

# Effect of Training Program Regarding Occupational Health Hazards on Nurse Interns' Knowledge and Practice

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## Abstract

**Background:** Nurse Interns face a wide range of hazards in hospitals including needle stick injuries, back injuries, latex allergy, violence, and stress.

**The goal of this study:** Identify the impact of training program regarding occupational health hazards on nurse interns' knowledge, practice and attitude through: assessing nurse interns' knowledge regarding occupational health hazards before and after the program, assessing nurse interns' practice regarding of occupational health hazards before and after the program, assessing nurse interns' attitude regarding of occupational health hazards before and after the program, designing and implementing the training program and measuring the effect of training program regarding occupational health hazards on nurse interns' knowledge and practice.

**Design:** Quasi- experimental research design.

**Subject:** The study was conducted at four hospitals affiliated to Ain Shams University. The subjects of this investigation included 91 nurse interns.

**Tools of data collection:** Data were collected by using four tools namely: Needs assessment sheet, Self-administered Questionnaire, Observation Checklist, and attitude scale.

**Results:** Highly significant differences of total occupational health hazards knowledge among nurse interns throughout program phases was observed. Nurse interns' total practice regarding occupational health hazards was markedly increased throughout program phases. Highly significant difference in total attitude towards protection from hazards throughout the program phases was noticed.

**Conclusion:** Implementation of the training program led to significant improvements in nurse interns' knowledge, practice, and attitude regarding occupational health hazards.

**Recommendations:** providing training program for nurse interns about occupational hazards and especially on protective measures, development and dissemination of policies and guidelines of safety practices, evaluation sheet of the nurse interns should include items related to occupational health hazards and compliance ways of protection, and further investigation might include factors affect reporting of occupational hazards.

**Keywords:** *Nurse interns, Occupational health hazards, Training program.*

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## Introduction

Nursing is one of the hazardous occupations, in which the risks are four times higher than those in other professions<sup>1</sup>. Health care workers are continually exposed to occupational health hazards<sup>2</sup>. Nurses are

exposed to many occupational hazards that may threaten their health and safety<sup>3</sup>.

Occupational safety at the workplace improves the employees' health and increases their productivity. In the medical profession, Nurses constitute the largest group of healthcare workers, and experience a higher rate of working environment dangers exposure than other health services laborers<sup>4</sup>

Nurses and nurse interns are the most significant individuals from the medical care group, who give direct consideration to the patient are presented to various occupational dangers, for example, drugs, chemicals, infectious agents, absence of materials and ergonomic conditions, extreme working, and unreasonable outstanding burden, and furthermore they have physical (needle stick, musculoskeletal disorders and pain, and varicose veins), chemical (skin problems, latex sensitivities), biological (infectious sicknesses), and psychological (stress, burnout, psychological health problems, sleep trouble) problems<sup>5</sup>.

Health care organization likes other high danger work environment is described by exposure to an elevated level of occupational hazards that significantly imperils the health status and life of health care workers, and occupational hazards may be the leading cause of death and mortality<sup>6</sup>. The World Health Organization (WHO) confirms that hospitals are the primary priority in preventing workplace hazards<sup>7</sup>.

Nursing assistants are baccalaureate understudy nurses caretakers who start the job change from senior understudy to proficient nurse through internship preparing program<sup>8</sup>. The internship program is required for a Bachelor of Science in nursing achieving the satisfaction of year of a baccalaureate. The internship year is viewed as a period of change from undergrad nursing understudies to starting level enlisted nurses. During this year, nurture understudies ought to procure the qualities, mentalities, and essential objectives to the nursing profession. The preparation internship program advances techniques for new graduate recruitment and retention, give a chance to unite clinical nursing information in new areas of practice<sup>9</sup>.

Nurse interns like other health care workers in the profession that have the highest risk because exposure to high rate of occupational hazards. Nurses represent the largest group of health care workers and they have directly and indirectly contact with the patients the

nurses and nursing intern exposure to a higher degree of workplace hazards than other professional does in the medical field. Therefore, this occupational hazard can be reduced by implementing number of programs such as; training, and education of the nurses and nursing interns<sup>4</sup>.

