

Prevention of Needle Stick and Sharp Objects Injuries among Internship Nursing Students during their Clinical Exposure: An Educational Program at Assiut University Hospitals, Egypt.

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Abstract: -Needle-stick and sharp injuries (NSIs) are the most common source of occupational exposures to blood and the primary cause of blood-borne infections to healthcare workers (HCW). Internship Nursing students are particularly exposed to occupational hazards such as needle stick and sharp injuries due to limited knowledge and experience. These injuries with sharps may lead to dangerous hazards such as infections with hepatitis B & C and HIV. **Aim of the study:** Assess the effect of educational program on knowledge and practices of internship nursing students toward prevention of needle stick injuries during clinical training. **Subjects and methods:** quasi-experimental design with pretest posttest was utilized. The study was conducted at Assiut university hospitals in medical surgical departments: (include 3 hospital main hospital, cardiac, urology hospital) during clinical rotation of internship nursing students. 76 internship nursing students who were registered at Faculty of Nursing, Assiut University, they were divided as following: (19) nursing students from main hospital, (28) nursing students from Urology hospital and (29) from cardiac hospital, trained in medical surgical departments during clinical rotation. **Tools:** two tool, Assessment questionnaire sheet, & Observational checklist. **Results:** the subject's knowledge regarding needle stick injuries in post-program is better than preprogram. There is a highly significant statistical difference between subjects' knowledge & performance regarding precautions to be taken before, during and after needle stick injuries from pre to post program. **Conclusion:** Application of educational program about prevention of Needle Stick shows a significant improvement in internship nursing students' knowledge and practice. **Recommendations:** Continued nursing education and in-service training programs about infection control should be well organized within Assiut University Hospitals and equipped with the necessary educational facilities and materials necessary to upgrade and skills of practicing nurses, which will be reflected on better outcome and service for inpatients. **Keywords:** Needle-stick injury, blood-borne infections, internship nursing students, educational program.

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I. Introduction

Needle-stick injury (NSIs) is defined as an accidental skin penetrating wound caused by needles such as hypodermic needles, intravenous needles, blood-collection needles, Intra-venous catheter stylets, needles used to connect parts of IV delivery system, scalpels and broken glass (Centers for Disease Control and Prevention, 2015). Globally NSIs are the most common source of occupational exposures to blood and the primary cause of blood-borne infections to healthcare workers (HCWs), two million healthcare workers are exposed to blood borne pathogens each year. Causative factor of NSIs are overuse of injections, during blood sample taking, administering an intramuscular or intravenous drug, lack of supplies of disposable syringes, safer needle devices, sharps-disposal containers, recapping of needles after use, passing instruments from hand to hand in the operating suite, lack of awareness of hazard and lack of training are the important causes of NSIs (WHO, 2002, 2003 and Swe et al. 2014). There are more than 20 types of blood borne pathogens and mainly of hepatitis B; hepatitis C and human immune deficiency (HIV) virus can be transmitted through needle stick injuries (Jaybhaye et al, 2014, Al-Dabbas and Abu-Rmeileh, 2012)

Needle sticks injury is one of the constant threats to health care workers, especially nursing students who are at high risk because of their limited clinical experience during their clinical years. Nursing students are at a risk of needle stick injury with the consequent risk of acquisition of blood-borne infection by pathogens such as HIV, Hepatitis B and Hepatitis C, Also NSIs can transmit other diseases such as malaria, tuberculosis, diphtheria and herpes, while performing their clinical activities in the hospitals. According to studies, 11 to 50% of students had history of exposure to infection related to sharp injuries during their

undergraduate training period. (Gupta D. K., et al.2015. AssiriA. M, et al, 2013, Swe, et al.2014, Smith et al.2009 and Leigh et al. 2008). 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 (Amini et al. 2015).Nursing students are exposed to needle stick and sharp injuries as they start their work of patient care in the hospital from 1st year of their training curriculum because they might have insufficient background to recognize the level of risk that is posed by patients and insufficient knowledge about standard infection control principles for blood-borne pathogens (Moazzam A., et al, 2010)

