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Effectiveness of Instructional Program on Nurses' Knowledge about Prevention of Needle Stick Injuries at Imam Al Hussein Medical City in Holy Karbala Governorate

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Abstract: *The injuries by contaminated needle-stick consider one of the hazards surrounding the work environment and occupy a wide area of interest to health institutions and health care providers as well as patients globally, some of these injuries possible to convey lethal infections consequent high costs, psychological problems and many complications for injured person and society.*

Objective: *Determining the effectiveness of needle stick injuries instructional program on nurses' knowledge and find out the relationship between nurses' knowledge and demographic characteristics (age, gender, educational level, and years of experience).*

Methodology: *A quantitative study using "quasi-experimental design", conducted at Imam Al Hussein Medical City in Holy Karbala Governorate, from January to August 2017. A purposive "non-probability" sample of (60) nurses were selected from medical and surgical wards. Instrument was designed in a multi-choice format. Descriptive and analytical statistical measures were used to show the results by using (SPSS version 20) software. The questionnaire consists from three parts; (1) Demographical data, (2) Nurses' knowledge about infection control and prevention of needle-stick injury, and part (3) Nurses' knowledge about post-exposure prophylaxis. The reliability was determined through a pilot study, the validity was determined through a panel of (12) experts. The descriptive statistical measures (frequency, percentage, mean of score), and inferential statistical measures (Paired Sample T- test, ANOVA were used for the data analyses.*

Results: *In study group results indicate that (50%) of the participants were of the 18-24 age groups, (83.3%) were females, half of them with a secondary nursing school graduate, (60%) of them had (1-5) years of experience in Medical City, (60%) of them participated in infection control program, (43%) of the participants had training course related to infection control inside country and (96.7%) of them not participated in courses outside the country.*

In pre-test (73.3%) of the nurses had a fair level of knowledge and after applied the instructional program the post-test result was (100%) for nurses who had a good level of knowledge, while the nurses in the control group showed a fair level of knowledge during the pre-test and post-test periods (66.7% and 63.4%) respectively.

Conclusions: *research indicate high effectiveness of the instructional program on nurses' knowledge that found a high significant difference among the nurses' knowledge in the study group ($p=0.001$), there is a significant relationship between nurses' knowledge with respect to their age only at (p-value ≤ 0.05).*

Recommendations: *The researcher recommend to establishment center called (Iraqi Eye of the Needle) that interested in all matters related to prevention of needle-stick injuries and applying hierarchy of controls in all health care settings.*

Keywords: *Infection Control, Instructional Program, Needle Stick Injuries, Prevention*

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I. Introduction

There are many hazards surrounding health care provider especially nursing staffs inside the hospitals and other health care sittings, chiefly in large hospitals that presented in area with high density of population or visitors. One of the most hazards which prevalence among health care provider is exposure to the patient's blood, fluids and secretions through the permeability of these fluids to the body by several methods like injury by contaminated sharps or needles, which adversely affect to the services that provided to patients as well as the negative effects on the nursing staff themselves [(1)]. Needle-stick injury (NSI) refers to penetration of the skin layers by the needle that contaminated with microorganisms before the injury occurred [(2)]. The real danger exists in contaminated needles with known or unknown different (BBP) like hepatitis (B) virus or hepatitis (C) virus or Human Immunodeficiency Virus (HIV) and more than twenty-five bloodborne viruses transmitted through

needle-stick injuries [3]. In the United States of America, occupational injuries affect healthcare providers, and the rate of needle-stick and sharps injury make up 80% of total injuries in health care settings [4]. Needle-stick injury not restricted on biological effects, there are psychological negative effects of needle-stick injuries can include anxiety, stigma, and fear from transmission the infection to children or partner and others, emotional trauma, in addition to isolation and depress status and these lead to "self-destruction" condition affect in the life of the infected person. There are several factors that increasing the risk of transmission blood borne pathogens through needle-stick injury like; depth of injuries, visible blood or contaminated materials on the needle, type of needle, gauge of the needle, high level of viral load, positive (HBeAg) in source and not worn personal protective equipment [5]. The riskiest groups to needle-stick injuries are; nursing staff, physicians, occupations related to medicine, dentists and their assistants, and other support occupations or students. [6][7]. The highest proportion about (33 %) of how the injuries where occurs was through the use of the tool containing needle, followed by high rate about (22.9 %) post using and pre disposing, among steps of multi-steps caring form (7 %), however about (5.5 %) during place the devices sharp instruments box, also injury can occur in rate (4.8 %) through disconnect the needle from another part of the system, (4.6%) possible that the injury occur when leave the needle on the surface, recover or recapping the needle will form (3.7 %) and other risk factors will form (18.5 %) of all causes by needle prickle injures [8]. The application of control and safety criteria in preventing (NSIs) represented in "Hierarchy of Controls" in sequence from the most effective to least effective respectively by; elimination of hazard, engineering controls, administrative controls, work practice controls and personal protective equipment (PPE) [9].