Significance of the study: Occupational health hazards are very common in developing countries where work place risks are more extreme. There are upwards of 250 million occupational injuries every year, bringing about 330000 fatalities. Every year, an expected 160 million new cases of work related ailment happen around the world, hazards in workplace affect not only the workers but also the agency itself by its effect on wage loss, medical payment workplace disruption, effect on productivity, and high absenteeism rate, low employee morale and job loss.

Nurse interns face a wide scope of perils in hospitals including needle stick wounds, back injuries, latex hypersensitivity, violence, and stress. In spite of the fact that it is conceivable to prevent or lessen nurse intern's exposures to these hazards, nurse interns actually are experiencing large numbers of occupational hazards and illness. Rates of occupational injury to health care team have increased over the past decade.

**Aim of the study:** This study aims at identifying the effect of training program concerning occupational health hazards on nurse interns' knowledge, practice and attitude through:

1. Assessing nurse interns' knowledge related occupational health hazards before and after the program.
2. Assessing nurse interns' practice regarding of occupational health hazards before and after the program.
3. Assessing nurse interns' attitude regarding of occupational health hazards before and after the program.
4. Designing and implementing the training program.
5. Measuring the effect of training program regarding occupational health hazards on nurse interns' knowledge and practice.

**Research Hypothesis:** Nurse Interns' knowledge, practice and attitude regarding occupational health hazards will be improved after implementing the program.

## Subjects and Method

**Research Design:** A quasi-experimental design was utilized in conducting this study.

**Setting:** This investigation was carry at four hospitals affiliated to Ain Shams University where the nurse interns having their training, namely: Ain Shams University Hospital including (6 units) which was Cardiac Care Unit (CCU), Neurological ICU, Stroke ICU, Endemic ICU, and Kidney Dialysis Units, and Neonatal ICU, Medical ICU, Surgical Also, Academic Institution of Cardiac Surgery including (3 units) which was Adult ICU, CCU, Post Catheter Care Unit.

**Setting:** Cardiac Catheter OR. El-demerdash Hospital including (3 units) which was Operating room (21 rooms) and Intensive care unit and Emergency operating rooms (5 rooms). Pediatric Hospital including (4 units) which was Minor OR (1room) ICU.

**Study Subjects:** All nurse interns having their training in the previously mentioned settings during the data collection period (academic year 2018-2019). The study sample was (91) nurse interns, 57 females and 34 males, distributed as fowled: Ain Shams University Hospital (30) nurse interns, El-Demerdash Hospital (31) nurse interns, Pediatric Hospital (15) nurse interns, The Academic Institution of Cardiac Surgery (15) nurse interns

**Data collection tools:** The data were gathered utilizing four tools namely: Needs evaluation sheet, Self-administered Questionnaire, Observation Checklist, and attitude scale.

**1. Needs assessment sheet:** developed by the researcher guided by<sup>10</sup>, to assess nurse interns' needs regarding training program of occupational health hazards. It was used before beginning the training program. The sheet contained two parts.

**The first part:** aimed to collect socio - demographic data of the study subjects like: age, department, gender, marital status, and attendance of training courses about occupational hazards.

**The second part:** aimed to assess nurse interns' needs regarding training program of occupational health hazards. It contain (10) items related to training program regarding occupational health hazards content. These items contain various topics such as: occupational health hazards, back pain and body mechanics, work related

injuries, infection and nosocomial infection, disinfection and sterilization, safe handling and disposal of sharps, hand washing, personal protective equipment (PPE) in health care setting, cleaning of surgical instruments, psychological job hazards.

**Scoring system:** Responses were measured by three-likert scale for clinical subscale ranging from urgent need to know, moderate need to know and no need to know. The scores of the items were summed up and the total divided by the number of the items giving mean score of the part. These scores were converted into a percent score. It was urgent need to know if the percent score was more than 75%, moderate if the percent score was 60 -75%, no need to know if the percent score was less than 60 %

**2. Self-administered questionnaire:** This tool was aimed to assess knowledge of nurse interns regarding hazards facing them during internship training and the different method of protection from these hazards. This tool adopted from<sup>11</sup>. The questionnaire sheet consisted of the following three parts:

**Part I:** Aimed to collect socio-demographic data of study subjects like: age, gender, department, marital status, and attendance of training courses about occupational hazards.

**Part II:** Aimed to collect medical and work-related data related to work hazard exposure to assess nurse interns' actual exposures to various types of hazards during internship training, including (physical, chemical, biological, psychological, and social hazards). Through thirty four items. These items were grouped under five questions and nurse interns select the answer (Yes or No).