Nurse internship (NIs) are newly graduated nursing students, require to be trained and supervised by expert nurses through different area in hospital to function without help and competently. NIs should spend an internship year in teaching hospitals, but those hospitals face severe lack in nursing staff, so NIs are obligated to function as professional nurses, while they still limited clinical experience and knowledge,(Obied et al, 2013 and Nayeri&Negarandeh,2009). Ensuring NIs competency and safety is crucial as they are considered the future nursing staff. Different studies revealed that considerable percent of newly graduated nurses lacking knowledge and skills regarding standard precautions (SPs). (Sreedharan et al, 2011, El Ashmawy, 2012). (Gupta et al.2015 and Jaybhaye,2014),reported that NIs experienced needle stick injury (NSI), as a result they are more prone to blood transmitted diseases, while they have to keep patient safety and follow SPs to protect self and patients. Little statistics is available on the current epidemiology of needle stick injuries among nursing students. So pre-clinical undergraduate nursing students often are prepared for the clinical area with the use of simulations in learning or skills laboratory before caring for patients (Al tawil F. 2013).

Nursing students are most suitable candidates for educational training about prevention of NSSIs as they are likely to come across such critical situations in the future, and it produce positive changes in both knowledge and attitudes toward needle stick injury, this training strategies include; safety education to improve personal universal precautions, elimination of needle recapping and use of sharp containers for safe disposal which reduced needle stick injuries with additional reductions possible through the use of safer needle devices and reduce patients' risk of exposure to the blood of injured personnel . *Abd El-Hay, 2015 and Swe et al, 2014*).

II. Aim of the Study

Assess the effect of educational program on knowledge and practice of internship nursing students toward prevention of needle stick during clinical training

III. Research Hypothesis

The program contributed to a significant improvement in the level of internship nursing students' knowledge and practice regarding needle stick and sharp injuries post intervention educational program.

IV. Materials and method

Research design; quasi-experimental design with pre- program, post- program.

Settings; this study was conducted at Assiut university hospitals in medical surgical departments: (include 3hospital main hospital, cardiac, urology hospital). During clinical rotation of internship nursing students.

Subjects; 76 internship nursing students who were registered at Faculty of Nursing, Assiut University, they were divided as following; (19) nursing students from main hospital, (28) nursing students from Urology hospital and (29) from cardiac hospital, trained in medical surgical departments during clinical rotation.

Tools: *Two tools were used in this study*

Tool" 1": Assessment questionnaire sheet:

The study questionnaires were developed by the researcher to assess internship nursing students' knowledge and practice toward prevention of needle stick during their clinical training in the hospital before and after educational program; it was consisted of: **Part I;** It was covered; socio-demographic characteristics of the internship nursing students namely as: age, department, training about needle stick injury, training about infection control measures, have a needle stick injury.

Part II: Knowledge questionnaire sheet was developed by the researcher based on **Mitchell and Parker (2015)** , **Abd El-Hay S.A. (2015)** to gather the knowledge regarding needle stick , before and after educational program; the questionnaires content 11 question and were covered the following items; definitions, transmitted diseases & main area of needle stick, causes of NSSIs , knowledge about infection control measures, knowledge about sharps disposal containers and knowledge related to immediate response after NSSIs. The researcher used —weak (0), good (1), very good (2) and excellent (3). Scoring system of this questionnaire: -

zero, was given for weak answer and (2) for good answer, with a total score of (33), the higher the score, the higher the level of knowledge regarding NSSIs.

Tool II- Observational checklist was developed by the researcher based on **WHO (2016), CDC (2011) and Safety Meetings for Health Care Workers (2002)**. It was covered (3) procedures related to needle stick include the following; assessment of Student performance prior starting procedures (9) items, Students performance during the procedure (10) items, Students performance after the procedure (10) items . The researcher used —Done/ or —Not done/ the scoring system for performance checklist: - (1) mark was given for done answer, (2) for not done answer, and (3) for not available .with a total score of 86, the higher the score the better the performance regarding needle stick.