II. Methodology

A quantitative descriptive study using "quasi-experimental design", the sample was divided into two groups (study and control) with pretest and posttest design, was conducted to identify the effectiveness of instructional program on nurses' knowledge toward prevention of needle stick injuries at Imam Al Hussein Medical City in Holy Karbala governorate which consumed from January to August, 2017. Before date collection, the formal administrative permission was obtained from the relevant authorities from; Ministry of Higher Education and Scientific Research, Ministry of Planning, Ministry of Health. The study was conducted in Holy Karbala Governorate in the biggest and oldest hospital in this holy city called Imam Al Hussein Medical City. The governorate receives visitors from most countries of the world and according to Holy Karbala Health Directorate compass, the health institutions provided care and health services to (14,152,472) patients in 2015 [10]. Non-probability (Purposive sample) of (60) nurses, (33) male and (27) female from morning shift nursing staff who work in medical and surgical words were selected based on the study criteria and after obtaining agreement from them with cooperation and coordination with the administration of nursing affairs in the hospital.

III. Results

Table (1): Participants' Sociodemographic Characteristics for the Study and Control groups (N=60)

List	Characteristics		Study group		Control group	
			Frequency	Percent	Frequency	Percent
1	**Age**	18 – 24 years	15	50	3	10
		25 – 34 years	11	36.7	8	26.7
		35 – 44 years	2	6.7	11	36.7
		45 – 54 years	2	6.7	7	23.3
		55 ≤ years	-	-	1	3.3
		Total	30	100	30	100
2	**Gender**	Male	5	16.7	28	93.3
		Female	25	83.3	2	6.7
		Total	30	100	30	100
3	**Level of nursing education**	Higher	-	-	-	-
		College	4	13.3	1	3.3
		Institute	11	36.7	10	33.3
		Secondary	15	50	14	46.7
		school	-	-	1	3.3
		Others*	-	-	4	13.3
		Total	30	100	30	100
4	**Years of experience**	1-5	18	60	8	26.7
		6-10	2	6.7	4	13.3
		11-15	4	13.3	7	23.3
		≥ 16	6	20	11	36.7
		Total	30	100	30	100
5	**Participation in infection control program**	Yes	18	60	18	60
		No	12	40	12	40
		Total	30	100	30	100

6	**Number of training course inside country**	None	12	40	12	40
		1-3	13	43.3	14	46.7
		4-6	4	13.3	3	10
		7-10	1	3.3	1	3.3
		Total	30	100	30	100
7	**Number of training course outside country**	None	29	96.7	29	96.7
		1-3	1	3.3	1	3.3
		4-6	-	-	-	-
		7-10	-	-	-	-
		Total	30	100	30	100

** College of Science Alumni*

The analysis of nurses' demographic characteristics in table (1) revealed that half of the sample (50%) in the study group was with age group (18-24) years old, while the highest percentage (36.7%) in the control group was with age group of (35 – 44) years old. More of nurses in the study group were female nurses (83.3%), but, reversely, most of the nurses in the control group were male nurses (93.3%). Regarding to educational level among nurses, the high percentage is associated with secondary nursing school graduate for nurses in study and control groups (%50% and 46.7%) respectively. The nurses in the study group are having (1-5) years of experience formed (60%) while (36.7%) of the nurses in the control group are having more than 16 years of experience in their profession. More than half of nurses are participating in infection control program (60%), the percentage that presented equally for the study and control group, among those nurses who are participated in such program, they participated in (1-3) programs inside country (study group= 43.3% and control group= 46.7%), and only one nurse from the study group and control group is participated in such program outside the country (3.3%).

Table (2): Evaluation of Nurses' Knowledge Related to Infection Control and Prevention of Needle Stick Injuries for Study and Control Group

List	Nurses' Knowledge	Study group (N=30)								Control group (N=30)							
		Pre-test				Post-test				Pre-test				Post-test			
		Correct	Incorrect	M.S	Evaluation	Correct	Incorrect	M.S	Evaluation	Correct	Incorrect	M.S	Evaluation	Correct	Incorrect	M.S	Evaluation
1	Dealing with all cases that entered to the hospital as infectious diseases cases	16	14	0.53	Fair	30	0	1.00	Good	18	12	0.60	Fair	18	12	0.60	Fair
2	Before wearing gloves for the purpose of providing nursing care hand washing should be done before wearing gloves	17	13	0.57	Fair	30	0	1.00	Good	18	12	0.60	Fair	18	12	0.60	Fair
3	Before contact with the patient when administrative the treatments: wash hands and then wear gloves	29	1	0.97	Good	30	0	1.00	Good	25	5	0.83	Good	25	5	0.83	Good
4	Before giving intravenous infusion (I.V. Solutions): Wash hands and then wear gloves	26	4	0.87	Good	30	0	1.00	Good	26	4	0.87	Good	26	4	0.87	Good
5	Before drawing the blood samples, you should wash your hands and then wear the gloves	24	6	0.80	Good	30	0	1.00	Good	22	8	0.73	Good	22	8	0.73	Good
6	After contact with the patient and completion of nursing care, Use available hand sanitizers and wash the hands with soap and water	19	11	0.63	Fair	30	0	1.00	Good	18	12	0.60	Fair	18	12	0.60	Fair
7	When washing the hands with soap and water, It is preferable to use the available hand sanitizers before hand washing	1	29	0.03	Poor	30	0	1.00	Good	11	19	0.37	Fair	11	19	0.37	Fair
8	The ideal time for hands washing with soap and water before giving nursing care as recommended by the World Health Organization is 40 - 60 seconds	20	10	0.67	Fair	30	0	1.00	Good	10	20	0.33	Poor	10	20	0.33	Poor