**Part III:** This part developed by<sup>11</sup>. This part was aimed to assess nurse interns' knowledge regarding occupational hazards. This part was consisted of 25 multiple choice questions. These questions classified into ten categories.

**Scoring system:** Knowledge items were scored (1) for the right answer and (zero) for the incorrect answer. The scores of the items were summarized and the total divided by the number of the items giving mean score of the part. These scores were changed over into a percent score. The mean and standard deviation for third part were calculated then converted into a mean percent. The maximum possible total score was (twenty-

five). Knowledge levels was considered high level of knowledge if the percent score was more than 75%, moderate if the percent score was 60 -75%, low level if the percent score was less than 60 %<sup>11</sup>.

**3. Observation Checklist:** This tool aimed to assess the actual nurse interns' practice related to safety standards, precautions, this tool adopted from<sup>11</sup>. This tool was consisted of the 64 items. These items were grouped under nine categories: hand washing 15 items, gloving 10 items, eye protection 1item, masking 2 items, personal hygiene 7 items, cleaning instruments 6 items, sharp box use 8 items, proper lifting 9 items, Safe waste disposal 6 items.

**Scoring system:** The scoring system ranged from done '(1)' or not done '(0)' or 'not applicable '(not account)'. For each part, the score of the items were summed up and the total divided by the numbers of the items, then mean and standard deviation were calculated. These scores were converted into a mean percent. The practice was considered satisfactory if the percent score was 60 % or more and unsatisfactory if less than 60 %<sup>12</sup>.

**4. Attitude scale:** This tool aimed to assess nurse interns' attitude towards protection from hazards facing them during internship training. This tool developed by<sup>11</sup>. The tool consisted of 12 positive and negative statements covering various types of hazards, in addition to the universal precautions, for example (I try to avoid infectious patients to avoid infection).

**Scoring system:** The scoring system was using three points likert scale Agree (2) and uncertain (1) and disagree(0). The scores of the items of each subscale were summed-up, converted into percent score, for the purpose of each presentation of each item. The nurse interns' attitude score were considered satisfactory if the percent score is 60% or more, unsatisfactory if less than 60 %<sup>13</sup>.

**II. Operational design:** Operational design for this research included three phase's namely pilot study, preparatory phase, and the fieldwork.

**a. Preparatory phase:** This phase started from January 2018 until April 2018 It contain review of the current and past literature, public and global related literature, journals concerning the different aspects of the study, using textbooks, thesis, and articles dependent on this review.

**Tools validity & reliability:** Tools validity: aimed at testing the validity of the evaluation tools and its components. Two kinds of validity tests were utilized: face and content validity. Face validity aimed at checking that the tool gives the appearance of measuring the concepts of occupational health hazards. Content validity was led to decide the suitability of every item to be included in the tools. The tools validity developed by<sup>11</sup>.

**Tools reliability:** The reliability test was done to assure the consistency, determine how strongly the attributes were related to each other and to the composite score. The reliability test was used in this stage for three tools for data collection using Cronbach's' Alpha test. Cronbach's alphas were ( $r= 0.896$   $0.917$ and  $0.705$ ) for Occupational hazards knowledge questionnaire, Occupational health hazards practice observation checklist, and Attitude scale respectively.

**Pilot study:** The pilot study was done on 10% of the study sample (9 nurse interns). These nine nurse interns were included in the main study sample. Data obtained from the pilot study was analyzed, and no modifications were done. The time consumed for fulfilling the study tools was 35 minutes.

**Field work:** The field work of the study lasted for seven months from beginning of February to the end of September 2019. The field work was done through the following phases.

**Phase I (Assessment phase):** This phase involved pre-testing of the study nurse interns' knowledge, practice and attitude regarding occupational health hazards using the relevant data collection tools. The researcher visited each of the four hospital included in the study to explain the purpose and nature of the study to the administration and obtain their permission to carry out the study. Then, researcher met with the nurse interns, oriented them about the study aim and procedures, and invited them to participate. The needs assessment sheet was distributed to study subjects to assess their needs regarding the program. Then the researcher distributed the self-administered questionnaire form to study subjects to assess their knowledge and attitude scale regarding occupational health hazards, along with filling instructions.

