Assessment of the Occupational Hazards and Safety Measures among Staff Nurses

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Abstract

Background Nursing is one of the hazardous occupations, in which the risks are four times higher than those in other professions. Several protective safety measures must be taken to reduce exposure to occupational hazard. **The aim of this study:** assessing the occupational hazards and safety measures among staff nurses. **Subject and methods:** The study was conducted at Egypt Air hospital for Research and Treatment. it is affiliated to Ministry of Civil Aviation, using descriptive cross-sectional research on 185 staff nurses. Data were collected by using two tools namely, self -administered knowledge questionnaire and observation checklist for staff nurses' practice regarding safety measures. **Results:** findings revealed that slightly more than two third of them had satisfactory total knowledge regarding occupational hazards and total knowledge categories, and slightly more than half 51% of studied staff nurses had adequate total practice. **Conclusion:** it is concluded that there was statistically significant weak positive correlation between knowledge and practice; while there was no statistically significant correlation between staff nurses' ages and their knowledge and practice. **Recommendations:** Training of staff nurses regards to occupational hazards and safety measures either in the form of workshops or seminars is recommended, enhancing knowledge and skills of safety measures through the orientation for newly staff nurses, and Further research is needed to investigate the effect of training intervention on knowledge and practices of safety measures of staff nurses.

Keywords: Occupational hazards, safety measures, staff nurses.

Introduction:

Nursing is one of the hazardous occupations, in which the risks are four times higher than those in other professions. The dangers that threaten nurses include biological risks emerged from the exposure to infectious agents, risks of chemical contacts physical dangers, attacks and beatings, and negative effects of psychosocial and organizational factors, Over worldwide million of the workers exposed to the work place accidents and hazardous substances. (**Whalen, etal., 2020**).

Health workers are the bedrock for sustainable social and economic development of any giving society at both local and global level and they play vital role to functioning of a given health system. The majority of the health workers provide health care services to the consumers. While, the other staff carryout administrative duties and the paramedical or allied staff are the supporting staff, but the unfortunate fact is that, these workers while, carrying out there job are exposed to wide range of harmful and hazardous substances which could cause illness and injuries. In most cases focus are on the care consumers rather than the care giver ***Chuah et al., 2020).***

The level of hospital safety climate and safe working environment largely depend on legislation and compliance level of occupational safety policy and inspection of workplace environment to ensure practice of health and safety standard. The common health hazards found in health facilities are physical, biological, chemical, thermal, toxic and stress related problems. Prolonged

standing or sitting may cause a lot of strain; injury may result from working accident, or falls. Health care workers health and safety is vital ingredient to healthy and productive society (**Mehraj et al., 2018).**

Factors and barriers that affect safety protective measures and that interfere with the safe practice of care include: absence of role model, and the high work load or lack and inaccessibility of sinks. Additionally, hazards and risks might results from poor supervision, lack of time and knowledge, forgetfulness, lack of means, negative influence of the equipment on nursing skills, uncomfortable equipment, and lack of training, insufficient experience on the job, conflict between the need to provide care and self-protection and distance to vital/essential supply, equipment or facility (**Shariat et al., 2018**).

Use a hazard control plan to guide the selection and implementation of controls and implement controls according to the plan. Develop plans with measures to protect workers during emergencies and non-routine activities ***(Böckerman, & Ilmakunnas, 2018).***

Significance of study:

The researchers observed that staff nurses suffering from exposure to occupational hazards at work setting and complain from its effects. Also observe that performance affected by this hazard and decrease productivity and quality of work. Therefore, this study aimed at assessing the occupational hazards and safety measures among staff nurses.

The aim of the study:

This study aimed at assessing the nurse's practice regarding safety measures among staff nurses.

Research Question:

What are the nurse's practice regarding safety measures among staff nurses?

Subjects and methods

Research design:

This descriptive cross sectional research was conducted to this study.

Setting:

The study was conducted at Egypt Air hospital for Research and Treatment. This hospital is affiliated to Ministry of Civil Aviation and it serves inpatient and outpatient services to all categories of the community, the bed capacity (350) and it divided into five separate buildings, Cairo, Egypt.