Table (2): (Continued)

9	The ideal time to sterilize the hands with available disinfectants in your workplace before providing nursing care as WHO recommendations takes 20-30 seconds	17	13	0.57	Fair	30	0	1.00	Good	11	19	0.37	Fair	11	19	0.37	Fair
10	When washing hands for the purpose of sterilization, The watch, rings and bracelets are removed if founded	23	7	0.77	Good	30	0	1.00	Good	27	3	0.90	God	27	3	0.90	Good
11	The place of preparation of treatment by injection of all kinds should be Near to the patient's bed	16	14	0.53	Fair	30	0	1.00	Good	19	11	0.63	Fair	19	11	0.63	Fair
12	The disposal of medical syringes after use through Put it completely inside the sharp disposal container without recapping	13	14	0.43	Fair	30	0	1.00	Good	19	11	0.37	Fair	19	11	0.37	Fair
13	The use of (Safe Needle Disposal) or safe recapping techniques: Reduce the chances of exposure to Needle Stick Injuries	12	18	0.40	Fair	30	0	1.00	Good	10	20	0.33	Poor	10	20	0.33	Poor
14	The typical system for the number of waste containers in the wards requires a Three different waste container	15	15	0.50	Fair	30	0	1.00	Good	15	15	0.50	Fair	15	15	0.50	Fair
15	Hepatitis B Vaccination Reduces the chances of infected by this disease when exposed to (NSI)	24	6	0.80	Good	30	0	1.00	Good	23	7	0.77	God	23	7	0.77	Good
16	Hepatitis B Infection Has high rates in full cure	5	25	0.17	Poor	30	0	1.00	Good	7	23	0.23	Poor	7	23	0.23	Poor
17	Hepatitis C Infection It has a treatment but with the virus remaining in the patient's body	9	21	0.30	Poor	30	0	1.00	Good	7	23	0.23	Poor	7	23	0.23	Poor
18	Acquired Immune Deficiency Syndrome (AIDS), There is no cure	21	9	0.70	Good	30	0	1.00	Good	10	20	0.33	Poor	10	20	0.33	Poor
19	Previous planning for any nursing procedure Reduces the chances of getting Needle Stick Injury	28	2	0.93	Good	30	0	1.00	Good	27	3	0.90	God	27	3	0.90	Good
20	Training nursing staff and enhancing the practical aspect of providing nursing care reduces the chances of getting Needle Stick Injury	27	3	0.90	Good	30	0	1.00	Good	25	5	0.83	God	25	5	0.83	Good
21	Hepatitis B vaccine regime consists of Three doses	27	3	0.90	Good	30	0	1.00	Good	23	7	0.77	God	23	7	0.77	Good
22	Hepatitis B vaccine is given by Intramuscular injection (I.M)	18	12	0.60	Fair	30	0	1.00	Good	22	8	0.73	God	22	8	0.73	Good
23	Hepatitis B vaccine gives immunity against hepatitis B virus only	13	17	0.53	Fair	30	0	1.00	Good	18	12	0.60	Fair	18	12	0.60	Fair
24	The numbers of viral hepatitis types are Six types	19	11	0.63	Fair	30	0	1.00	Good	3	27	0.10	Poor	3	27	0.10	Poor
25	During my work and providing nursing care I have not been exposed to Needle Stick Injury	7	23	0.23	Poor	7	23	0.23	Poor	11	19	0.37	Fair	11	19	0.37	Fair
26	For the purpose of re-covering the needle in some cases if necessary the nurse should do that by place the needle cover on the sterile table and use one hand for the purpose of returning the cover	12	18	0.40	Fair	30	0	1.00	Good	12	18	0.40	Fair	12	18	0.40	Fair
27	Passing medical syringes from hand to hand among colleagues at work increases the chances of exposure to Needle Stick Injury	24	6	0.80	Good	30	0	1.00	Good	17	13	0.57	Fair	17	13	0.57	Fair

Table (2): (Continued)