The nurse interns were then observed individually by the researcher using the observation checklist to assess the actual nurse interns' practice related to safety

standards, precautions. Each nurse intern was observed three times. The period between successive observations was two days.

**Phase II (Training program planning):** The content of the training program was developed based on review the regarding literature and based on the assessment of the knowledge questionnaire. Different instructional strategies were selected to suit the participant's needs, and achieve the objectives and contents of the training program. It was aimed at providing trainers with much experience as possible. Within the available resources, a training program was developed by the researcher.

**Phase III (program implementation):** The training program was implemented to nurse interns working in the study setting. Nurse interns were divided into five groups. Training program consisted of 12 sessions. The training program sessions carry out four days/week (4hours/day). It was carried out from 12:00 am to 2:00 pm, while in afternoon shift program was implementing from 3:00 pm to 5:00 pm for nurse interns in the different departments.

Time allowed for achieving the program objectives was 22 hour: 14 hour theoretical and 8 hour practical hours. Each session contain theory or practice content and including time for discussion. This phase take from beginning of April to middle of May 2019.

**Phase IV (post program evaluation):** Investigator evaluated impact of training program regarding occupational health hazards on nurse interns' knowledge, practice and attitude. A post-test was done immediately after program implementation during May 2019. This was finished utilizing the same data collection tools and checklist as in assessment stage.

**Phase V (follow-up):** follow up test was repeated three months after post-assessment evaluation by using the same data collection tools to estimate the impact of training program related occupational health hazards on nurse interns' knowledge, practice and attitude. This phase took four months.

**III. Administrative Design:** An official permission to conduct the study was obtained from hospital directors through letters. The letter included the aim of study and photocopy from data collection tools in order to get the permission and help for collecting data. Then the researcher met each director of the four hospitals, and demonstrates purpose of the study to obtain their

cooperation and help during the study.

**Ethical Consideration:** The research approval was obtained from a scientific research ethics committee. The aim and purpose of the research were explained to each director of the four hospitals, as well as the nurse interns who were included in the study, and oral assent was gotten from every participant before the study conduction. Also, it guaranteed keeping up anonymity and confidentiality of the subject data. Nurse interns were informed that they were permitted to decide to participate or not in the study and that they had the right to pull back from the study whenever.

**Statistical Design:** Data entry was done utilizing SPSS V20 PC software package. Data were presented utilizing descriptive statistics in the form of frequencies and percentages for qualitative variables, and means  $\pm$  standard deviations for quantitative variables. Qualitative variables were compared utilizing chi-square test.

Moreover, paired t-test was utilized to compare two means in the same studied group pre and post intervention and between two means post intervention and during follow up stage. Pearson correlation co-efficient (r) was utilized for assessment of the inter-relationship between quantitative variables. The confidence level chosen for the study was 95%. Statistical significance was considered at p value  $<0.05$ .

## Results

**Table (1)** demonstrates the socio demographic characteristics of study subject. As regard to age, 80.2% of nurse intern's age ranged (22-23y), with mean age of  $22.67 \pm 0.83$ . Moreover, more than half (62.6%) of them were female, (35.2%) of them had an internship training in OR in different hospitals. Also, more than half (66.7%) of them who had attend the courses was its duration was one day, and majority of nurse interns (83.4%) attend courses at time ranged (1-5 months). Also, shows the majority (80.2%) of nurse interns was not attending any of training courses. Also, clarifies that, physical hazards were at a first rank level of hazards which more than two fifth (44.0%) of nurse interns were exposed to physical hazards as perceived by them, followed by psychosocial hazards which slightly more than one quarter (29.7%) of them, while chemical hazards was at the last rank level of hazards which lowest percentage (9.9%) of nurse interns were exposed to.

**Table (2)** demonstrates that, at pre program phase only (4.4%) of nurse interns had high total knowledge level. As observed at post program and follow up phases the total knowledge level was improved markedly (91.2%, 80.2% respectively). Also, shows that, more than half of nurse interns (53.8%) had satisfactory practice in preprogram phase regarding gloving, while in post program phase the nurse interns' satisfactory practice reached to (98.9%), and slightly decline (96.7%) in follow up phase, Also, minority (33.0%) of nurse interns had satisfactory practice level regarding occupational health hazards at preprogram phase. Moreover, there were highly improvement in total nurse interns' practice during post program phases (94.5%), and slightly decline (85.7%) in follow up phase however the levels remained significantly high compared with preprogram phase . The present study finding showed that, majority of nurse interns (92.3%) had satisfactory attitude in post program and in follow up phase there was slightly decline (78.0%), while minority (8.8%) of nurse interns' had satisfactory attitude in preprogram phase, with highly statistically significant difference in total attitude towards protection from hazards throughout the program phases.