Methods: The necessary approval was obtained from the Dean of the Faculty of Nursing Assuit University to carry out the study. Oral consent was obtained from every student who included in the study after explanation the aim of the study and assuring them of confidentiality of collected data. Confidentiality was maintained by the use of code number instead of name and the right of withdrawal was reserved. **Tools** were revised by 5 experts in the field of Medical and Surgical Nursing to ascertain the content clarity and validity of items. A pilot study was conducted on 3 nursing students to ensure the reliability of the tool, applicability of items and identify the obstacles and problems that may be encountered in data collection, this number were excluded from the studied sample. Data collection for this study was carried out in the period from January 2017 to April 2017. Two sheets were used two times; the first time for data collection was at the beginning of the study as a baseline measure before starting educational program. The second time was 8 weeks after program had begun.

Preparation & Intervention phase for the program: The preprogram for internship nursing students' knowledge and practice was carried out before the beginning of program, to detect the needs of the students. Knowledge sheet was filled by the students within 15 minutes and observational check list was filled by the researcher in the Main, urology and cardiology Hospitals during clinical training within 45 minutes for each students. The students were collected. The hospital clinical training sessions, they were divided into (5) groups as following; (3) students in medical unit, (16) students in surgical unit, (29) students in cardiac department, (28) students in kidney unit, distribution of the nursing students was depended on the clinical rotation plan. - The instructional material used in teaching was included the booklet prepared by the researcher through literature review about needle stick prevention. The subjects in two groups were given 120 min/ lecture and group discussion using a PowerPoint presentation for knowledge part, with viewed a 60-minute video about how to use needle instruments by demonstration & re-demonstration with using real material for performance part. The educational program was covered in (14) sessions; each session lasts 2 hours, 2 days a week for a period of 7 weeks. - 1st and 2nd sessions (first week) two groups were given theoretical knowledge about needle stick and sharp injuries which covered; definitions, transmitted diseases & main area of needle stick, causes of NSSIs, infection control measures, sharps disposal containers and knowledge related to immediate response after injuries. 3rd ,4th ,5th and 6th sessions(second and third week) nursing students were exposed to a demonstration and hands-on training using a mannequin in the Faculty lab by the researcher through presentation of techniques for needle and sharp instruments as following; assessment of hazards in workplace, preparation before procedure, performance during procedures and performance after procedures. 3rd & 4th sessions were carried out in the second week for students in group (1) and 5th & 6th sessions were carried out in the third week for students in group (2).In the next 4 weeks (8 clinical sessions) of the program were given to the nursing students according to previous distribution in the King Khaled Hospital during their clinical practice rotation to train them about how to perform procedures on real situations by the researcher with four demonstrators in the following clinical settings (medical, surgical, ICU, kidney unit and emergency unit).

Post-test evaluation phase; Post-training, four trained nurse observers, using the checklist, documented students' work place practices with regard to assessment of hazards in workplace, preparation before procedure, performance during procedures and performance after procedures. Students were observed individually for 30 minutes and were awarded that they were being watched. After that knowledge sheet were filled by the students within 25 minutes in the faculty Lab.**Methods of data analysis:** All data were collected, coded, and internring. Statistical analysis is performed by statistical Package SPSS in general (version 32). Quantitative variables are described by the Mean, Standard Deviation (SD), while qualitative categorical variables are described by proportions and percentages. Chi-square and P- value test used to test correlation.

V. Result

Part I. Demographic characteristics of internship of nursing student

This figure revealed that according to distribution of internship nursing students according to hospital name were 38.2% were in cardiology hospital, 36.8% were in urology hospital and 25% were in the main hospital. N=76

