barrier products/specialized PPE, work overload and overuse of medical sharp/ unsafe medical sharps/careless. There are no clear work procedures/guidelines or standard guidelines for handling used disposable healthcare sharps in the unit. The most factors affecting accident/risk related to handling healthcare sharps were while separating needle from the injector followed by presence required personal protective equipment provided adequate for use all the time.

6. RECOMMENDATIONS

- Provide each unit in the agency with simple, clear and complete guide protocol for handling of all types of sharps.
- Provide and apply protocol of post exposure to sharp injuries for immediate intervention and prevention of infection.
- Training courses regarding handling of sharps for the undergraduate nursing students.
- Provide health care agency with adequate and complete PPE needed in each unit with manual of perfect use.

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