**Table (3)** demonstrates there was a positive significance correlation among total knowledge score and total practice score related occupational health hazards among nurse interns throughout program phases. Also, shows that, there was a highly significance correlation among total attitude score and total knowledge score regarding occupational health hazards among nurse interns through post and follow up program phases. However, there was significant correlations among total attitude score and total knowledge score regarding occupational health hazards among nurse interns in preprogram phases.

**Table (1): Socio-demographic characteristics of Nurse Interns (n= 91).**

Items	Nurse interns (91)	
	Frequency	Percent
<b>Age (in Years)</b>		
22- <24	73	80.2
24-25	18	19.8
Mean ± SD	22.67±0.83	
Range	22-25	
<b>Gender</b>		
Male	34	37.4
Female	57	62.6
<b>Department</b>		
CCU and post catheter	16	17.6
kidney dialysis	13	14.3
Neuro and stroke ICU	6	6.6
Endemic ICU	2	2.2
ICU	16	17.6
Neonatal ICU	4	4.3
OR	32	35.2
Emergency department	2	2.2
<b>Name of Attending training courses</b>		
Infection control	16	88.9
Control of fire	2	11.1
<b>Duration of the courses</b>		
Lecture	5	27.8
One day	12	66.7
3weeks	1	5.5
<b>Time attendance of courses</b>		
> One month	2	11.1
1-5 months	15	83.4
< 5 months	1	5.5
<b>Attendance of training courses</b>		
Yes	18	19.8
No	73	80.2
<b>Actual exposures to hazards</b>		
Physical	40	44.0
Chemical	9	9.9
Biological	12	13.2
Psychosocial	27	29.7
Social	16	17.6

**Table (2): Levels of nurse interns’ total knowledge & distribution of total practice regarding occupational health hazards and total attitude towards protection from hazards throughout program phases (n= 91).**

Total knowledge regarding occupational health hazards									
Items	Levels of knowledge	Program phases						X <sup>2</sup>	P-value
		Pre		Post		Follow up			
		No	%	No	%	No	%		
Total knowledge regarding occupational health hazards	Low	73	80.2	2	2.2	7	7.7	137.8	0.000**
	Moderate	14	15.4	6	6.6	11	12.1		
	High	4	4.4	83	91.2	73	80.2		

Total occupational health hazards practice									
Satisfactory practice 60%+	Program phases						Pre & Post (X <sup>2</sup> P-value)	Post & follow up (X <sup>2</sup> P-value)	
	Pre		Post		Follow up				
	No	%	No	%	No	%			
Hand washing	26	28.6	84	92.3	77	84.6	77.30 > 0.000**	-3.47 > 0.00**	
Gloving	49	53.8	90	98.9	88	96.7	51.19 > 0.000**	-1.02 <0.05	
Eye protection	0	0.00	0	0.00	0	0.00	0.00 <0.05	0.00 <0.05	
Masking	19	20.9	68	74.7	69	75.8	52.87 > 0.000**	0.030 <0.05	
Personal protective equipment (PPE) in health care setting	45	49.5	76	83.5	69	75.8	49.73 > 0.000**	-1.66 <0.05	
personal hygiene	47	51.6	87	95.6	85	93.4	45.27 > 0.000**	-0.423 <0.05	
Instruments/Equipment processing (Cleaning)	18	19.8	30	33.0	27	29.7	4.10 > 0.05*	-0.230 <0.05	
Use sharp container	47	51.6	87	95.6	80	87.9	45.27 > 0.000**	-4.57 > 0.05*	
Body mechanics (when lifting)	35	38.5	76	83.5	66	72.5	38.82 > 0.000**	-3.27 > 0.05*	
Safe waste disposal	45	49.5	80	87.9	61	67.0	31.29 > 0.000**	-11.37 > 0.00**	
Total occupational health hazards practice	30	33.0	86	94.5	78	85.7	74.55 > 0.000**	-3.95 > 0.05*	