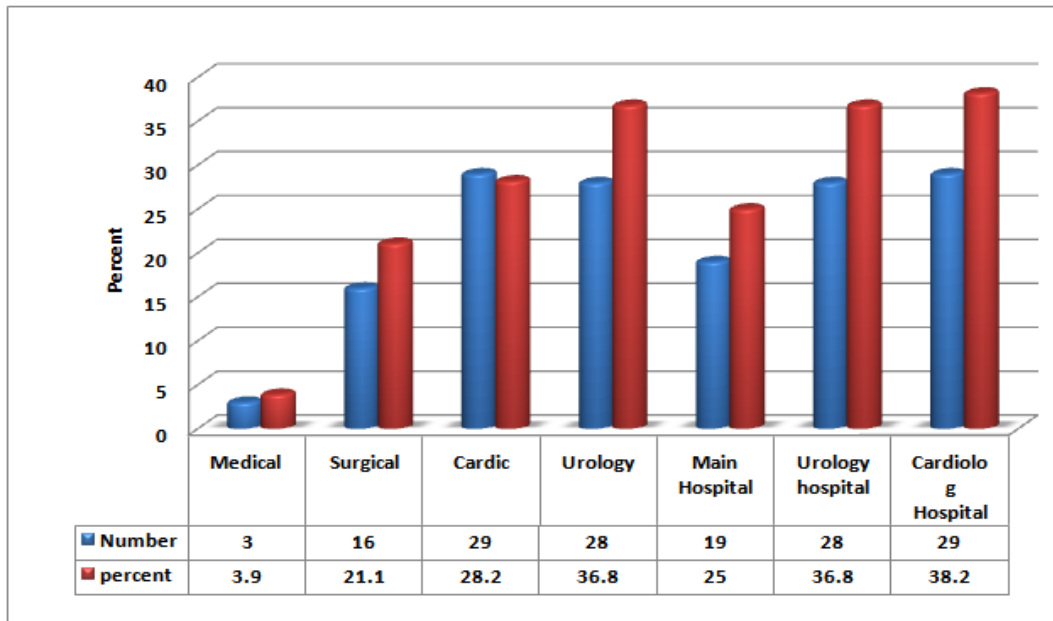
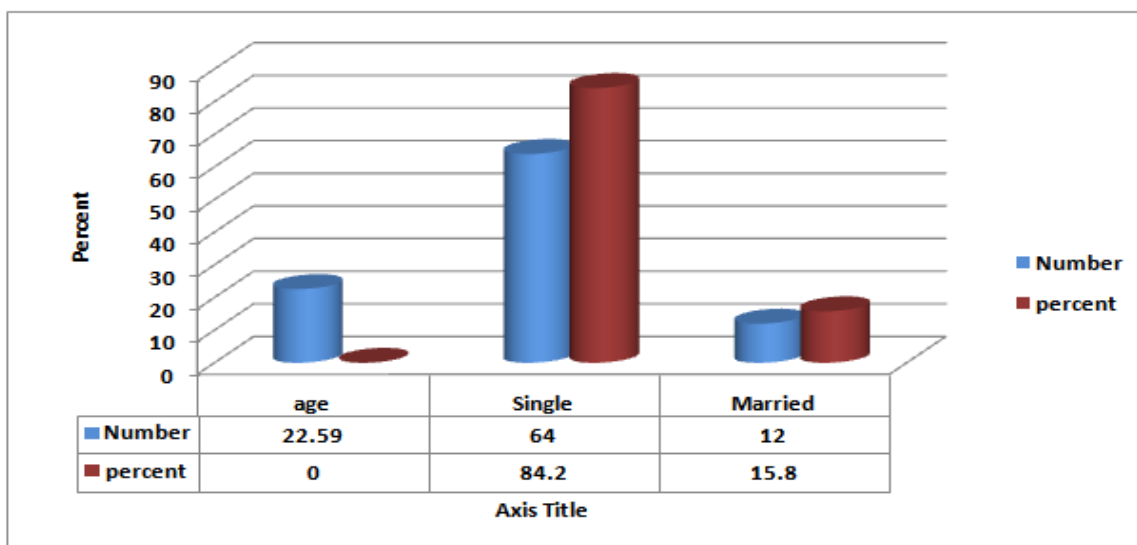


Figure (1): Distribution of Internship Nursing Students according to Hospital Name and Departments of Clinical Rotation

Figure (2): Distribution of Internship Nursing Students according to their Socio-Demographic Characteristics N=76



This figure shows that most of the subjects of the study were single. This table illustrated that the subject's knowledge regarding needle stick injuries in post-program is better than preprogram.