Subjects

Study subjects include nurses working in different hospital units/ departments as Intensive care units (ICU), coronary care unit (CCU), operating theaters, pediatric intensive care units, and premature unit, advanced surgery, gyna and obstetric department, orthopedic and medical department, catheterization unit, Chemo therapy and kidney dialysis unit.

Sample size:

The required sample size turned to be 185 staff nurses from total number 500 (117 females and 68 males). The sample size was calculated by adjusting the power of the test to 80% and the confidence interval to 95% with margin of error accepted adjusted to 5% **(Rayan, 2013).**

The sample size calculated according to the following equation:

$$n = \frac{N}{1+n(e)2}$$

n=sample size
N=population size
e=co-efficient factor

Sample Technique:

The sample size was selected by simple random sampling technique,

Tools of data collection

Data were collected using two tools namely, self -administered knowledge questionnaire and observation checklist for staff nurses' practice regarding safety measures.

First tool: Self -administered questionnaire

This tool adapted from Hassan (2004) and was modified by researchers; it was divided into four parts,

Part I: demographic data

It was consisted of information on the demographic characteristics of the studied nurses' as: name, age, gender, educational level, and attendance of training course.

Part II: frequency of exposure to occupational hazards

This part used for assessing frequency of exposure regarding occupational hazards among studied staff nurses, it was included four multiple choices questions.

Part III: universal precaution and measures

It was used for assessing nurse's knowledge Universal precautions and measures used by nurses. It was included (four) multiple choices questions measures which categorized in the following categories: During hand washing (1) question, Gloves should be (1) question, Contact with any contaminated materials (1) question, Blood spill on the floor (1) question

Scoring system

For each question, a correct response scored 1 and incorrect scored zero. The scores of the items summed- up for the total scale, and divided by number of the items given a mean score. These scores converted into percent scores and mean and standard deviations computed. Staff nurses' knowledge considered satisfactory if the percent score was 60% or higher and unsatisfactory if less than 60%.

Second tool: observation checklist for staff nurses practice regarding safety measures

This tool adapted from ***Hassan, (2004)*** and was modified by researchers. It was aimed to assess the actual practice of staff nurses related to different safety measures and precautions. It was consisted of(7) areas of observation and (53) items as following

Table (1): Categories of observation checklist for Staff Nurses practice regarding Safety Measures.

Categories	No, of items	Example
1-Hand washing	8	-Brush along the sides of finger and hands
2-gloving	7	-Remove all jewelries
3-Eyes cover	4	-Prepare clean cover
4-masking	8	-Inspect the Respirator
5-gowning	5	-Remove of all personal items (watch, rigs, all jewelers and artificial nails.)
6-Instrument,equipment processing: a-Cleaning	4	-Immerse instrument in cidex2% for 20-30 min
b-Autoclave	4	-Remove instrument from autoclave by using sterile forceps
c-Use sharp container	6	-Not left overfilled more than 2/3
7-Body mechanics	7	-Turn body in one plane

❖ **Scoring system:**

Items checked done and not done were scored 1 and zero respectively. The scores of the items summed- up for the total scale, and divided by number of the items given a mean score. These scores converted into percent scores and mean and standard deviations computed. Staff nurses' practice level considered high if the percent score was 60% or higher and low if less than 60%

1-Preparatory phase:

During this phase, the researcher reviewed the national, international, current and past related literature. This was done using textbooks and internet search for articles in scientific journals, and theses concerning the topic of the study. Based on this review, the researchers modified the data collection tools, and started writing the introduction. This phase started from the August and lasted inSeptemper2021.

Validity of Tools

These tools tested and evaluated for their face and content validity by jury group. The five experts from faculty members in the nursing field with different specialties, (1) expert from Nursing Administration department Ain Shames University, (1) expert from Nursing Administration Cairo University, (2) from psychiatry department Ain Shames University, (1) from community department Ain Shames University, Experts elicited responses were either agree or disagree for the face and content validity. The required corrections and modifications were done. The items on which 95% or more of the experts have agreed were included in the proposed tools.

Reliability of Tools.