Total attitude towards protection from hazards									
Satisfactory attitude 60%+	Program phases						Pre & Post (X <sup>2</sup> P-value)	Post & follow up (X <sup>2</sup> P-value)	
	Pre		Post		Follow up				
	No	%	No	%	No	%			
Total attitude towards protection from hazards	8	8.8	84	92.3	71	78.0	127.0 > 0.000**	-7.35 > 0.00**	

**Table (3): Correlations between total practice score and total knowledge score regarding occupational health hazards & Correlations between total attitude score regarding protection from hazards and total knowledge score among nurse interns throughout program phases**

Parameter	Total knowledge score regarding occupational health hazards					
	Pre		Post		Follow up	
	R	P-value	R	P-value	R	P-value
Total practice score regarding occupational health hazards	0.211	<0.05*	0.412	<0.000**	0.356	<0.000**
Total attitude score regarding protection from hazards	0.228	<0.05*	0.247	<0.01**	0.239	<0.01**

## Discussion

Nursing interns are more prone to occupational health hazards, and injuries in the course of their clinical training activities, and their day to day activities in the health care settings<sup>14</sup>. Subsequently, WHO emphasizes on the primary prevention of work environment dangers, particularly because of the highest incidence of occupational injuries happens in hospitals and health care settings, in comparison with to the manufacturing industries<sup>15</sup>

Current study revealed that, physical hazards were at a first rank level of hazards which more than two fifth of nurse interns were exposed to physical hazards as perceived by them, followed by psychosocial hazards which slightly more than one quarter of them, while chemical hazards was at the last rank level of hazards which lowest percentage of nurse interns were exposed to. The study result is in congruence with a study conducted in Egypt by<sup>17</sup> who decided that, attendants rank physical dangers followed by mental and social risks.

The present study finding revealed that, minority only of nurse interns' had high level of occupational health hazards knowledge before implementing the program. It may be due to more than three fourth of nurse interns didn't attend any training program or courses about occupational health hazards.

The findings of the present study is in congruence with<sup>18</sup> that found, low knowledge and awareness level in their study among healthcare workers regarding occupational hazards in their health care settings in Malaysia. In contrary with the present study findings<sup>19</sup> who reported that, respondents had an above average overall knowledge of workplace hazards and safety practices.

As observed the total high level of occupational health hazards knowledge was improved markedly throughout program phases. This finding may be due to the program was effective in improving the occupational health hazards knowledge among nurse interns. The same trend was observed by<sup>20</sup>.

Moreover, slightly decline of total occupational health hazards knowledge level at follow up phase among nurse interns. This result may be due to normal phenomena of retention and forgetfulness due to the high work load. In agreements with the present study<sup>21</sup> who reported that, a significant number of nurses have knowledge about occupational health hazards, although few numbers have insufficient knowledge.

Also, the result showed that, there were highly significant differences of total occupational health hazards knowledge between nurse interns all through program stages. This reflects positive influence of the health education program in enhancing occupational health hazards knowledge among nurse interns. This finding is consistent with<sup>22</sup> decided that, there were highly significant differences throughout program phases in improving nurses' knowledge regarding total occupational health hazards knowledge.

In addition, as observed, the nurse interns gloving practice technique was improved markedly throughout program phases, with highly statistically significant differences between total practice regarding gloving throughout pre and post program phases. This finding may be due to the training program encourage the nurse interns to follow correct gloving practices and set a trend in their practical life. In the same line<sup>23</sup> found that, in their study, wearing hand gloves for routine clinical system was rehearsed by almost all participants.

Moreover, as observed at post training program phases the total personal protective equipment practice (PPE) in health care setting among nurse interns was statistically significant improved markedly throughout pre and post program phases.. This result may be due to educational programs for nurse intern help them in improving their knowledge and practice personal protective equipment. The same trend was observed by<sup>24</sup> mentioned that, regarding application of the universal precaution revealed a significant increase in applying hand-washing, wearing gloves, and wearing face mask after the program compared with the application of the universal precautions before the program.

Moreover, there was slightly declined occur in total practice regarding personal protective equipment practice (PPE) in health care setting among nurse interns at follow up phase. This finding may be due to lack of closed supervision related to personal protective equipment practice. It may also be attributed to nursing staff shortage, work overload, and the time constrains of having to deal with a large number of patients within a limited time. Similarly,<sup>25</sup> who found that, guideline recommendations for routine preventive care are not always followed, such as hand washing, wearing mask, goggles, sterile gown, and gloves 6 months after implementation.