28	Work interruption during the nursing procedure involving the use of needles increases the chances of exposure to Needle Stick Injury	22	8	0.73	Good	30	0	1.00	Good	14	16	0.47	Fair	14	16	0.47	Fair
29	Cannula stylet and (finger piercing) is placed after use in the sharps disposal container	27	3	0.90	Good	30	0	1.00	Good	25	5	0.83	Good	25	5	0.83	Good
30	Injured by hardwood needles like "Suturing needles" is considered less serious than injury by hollow bore needles	2	28	0.07	Poor	30	0	1.00	Good	8	22	0.27	Poor	8	22	0.27	Poor
31	Overfilling sharps container above the limit established exposed caregivers to Needle Stick Injury	23	7	0.77	Good	30	0	1.00	Good	26	4	0.87	Good	26	4	0.87	Good
32	Arrangement of the patient's room has a role in reduces the chances of exposure to Needle Stick Injury	17	13	0.57	Fair	30	0	1.00	Good	25	5	0.83	Good	25	5	0.83	Good
33	Informing the patient about nursing procedure before doing reduces the chances of exposure to needle stick injury	15	15	0.50	Fair	30	0	1.00	Good	23	7	0.77	Good	23	7	0.77	Good
34	Take the right body alignment for the nurse during nursing procedure reduces the chances of exposure to Needle Stick Injury	20	10	0.67	Fair	30	0	1.00	Good	22	8	0.73	Good	22	8	0.73	Good
35	Shortage of nursing staff in workplace increase the chances of exposure to Needle Stick Injury	13	17	0.43	Fair	30	0	1.00	Good	20	10	0.67	Fair	20	10	0.67	Fair
36	Preparation of nursing care supplies to the patient reduces the chances of exposure to Needle Stick Injury	20	10	0.67	Fair	30	0	1.00	Good	21	9	0.70	Good	21	9	0.70	Good
37	Take Vaccinations regimes and booster doses against certain diseases in your workplace have a positive effect in the prevention of some diseases caused by Needle Stick Injury	25	5	0.83	Good	30	0	1.00	Good	24	6	0.80	Good	24	6	0.80	Good
38	During vaccination campaigns for health care providers encourage taking the vaccines to gain immunity against diseases	29	1	0.97	Good	30	0	1.00	Good	22	8	0.73	Good	22	8	0.73	Good
39	Protocol of precautions to prevent Needle Stick Injury is found in your workplace	17	13	0.57	Fair	3	27	0.10	Poor	13	17	0.43	Fair	13	17	0.43	Fair
40	Modern techniques in medical syringes (Safe Needle Devices) are present in your workplace	16	14	0.53	Fair	2	28	0.07	Poor	11	19	0.57	Fair	11	19	0.57	Fair
41	Nursing staff are more likely to have Needle Stick Injury time of work has no effect on exposure to Needle Stick Injury	22	8	0.73	Good	30	0	1.00	Good	17	13	0.57	Fair	17	13	0.57	Fair
42	The sharp container should be disposed when container is filled with three quarters (3/4)	16	14	0.53	Fair	30	0	1.00	Good	13	17	0.43	Fair	13	17	0.43	Fair
43	Avoid Needle Stick Injury depends on awareness and focusing in nursing procedure	20	10	0.67	Fair	30	0	1.00	Good	20	10	0.67	Fair	20	10	0.67	Fair
44	To avoid Needle Stick Injury the contaminated needles must disposed it in Anti-perforation sharps container	19	11	0.63	Fair	30	0	1.00	Good	19	11	0.63	Fair	19	11	0.63	Fair
45	The correct technique for drawing blood samples to avoid Needle Stick Injury is	12	18	0.40	Fair	30	0	1.00	Good	11	19	0.37	Fair	11	19	0.37	Fair

	by direct withdrawal from laboratory tube holder																
Total				**0.60**	**Fair**			**0.94**	**Good**			**0.57**	**Fair**			**0.57**	**Fair**

No: Number, M.S: Mean of score, Poor: M.S=0-0.33, Fair: M.S= 0.34-0.67, Good: M.S= 0.68-1

Table (2) presents the evaluation of nurses' knowledge towards infection control and prevention of needle stick injuries; the table shows that nurses in the study group are showing fair knowledge during the period of pre-test (M.S= 0.60) and they are showing a good level of knowledge during post-test period (M.S= 0.94), in which mean of score for all items were reveal a good levels except the item 25, 39, and 40 that reflect a low score (M.S= 0.23, 0.10, and 0.07) respectively. The nurses in the control group are showing a fair knowledge during the pre-test and post-test period (M.S= 0.57).

Table (3): Evaluation of Nurses' Knowledge Related to Post Exposure to Needle Stick Injury for Study and Control Group

List	Nurses' Knowledge	Study group (N=30)								Control group (N=30)							
		Pre-test				Post-test				Pre-test				Post-test			
		Correct	Incorrect	M.S	Evaluation	Correct	Incorrect	M.S	Evaluation	Correct	Incorrect	M.S	Evaluation	Correct	Incorrect	M.S	Evaluation
1	After exposure to injury by sed needle there is a ossibility to get infectious iseases	29	1	0.97	Good	30	0	1.00	Good	21	9	0.70	Good	21	9	0.70	Good
2	When Exposure by Needle tick Injury during nursing are providing the Supervisor s notified and the nurse topped working to complete ost Exposure prophylaxis PEP)	20	10	0.67	Fair	30	0	1.00	Good	19	11	0.63	Fair	19	11	0.63	Fair
3	The first aid after exposure to Needle Stick Injury is to void pressing the place of njury and leave the blood out reely	10	20	0.33	Poor	30	0	1.00	Good	7	23	0.23	Poor	7	23	0.23	Poor
4	The first aid after exposure to Needle Stick Injury to clean he wound running water at ormal temperature with soap s used in washing the injury it by	9	21	0.30	Poor	30	0	1.00	Good	8	22	0.27	Poor	8	22	0.27	Poor
5	Use of disinfectants after xposure to contaminated eedles have not proven ffect in reducing the ncidence of infection after NSI)	5	25	0.17	Poor	30	0	1.00	Good	3	27	0.10	Poor	27	3	0.10	Poor
6	ncrease the depth of the ound that caused by Needle tick increases the chances of ransmission the infectious iseases	23	7	0.77	Good	30	0	1.00	Good	23	7	0.77	Good	23	7	0.77	Good
7	hallow Needle Stick Injury ithout bleeding consider risk ut with less chance of ransmission infectious iseases	23	7	0.77	Good	30	0	1.00	Good	18	12	0.60	Fair	18	12	0.60	Fair
8	When exposed to unintended Needle Stick Injury trying to haintain calm and apply post-xposure prophylaxis	28	2	0.93	Good	30	0	1.00	Good	24	6	0.80	Good	24	6	0.80	Good
9	ost-exposure Prophylaxis PEP) Protocol for Needle tick Injury are present in our workplace	16	14	0.53	Fair	2	28	0.07	Poor	14	16	0.47	Fair	14	16	0.47	Fair
10	n case of exposure to nfectious disease through Needle Stick Injury you have health insurance which overs the costs of treatment	6	24	0.20	Poor	30	0	0.00	Poor	3	27	0.10	Poor	3	27	0.10	Poor
Total				**0.56**	**Fair**			**0.80**	**Good**			**0.47**	**Fair**			**0.47**	**Fair**