Table (1): Distribution of Internship Nursing Students according to their Knowledge regarding Needle Stick Injuries from pre to Post Program N=76

Items	Pretest N%		Posttest N%	
Define the needle stick				
Weak	22	28.9	2	2.6
Good	24	31.6	4	5.3
Very good	18	23.7	15	19.7
Excellent	12	15.8	55	72.4
The causes of needle stick what are				
Weak	17	22.4	2	2.6
Good	45	59.2	7	9.2
Very good	13	17.1	32	42.1
Excellent	1	1.3	35	46.1
What are diseases can transmitted by needle stick				
Weak	7	9.2	0	0
Good	33	43.4	3	3.9
Very good	8	10.5	7	9.2
Excellent	28	36.8	66	86.8
How the needle stick can occur				
Weak	27	35.5	2	2.6
Good	37	48.7	12	15.8
Very good	8	10.5	31	40.8
Excellent	4	5.3	31	40.8
What are devices can cause needle stick				
Weak	31	40.8	5	6.6
Good	35	46.1	6	7.9
Very good	9	11.8	31	40.8
Excellent	1	1.3	34	44.7
What is your immediate response after needle stick				
Weak	21	27.6	1	1.3
Good	39	51.3	7	9.2
Very good	14	18.4	23	30.3
Excellent	2	2.6	45	59.2
Weak	38	50.0	1	1.3
Good	30	39.5	8	10.5
Very good	8	10.5	32	42.1
Excellent	0	0	35	46.1
What are Characteristics of sharp container				
Weak	31	40.8	1	1.3
Good	39	51.3	1	1.3
Very good	6	7.9	32	42.1
Excellent	0	0	42	55.3

Table (2): Distribution of Internship Nursing Students according to Their Knowledge regarding Precautions to be Taken Before, during and After Needle Stick Injuries from Pre to Post Program

Items	Pretest N%		Posttest N%		N=76
What are the precautions to be taken to protect yourself from needle stich injury before procedure					
Weak	38	50.0	1	1.3	0.00
Good	29	38.2	9	11.8	
Very Good	7	9.2	29	38.2	
Excellent	2	2.6	37	48.7	
What are the precautions to be taken to protect yourself from needle stich injury during procedure					
Weak	21	27.6	0	0	0.00
Good	38	50.0	1	1.3	
Very Good	15	19.7	33	43.4	
Excellent	2	2.6	42	55.3	
What are the precautions to be taken to protect yourself from needle stich injury after procedure					
Weak	21	27.6	0	0	0.00
Good	38	50.0	1	1.3	
Very Good	15	19.7	33	43.4	
Excellent	2	2.6	42	55.3	

This table demonstrated that there is a highly significant statistical difference between subjects' knowledge regarding precautions to be taken before, during and after needle stick injuries from pre to post program

Table 3: Comparison between Pre and Post Educational Program regarding their Knowledge N=76

Item	N	Mean	Std. Deviation	P.value
Pretest knowledge	76	9.4342	3.663	0.000
Posttest knowledge	76	24.3947	3.669	

*Significant or $P \leq 0.05$

This table mentioned that there is a highly significant statistical difference regarding total knowledge from pre to post program

Table (4): Comparison of the internship nursing students according to their performance about preparation of patient and equipment pre, during and after the procedure from pre to post program