Moreover, as observed at post program phase the total personal hygiene satisfactory practice level among nurse interns was statistically significant improved. This result may be due to instructive meetings for the staff to affect emphatically on the consistence to personal hygiene. Also, may be due to an effective infection control depends on nurse interns' ability to advise and encourage them to keep a satisfactory practice to hygiene practice. In the same line with the study<sup>26</sup> mentioned that, people that know about infection transmission are more spurred to follow cleanliness schedules and to keep up aseptic conditions than individuals that haven't.

While, there was slightly declined of total personal hygiene satisfactory practice level in follow up phase. This result may be due to lack of supervision affects compliance to personal hygiene negatively. In the same context<sup>27</sup> mentioned that, when there are gifted and committed nurses in cleanliness practice this influences the consistence to cleanliness schedules among the other staff at the ward in a positive manner.

Moreover, nurse interns' total practice regarding instruments/equipment processing (Cleaning) increased at post program stage. Also, there were a highly significant difference in whole items of instruments/equipment processing (Cleaning) and total practice regarding cleaning in pre and post program phases. This is emphasized the necessity of updated in-service education and training about infection control measures and principles to improve the level of nurse interns' knowledge and practices. A similar trend was observed who indicated that, large percentage of nurses had good level of practice regarding appropriate decontamination of equipment.

While, nurse interns' total practice regarding instruments/equipment processing (Cleaning) was slightly declined at follow up phase. This finding may be due to lack of equipment and resources, lack of time, and work load were the factors impeded the nurse interns from proper instruments/equipment processing (Cleaning). This study finding is congruent with<sup>28</sup> indicated that, lack of equipment and resources and lack of time were the factors impeded the nurses from proper infection control practice.

As observed, nurse interns' practice regarding use sharp container was statistically significant improved at post program phase. This finding could be due to trainings was be useful on nurses interns' practice and update their knowledge regarding use sharp container. Similarly,<sup>29</sup> was reported in his study that, behaviors of the nurses working in the clinics changed positively as far as taking measures against sharp and needle stick wounds after the training, which is an expected.

While, nurse interns' total practice regarding use sharp container was slightly declined at follow up phase. This finding may be due to understaffing, nurse interns' attention deficit, and desire to finish all the work quickly. <sup>29</sup>concluded that, understaffing, working conditions, absence of preparing and experience, consideration shortage, and want to complete all the work rapidly are accounted for as the elements to not used sharp container probably, and increasing the incidence of sharp and needle stick injuries.

As observed, nurse interns' practice regarding body mechanics (when lifting) was significant improved at post program phase. This might be identified with the participation of the interventional preparing program and the accentuation on psychomotor abilities application

both during and after the program practice was effective and helpful, confirmed to the previous result<sup>30</sup>.

While, nurse interns' total practice regarding body mechanics (when lifting) was slightly declined at follow up phase. This finding may be due to nonattendance of nonstop supervision and direction, increment in number of patients, lack of the nurses and increment work tasks, which adversely sway their performance practice regarding body mechanics and their quality of work life. In contrary,<sup>31</sup> concluded that, nurses' body mechanics and ergonomics practices had highly significant satisfactory level at both following and following 3 months from program execution.

As observed, nurse interns' practice regarding safe waste disposal was statistically significant improvement at post program phase. This finding may be due to active participation in training programs positively affected nurse interns' practice regarding safe waste disposal. The same trend was observed by<sup>32,14</sup>.

While, nurse interns' total practice regarding safe waste disposal was slightly declined at follow up phase. This finding may be because of lack of clear rules and written policies, lack of personal protection tools regarding safe waste disposal. In agreements<sup>33</sup> found that absence of all mentioned previous factors, in addition inappropriate training programs are the most factors that affecting hospital waste management system.

In addition, the present study found that, minority of nurse interns had satisfactory practice level regarding occupational health hazards at preprogram phase. This finding may be due to absence of effective execution framework, absence of data and precise records of occupational diseases and accidents, and absence basic professional training in occupational health and safety. The present study result is congruence with a study conducted at Nigeria by<sup>34</sup> they revealed that, almost half of nurses had bad practices regarding safety practices about occupational health hazards.