No: Number, M.S: Mean of score, Poor: M.S=0-0.33, Fair: M.S= 0.34-0.67, Good: M.S= 0.68-1

Table (3) presents the evaluation of nurses' knowledge towards post exposure to needle stick injury; the nurses in the study group are showing fair knowledge during the pre-test period (M.S= 0.56) and good level of knowledge during the post-test period (M.S= 0.80) in which all item were revealed a high scores except the item

(9) that is reveals a low score (M.S=0.07) which reflect a poor knowledge. The nurses in the control group are showing a fair level of knowledge during both, the pre-test and post-test period (M.S= 0.47).

Table (4): Overall Evaluation of Nurses' Knowledge about Prevention of Needle Stick Injuries for Study and Control Group

Knowledge' Levels	Study Group (N= 30)								Control Group (N= 30)							
	Pre-test				Post-test				Pre-test				Post-test			
	F	%	M.S	SD	F	%	M.S	SD	F	%	M.S	SD	F	%	M.S	SD
Poor	0	0	2.27	0.450	0	0	3.00	0.000	4	13.3	2.07	0.583	4	13.3	2.10	0.607
Fair	22	**73.3**			0	0			20	**66.7**			19	**63.4**		
Good	8	26.7			30	**100**			6	20			7	23.3		
Total	30	100			30	100			30	100			30	100		

F: Frequency, %: Percentage, M.S: Mean of score, SD Standard deviation Poor= 0-18, Fair= 19 -37, Good= 38- 55

Table (4) indicates that there is improvement in nurses' knowledge in the study group towards prevention of needle stick injuries; in addition to that, this table revealed that a fair level of nurses' knowledge during the pre-test period (73.3%) and during the post-test, their knowledge is increased to revealed good level of knowledge (100%). The nurses in the control group showed the same level of knowledge towards prevention of needle stick injuries which was a fair level of knowledge during the pre-test and post-test periods (66.7% and 63.4%).

Table (5): Effectiveness of an Instructional Program on Nurses' Knowledge about Prevention of Needle Stick Injuries for Study and Control Groups

Nurses' Knowledge	Study Group (N=30)					Control Group (N=30)				
	M.	t	df	p-value	Sig.	M.	t	df	p-value	Sig.
Pre-test	33.00	29.812	29	**0.001**	H.S	30.90	20.295	29	0.10	N.S
Post-test	50.47					30.90				

M: Mean, t: t-test, df: Degree of freedom, p: Probability, Sig.: Significance, HS: High Significant, N.S: Not Significant

Table (5) indicates the high effectiveness of an instructional program on nurses' knowledge that found a high significant difference among the nurses' knowledge in the study group (p=0.001), there is remarkable difference between the means of nurses' knowledge during the pre-test and post-test (M= 33.00 and 50.47), while there is non-significant difference among nurses' knowledge in the control group (p=0.10).

Table (6): Relationship between Nurses' Knowledge about Prevention of Needle Stick Injuries and their Age Group

Age Knowledge	Study Group (N=30)						Control Group (N=30)					
	Sources of Variance	Sum of Square	df	Mean Square	F	P≤ 0.05	Sources of Variance	Sum of Square	df	Mean Square	F	P ≤ 0.05
Infection control and prevention of needle stick injuries	Between Group Within Group Total	2.821 8.379 11.200	3 26 29	0.940 0.322	2.918	**0.043**	Between Group Within Group Total	127.946 1275.40 1403.37	4 25 29	31.987 51.017	0.627	0.648
Post exposure to needle stick injuries	Between Group Within Group Total	0.458 1.409 1.867	3 26 29	0.153 0.054	2.814	**0.049**	Between Group Within Group Total	7.455 129.212 136.667	4 25 29	1.864 5.168	0.361	0.834
Total Knowledge	Between Group Within Group Total	5.406 14.061 19.467	3 26 29	1.802 0.541	3.332	**0.035**	Between Group Within Group Total	119.158 1897.52 2016.70	4 25 29	29.790 75.902	0.392	0.812

df: Degree of freedom, F: F-Statistic, P: Probability value

Table (6) reveals that there is significant relationship in the study group between nurses' knowledge towards prevention of needle stick injuries with respect to their age, while there is no significant relationship between nurses' knowledge with their age among the control group at p-value ≤ 0.05.