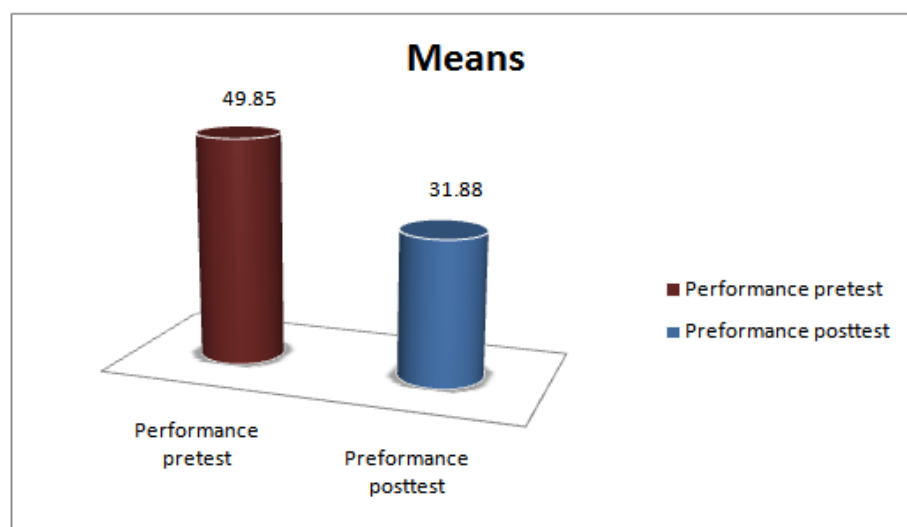
Items	N	Mean	Std. Deviation	P.value
Performance pretest	76	49.8553	2.45875	0.000
Performance posttest	76	31.8816	2.72258	

One sample t-test used for this comparisons

** Statistically significant difference ($p < 0.01$)

P: Comparison between pre and post educational program.

This table founded that there is a highly significant statistical difference according to their performance about preparation of patient and equipment pre, during and after the procedure from pre to post program



VI. Discussion

Needle sticks injury is one of the constant threats to health care workers, especially nursing students who are at high risk because of their limited clinical experience during their clinical years.

This study illustrated that the subject's knowledge regarding needle stick injuries in preprogram is poor. This is in line with Zhang, et. al., (2008), in his comparative study on nursing students in Northern China which reported that the students showed a general absence of information on safety guidelines. While on the other hand, a study by Saleem, et al., (2010) conducted on more than 85% of medical students from every class investigated the likelihood of incurring Hepatitis B, Hepatitis C, and HIV from needle stick wounds

Similarly, HongHong, et al. 2003, identified that structured training in prevention of occupational exposure to BBP improved knowledge and behavior and reduced the number of needle stick/sharp injuries among Chinese student nurses, compared with students who did not receive the training.

Also Martin, et al., 2007 in his study Needle stick Injuries among Surgeons in Training, concluded that "Needle stick injuries are common among surgeons in training and are often not reported. Improved prevention and reporting strategies are needed to increase occupational safety for surgical providers".

The results of this study mentioned that 50 % of subjects have poor knowledge about the precautions to be taken to protect herself from needle stich injury before procedure in pretest, this results is in line with Melek, 2009, who reported that forty-nine per cent of the students who responded sustained injuries; of

these 74% were injured while onwards. The highest number (72.2%) had been injured by hollow-bore needles; 65.2% who were injured were not wearing gloves at the time of injury; 27% of injuries were associated with recapping the needle.

The present study reported that most of subjects have poor knowledge about the precautions to be taken to protect her-self from needle stick injury during and after procedure in pretest. Guglielmi, et. al., (2005) accentuated that any healthcare worker who is in contact with needles or any sharp instrument faces immense risks of contamination and blood borne infections. Hence, the authors depicted that 38% of percutaneous complications occur during use; and, 42% before discarding the instrument

The results of this study founded that there is a highly significant statistical difference according to their performance about preparation of patient and equipment pre, during and after the procedure from pre to post program. According to Rampal, et. al., (2010), the risk of contamination is related to the characteristics of the instrument. Most puncture injuries are related to malpractice while re-encapsulating the needles; transferring body fluid to another vessel (e.g., transfer blood from a syringe to a tube); and, improper removal of sharp instruments from a suitable container. Also Phipps, et. Al., (2002) specified that obviously, needles or other sharp instruments in the nursing workplace can lead to injury especially when the workers are under-trained and lack the expertise in using the instruments with professional accuracy

VII. Conclusion

Application of educational program about prevention of Needle Stick shows a significant improvement in internship nursing students' knowledge and practice.

Recommendations

Continued nursing education and in-service training programs about infection control should be well organized within Assiut University Hospitals and equipped with the necessary educational facilities and materials necessary to upgrade and skills of practicing nurses, which will be reflected on better outcome and service for inpatients. In addition, periodic monitoring of nurses knowledge and practice by nursing audits and supervisors to evaluate the level of nurses.

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