The present study result showed that, nurse interns' total practice regarding occupational health hazards throughout program phases was markedly increased. Also, there were highly statistical improvement in overall nurse interns' practice during post program phases and slightly decline in follow up phase as compared with preprogram phase. This finding may be because of nurse interns' participating in the education program made a significant difference on the level of knowledge and

changing the practice regarding occupational health hazards.

This is congruent with the finding by<sup>22</sup> who found a significant difference pre/post implementing nursing guidelines about hazards prevention and nurse's practice about safety. Also,<sup>35</sup> reported that, significant improvement in nurses self-reported compliance with the standard precautions, as well as the observed compliance scores with standard precautions after the educational intervention.

The present study result revealed that, score of nurse interns' attitude towards protection from hazards was generally low at preprogram, while nurse interns satisfactory attitude at post program improved markedly and there was slightly declined at follow up phase, but it reminded higher than preprogram. Also, highly significant difference in total attitude towards protection from hazards throughout the program phases was observed.

This could be due to the training program advance nurse interns' knowledge and practice skills and as a result enhance nurse interns satisfactory attitude level, also may be due to dread of occupational infections and ailments which could be terminal and life dangerous in certain instances. In agreements<sup>4</sup> showed that, majority of nurses had positive attitude regarding safety precaution and prevention of occupational hazards. Similarly,<sup>6</sup> mentioned that, nurses had positive attitude regarding occupational health hazards.

Moreover, current study finding reported that there was a positive highly significance correlations among total knowledge score and total practice score related to occupational health hazards among nurse interns throughout program phases. This study finding may be due to implementation of educational and awareness program to ensure occupational safety for nurse interns established safe practices to create a safe environment, identified, and minimize potential hazards. The same trend was observed by<sup>36</sup>. Additionally the consequences of the current study demonstrated that there is positive significant correlation among change of knowledge and change of training, as knowledge improved, practice improved.

In the current investigation, there was positive impact of knowledge regarding occupational health hazards in improving nurse interns total practice score. This finding supported the hypotheses of the study,

which was there is a change in nurse interns' knowledge and practice regarding occupational health hazards after implementing the program. These results are considered satisfactory and demonstrated the achievement of the expected results in the study. In addition proving that, practical interventions were viable, without high costs and applicable to the reality of institutions can be effective.

This finding is supported by<sup>37</sup> found a strong positive correlation between the implementation of educational intervention and improvement of knowledge and change in preventive practices about the occupational risks by nursing professionals in the experimental group. Also,<sup>22</sup> the study demonstrated the effect of educational intervention in improving nurses' knowledge and practice, as it was reported that, significant difference among knowledge and practice pre/post implementing nursing guidelines about hazards prevention was observed.

Also there was highly statistically significance correlations between total attitude score and total knowledge score regarding occupational health hazards among nurse interns through post and follow up program phases. This finding may be due to implement of training programs regarding occupational hazards, promote high knowledge, and this translated to positive attitude and subsequently good behavior. In this regard,<sup>23</sup> compared the distribution of respondents by performance on composite knowledge, attitude and practice, participant had positive attitude.

### Conclusion

According to the study findings, it can be concluded that, there were highly significant differences of total occupational health hazards knowledge among nurse interns throughout program phases. Nurse interns' total practice regarding occupational health hazards throughout program phases was markedly increased. There was a highly significant difference in total attitude towards protection from hazards throughout the program phases. The training program Implementation led to significant improvements in nurse interns' knowledge, practice, and attitude regarding occupational health hazards.

**Recommendations:** According to the main study findings, we can recommend.

**Education:** Providing training program for nurse

interns regarding occupational hazards and especially on protective measures, Dissemination and development of policies and rules of safety practices among nurse interns, and psychological counseling and therapy should be easily accessible and available for troubled nurse interns.

**Practice:** Encourage and supervise the use of personal protective equipment by the nurse interns, perform regularly routine check-up of nurse interns to ensure occupational health, provide regular vaccination for all nurse interns to minimize liability for acquiring work related infection (to prevent biological hazards), supervise nurse interns' safety practices and it's need to be ameliorated through training as well as close supervision of their application, and observe and supervise nurse interns' practices to ensure their compliance with safety regulations.

**Research:** Further studies are also recommended to investigate the relationship among nurses' safety practices and occupational hazards training program analyze the after effect of work related injuries and illnesses on the nurse, evaluate the effect of work related injuries on the organization.

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