Table (7): Relationship between Nurses' Knowledge about Prevention of Needle Stick Injuries and their Gender

Gender / Knowledge	Study Group (N=30)						Control Group (N=30)					
	Sources of Variance	Sum of Square	df	Mean Square	F	P≤ 0.05	Sources of Variance	Sum of Square	df	Mean Square	F	P ≤ 0.05
Infection control and prevention of needle stick injuries	Between Group Within Group Total	0.960 10.240 11.200	1 28 29	0.960 0.366	2.625	0.116	Between Group Within Group Total	1.152 1402.24 1403.37	1 28 29	1.152 50.079	0.023	0.881
Post exposure to needle stick injuries	Between Group Within Group Total	0.107 1.760 1.867	1 28 29	0.107 0.063	1.697	0.203	Between Group Within Group Total	3.810 132.857 136.667	1 28 29	3.810 4.745	0.803	0.378
Total Knowledge	Between Group Within Group Total	1.707 17.760 19.467	1 28 29	1.707 0.634	2.691	0.112	Between Group Within Group Total	0.771 2015.99 2016.70	1 28 29	0.771 71.997	0.011	0.918

df: Degree of freedom, F: F-Statistic, P: Probability value

Table (7) depicts that there is no significant relationship between nurses' knowledge with their gender among the nurses in the study and control group at p-value ≤ 0.05.

Table (8): Relationship between Nurses' Knowledge towards Prevention of Needle Stick Injuries with their Level of Education

Education / Knowledge	Study Group (N=30)						Control Group (N=30)					
	Sources of Variance	Sum of Square	df	Mean Square	F	P≤ 0.05	Sources of Variance	Sum of Square	df	Mean Square	F	P ≤ 0.05
Infection control and prevention of needle stick injuries	Between Group Within Group Total	0.123 11.077 11.200	2 27 29	0.061 0.410	0.150	0.862	Between Group Within Group Total	298.267 1105.10 1403.37	4 25 29	74.567 44.204	1.687	0.184
Post exposure to needle stick injuries	Between Group Within Group Total	0.133 1.733 1.867	2 27 29	0.067 0.064	1.038	0.368	Between Group Within Group Total	22.202 114.464 136.667	4 25 29	5.551 4.579	1.212	0.330
Total Knowledge	Between Group Within Group Total	0.256 19.211 19.467	2 27 29	0.128 0.712	0.180	0.836	Between Group Within Group Total	406.136 1610.54 2016.70	4 25 29	101.534 64.423	1.576	0.212

df: Degree of freedom, F: F-Statistic, P: Probability value

Table (8) shows no significant relationship has been reported between nurses' knowledge regarding their level of education among the nurses in the study and control group at p-value ≤ 0.05.

Table (9): Relationship between Nurses' Knowledge about Prevention of Needle Stick Injuries and their Years of Experience

Years / Knowledge	Study Group (N=30)						Control Group (N=30)					
	Sources of Variance	Sum of Square	df	Mean Square	F	P≤ 0.05	Sources of Variance	Sum of Square	df	Mean Square	F	P ≤ 0.05
Infection control and prevention of needle stick injuries	Between Group Within Group Total	1.950 9.250 11.200	3 26 29	0.650 0.356	1.827	0.167	Between Group Within Group Total	244.516 1158.81 1403.37	3 26 29	81.505 44.571	1.829	0.167
Post exposure to needle stick injuries	Between Group Within Group Total	0.172 1.694 1.867	3 26 29	0.057 0.065	0.881	0.464	Between Group Within Group Total	52.146 84.521 136.667	3 26 29	17.382 3.251	5.347	**0.005**
Total Knowledge	Between Group Within Group Total	3.022 16.444 19.467	3 26 29	1.007 0.632	1.593	0.215	Between Group Within Group Total	455.491 1561.29 2016.70	3 26 29	151.830 60.047	2.529	0.079

df: Degree of freedom, F: F-Statistic, P: Probability value

Table (9) reports that there is no significant relationship is seen between nurses' knowledge with respect their years of experience among the nurses in the study group, while among control group, there is high significant relationship has be reported between nurses' knowledge with their years of experience at p-value ≤ 0.005.

Table (10): Relationship between Nurses' Knowledge about Prevention of Needle Stick Injuries with Respect to their Participation in Infection Control Courses

Participation Knowledge	Study Group (N=30)						Control Group (N=30)					
	Sources of Variance	Sum of Square	df	Mean Square	F	P≤ 0.05	Sources of Variance	Sum of Square	df	Mean Square	F	P ≤ 0.05
Infection control and prevention of needle stick injuries	Between Group Within Group Total	0.006 11.194 11.200	1 28 29	0.006 0.400	0.014	0.907	Between Group Within Group Total	1.422 1401.94 1403.36	1 28 29	1.422 50.069	0.028	0.867
Post exposure to needle stick injuries	Between Group Within Group Total	0.006 1.861 1.867	1 28 29	0.006 0.066	0.084	0.775	Between Group Within Group Total	5.000 131.667 136.667	1 28 29	5.000 4.702	1.063	0.311
Total Knowledge	Between Group Within Group Total	0.022 19.444 19.467	1 28 29	0.022 0.694	0.032	0.859	Between Group Within Group Total	1.089 2015.61 2016.70	1 28 29	1.089 71.986	0.015	0.903

df: Degree of freedom, F: F-Statistic, P: Probability value

Table (10) depicts that there is no significant relationship between nurses' knowledge regarding their participation in infection control program among the nurses in the study and control group at p-value ≤ 0.05.

IV. Discussion

Discussion of the Socio-demographic Characteristics of Studied Sample (Table 1):

In table (1) analyses of the nurse's socio-demographic characteristics revealed differences between the study group and control group, these results of the study are acceptable to some extent in the "non-equivalent" (pre-test and post-test) quasi-experimental design of the study [(11)].The character of age in table (1) presented that half of the sample in the study group are with age group ranged between (18 - 24) years old, The study findings are slightly difference from the results of the studies as stated in many researches regarding to study group, according to Saudi study in Jazan City [(12)] revealed to the median of age to (122) nurses was (26.6) and the result agree to Iranian research about the evaluation of needle-stick injuries among nurses of "Khanevadeh" Hospital in Tehran [(13)]. Majority of the study samples were female (83.3%), this result agrees with results of similar studies in some developing countries, that female to male ratio ranged respectively from 3:1 in Saudi Arabia [(12)], 13:1 in Nepal [(14)], 3:2 in Iran [(13)], 98:2 in Nigeria [(15)]. The study revealed that the educational level for the most participants was associated with secondary nursing school (50%), followed by nurses with diploma certificate in ratio (36.7%) and college of nursing graduate (13.3%), these ratios are not consistent with studies in other developing countries where graduates of health institutes and colleges constitute the largest proportion of research samples, this is related to identify nursing staff in three levels only, high school diploma, bachelor of nursing and post graduate degree in nursing [(13)], and two levels in Saudi Arabia [(12)] and three levels in Republic of Sudan [(16)]. The nurses in the study group were having experience (1-5) years formed (60%), this percentage is exactly to the same as of Egyptian study in "Zagazeg University Hospitals" related to the same subject done by Ahmed (2014) [(17)] revealed (60%) of participants had experience (1-5) years and agree with Nigerian study related to years of experience (1-5) was the majority of the sample (49.1%) [(15)] and study in Erbil Hospitals with rate (48.3%) [(18)] Regarding with participation in infection control program, the study showed (60%) from sample in study and control group were participated in infection control program and this indicates ongoing educational activity within the medical city and attempted to improve nurses' knowledge toward infection control and prevention nosocomial infection, in contrast with most of the study done in the same field regarding to nurses participation in infection control program such as in Sudan (87.5%) never attended to (NSI) prevention and infection control courses [(16)], (57.5%) of study sample not participated in infection control courses in Nigeria [(15)], in Indian study presented (60.7%) of nurses were never attended educational program related to needle-stick injury or infection control [(19)]. The nurses who participated in (1-3) programs inside country were (study group =

43.3% and control group = 46.7%) from (4-6) programs inside country (study group = 13.3% and control group = 10%), from (7-10) programs inside country (study group = 3.3% and control group = 3.3%) and only one nurse from the study group and control group is participated in infection control program outside the country that formed ratio (3.3%).

Discussion the Evaluation of Nurses' Knowledge related to Infection Control and Prevention of Needle Stick Injuries for Study and Control Group

Table (2) revealed that nurses in the study group are showing fair knowledge during pre-test (M.S = 0.60), a Palestinian study agreed with these findings and the results showed that the nurses had fair knowledge level regarding to infection control and prevention of needle stick injuries during pre-test [(20)]. Moreover, the findings agreed with Iraqi study conducted in Erbil hospitals that presented (26.7%) of nurses have poor knowledge and (28.3%) have fair knowledge [(18)]. The nurses represented a good level of knowledge during post-test period (M.S = 0.94), this results agree with Egyptian study's result related to infection control and prevention of (NSI) that showed highly significance during post-test (p-value <0.01) [(21)] and these result consistent with the findings of Iraqi study [(22)] who reported a significant increasing in nurses' knowledge score about infection control from the pre-test to the post-test The mean of score for all items were revealed a good levels except the item 25, 39, and 40 that reflect a low score (M.S= 0.23, 0.10, and 0.07) respectively because of item (25) regarding to the times of exposure to (NSI) during providing the nursing care as follow; (not exposed to NSI, only one exposed, twice or more exposed to NSI), so the results were similar in pre-test and post-test (M.S. = 0.23) at poor level range due to the stability of the answers in both tests this means that (76.6%) of sample exposed to needle-stick injury.

Regarding to the item (39) that related to question about protocol of precautions to prevent needle stick injury if found or not at work place, the result revealed fair level (M.S. = 0.57) in pre-test and after clarification to the meaning of (NSI) prevention protocol, the result was in poor level (M.S. = 0.10), so this is related to understanding meaning of prevention protocol in instructional program.

In related to item (40) which concerned with techniques in medical syringes (Safe Needle Devices) if founded or not founded at work place, the result showed fair level of nurses' knowledge (M.S. = 0.53) in pre-test and after clarification to the meaning of (SND's), the result was in poor level (M.S. = 0.07) so, this related to understanding to the meaning of (SND's) that illustrative in instructional program and not available at Imam Al Hussein Medical City,

Discussion the Evaluation of Nurses' Knowledge Related to Post Exposure to Needle Stick Injury for Study and Control Group

In table (3) the study group showing fair level of knowledge during the pre-test period (M.S= 0.56) this finding is agree with what appeared in a study involving (16) nurses in Ugandan teaching hospital related to their knowledge about post-exposure prophylaxis, the study revealed all participants have a lack of knowledge toward post-exposure prophylaxis and they avoided reporting process for injury, because the fear from side effects of anti-retroviral moreover to that they thought the report and post-exposure prophylaxis causes stigma [(23)].

In contrast, good level of nurses' knowledge toward (PEP) appeared during the post-test period (M.S= 0.80). In which all item were revealed a high scores, except the item (9) that revealed a low score (M.S=0.07) that related to question about (PEP) protocol for needle stick injury if present in workplace or not, and the change in mean of score related to understanding the meaning of (PEP) through explain it in instructional program.

In item (10) that is reveals a low score too (M.S=0.00) in point related to health insurance that covering the costs of treatment if case of exposure to infectious disease through needle stick injury happened.

Discussion Overall Evaluation of Nurses' Knowledge towards Prevention of Needle Stick Injuries for Study and Control Group

In table (4) the findings presented the effective of instructional program through high percent of the responses for nurses' knowledge related to infection control and prevention of (NSI), from applied pre-test, post-test on study and control group. The knowledge for (22) nurses in the study group showed a fair level (73.3%) in pre-test period, but only (8) nurses formed (26.7%) were have good level of knowledge. After the researcher applied the instructional program then applied the post-test, the results were as follows, all the participants showed good level of knowledge and they formed ratio (100%) [(22)] supported the present results through his Iraqi doctoral dissertation about infection control and applied program concerning to World Health Organization guide, the sample response was highly significant in relation to the educational program especially in domain related to prevention of sharps and needle-stick injury as follows; nurses knowledge for the study group (13.3% for pre-test and 100% for posttest), the nurses knowledge regarding to designing of the devices to provide safe injection was (3.3% for pretest and 100% for posttest).

Discussion the Effectiveness of an Instructional Program on Nurses' Knowledge towards Prevention of Needle Stick Injuries for Study and Control Groups

In table (5) t-test analysis used for measuring the effectiveness of the instructional program, the result indicate that instructional program is highly effective on nurses' knowledge appeared by highly significant at (p-value = 0.001), this result agree with a parallel other studies' results and findings that showed the effectiveness of the instructional program regarding to infection control management as general and prevention of needle-stick injury in particular, upon nurses' knowledge through pre-test and application of the program on study group than doing the post-test in several hospitals around the world, as in Egypt [(21)], in the Netherlands [(24)], in Iraq [(22)], in Iraq [(25)], in the United States of America [(26)], in Turkey [(27)].The researcher believes that the instructional program was designed and conducted to be an effective instructional instrument to improve nurse's knowledge regarding to prevention of needle stick injuries.

Discussion the relationship between Nurses knowledge and demographical characteristics Data (Tables 6-10)

1.1.1. **Age:** The data analysis of table (8) showed that there was significant association at level of between nurses' knowledge and their age (p-value = 0.035). This result agrees with study done by Jissir (2014) [(22)] that revealed a significant relationship between nurses' age with their knowledge

1.1.2. **Gender:** Table (9) showed that there was non-significant relationship level between nurse's knowledge and their gender (p-value = 0.112). This result agrees with study conducted by Karim, et al, (2015) [(18)] who showed that there was non-significant association between the nurses' knowledge with their gender.

1.1.3. **Level of education:** Table (10) revealed that there was non-significant relationship between nurse's knowledge and their level of education (p-value = 0.836). This result agrees with study conducted by Karim, et al, (2015) [(18)] who showed that there was non-significant association between the nurses' knowledge with their level of education

1.1.4. **Years of Experience:** Table (11) revealed that there was non-significant relationship between nurse's knowledge and their years of experience (p-value = 0.215). This result agrees with study done by Karim, et al, (2015) [(18)] who showed that there was non-significant association between the nurses' knowledge with their years of experience.

Discussion the Relationship between Nurses' Knowledge about Prevention of Needle Stick Injuries Regarding to their Participation in infection control courses

Table (12) showed that there was non-significant relationship between nurse's knowledge and their participation in infection control courses (p-value= 0.859). This result agreed with Karim, et al, (2015) [(18)] who mentioned, there was no statistically significant relationship related to nurses' knowledge and training course.

V. Conclusion

The researcher concluded that there is a highly effect of instructional program on nurses' knowledge toward prevention of needle stick injuries at Imam al Hussein medical city in Holy Karbala governorate, and there was a significant association between nurses' knowledge with their age, but there was non-significant association between the nurses' knowledge and their gender, level of education, years of experience and participation in infection control courses.

VI. Recommendations

The researcher recommend to establishment center called (Iraqi Eye of the Needle) that interested to everything related to needle-stick injury by providing full vaccination for all nursing staffs, applying specialized infection control instructional programs, providing safe injection devices and safety sharp boxes, applying of health insurance system, design protocols or procedure manuals that illustrate how to deal with needles and sharp tools and applying of viral screening test for any admitted patient in addition to that researcher recommend to activation work by hierarchy of controls in all hospitals.

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