The reliability of the tools that was assessed through measuring their internal consistency, determine and to composite score how strongly the attributes were related to each other by determining Cronbach alpha coefficient, proved to be high as indicated in the following table:

Tools	Cronbach Alpha Coefficient		
	Scale reliability	Face validity	Statistical validity
Knowledge questionnaire	0.86	0.93	0.92
Observation checklist	0.88	0.95	0.93

2-Pilot study:

Upon developing the data collection tools, a pilot study was conducted from October 2021 to November 2021 to examine the applicability of the tools, and the clarity of language and their suitability for application. It helped in identifying any potential obstacles or problems that might be encountered during the period of data collection. It also served to estimate the time needed to complete the questionnaires by each participant. It was applied on 10% of the study sample (15 nurses) are selected randomly. Questionnaire sheet was distributed to nurses, the time consumed for filling the questionnaire was ranged from 30 to 40 minutes.Then actual practice observed by researcher through using observation checklist to observe their actual practice related to safety measures, the time consumed to complete this tool ranged from 25 to 30 minutes**.** Data obtained from Pilot study was analyzed and no modifications were made in the questions. So, study sample in the pilot study was included in the main study sample.

Procedure/field work:

The Field work of the study lasted for three months from beginning of November 2021 to end of January 2022. The researchers collected the data regarding the knowledge and practice by self through meeting the nurses in their work then introduced themselves to the nurses, explained the aim of the study, and how to fill-in the knowledge questionnaire, and

sought their cooperation and methods of filling out the questionnaire and obtaining verbal consent from them to participate in the study each nurse took from 30 to 40 minutes to fill the questionnaire,. The researchers were present during the form filling to respond to any queries. The filled forms were handed back to researchers to check for completeness. Regarding the actual practice were observed by researchers through using observation checklist to observe their actual practice related to safety measures, the time consumed to complete this tool ranged from 25 to 30 minutes**.** The data were collected 4 days per week, from 9 am to 2pm.

Ethical considerations

The study protocol was approved by the Scientific Research Ethics Committee of the Faculty of Nursing, Ain Shams University. The researcher clarified the aim of the study and its procedures to all nurses, along with their rights to accept or refuse. Oral informed consents were obtained from each participant. They were reassured about the anonymity and confidentiality of any obtained information.

Statistical Design

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for quantitative variables and means and standard deviations and medians for quantitative variables. Cronbach alpha coefficient calculated to assess the reliability of the tools through its internal consistency. Quantitative continuous data compared using the non-parametric t-test. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. Statistical significance was considered at p-value<0.05.

Results:

Figure (1): shows that staff Nurses' total knowledge categories. The slightly less than two third of them had satisfactory knowledge regarding occupational hazards and total knowledge categories. While, more than one third of them had unsatisfactory knowledge regarding universal precautions and measures and total knowledge categories.

Table (1): shows that staff nurses' frequency to exposure to different hazards. The highest percentages of them 87.5% having frequency to exposure to physical hazards. While, The lowest percentages of them 57.8% having frequency to exposure to psychological hazards.

Table (2): shows that staff Nurses' practice areas of safety. The percentages having adequate practice of safety measures ranged between43.3% for gloving to 58.9% for hand washing and masking. It shows that the total practice of safety measures slightly more than half 52.4%.

Table (3): shows that staff Nurses' practice areas of instrument and equipment processing.The percentages having adequate practice of instrument and equipment processing ranged between60% for cleaning to 62.2% for autoclave and use sharp container. It shows that the total practice of instrument and equipment processing slightly more than half 57.8% adequate practice of instrument and equipment processing.

Figure (2): shows that staff Nurses' total practice areas. It shows that around half 51% of studied staff nurses had adequate total practice.

Table (4): shows that there was a statistically significant relation between staff nurses' total knowledge and practice p<0.05.

Table (5): shows that there was a statistically significant relation between staff nurses' practice and total knowledge p<0.05, also there was a statistically significant relation between staff nurses' practice with knowledge regarding universal precautions and measures p<0.05.

Table (6): shows that there was highly statistically significant moderate positive correlation between all knowledge areas scores p<0.01.

Table (7): shows that there was highly statistically significant moderate positive correlation between all Practice areas scores p<0.01.

Table (8): shows that there was statistically significant weak positive correlation between knowledge and practice.

Table (9): shows that there was a statistically significant weak positive correlation between nursing educational level and their practice p<0.05, while there was no statistically significant correlation between nursing educational level and their knowledge. There was no statistically significant correlation between staff nurses' ages and their knowledge and practice.

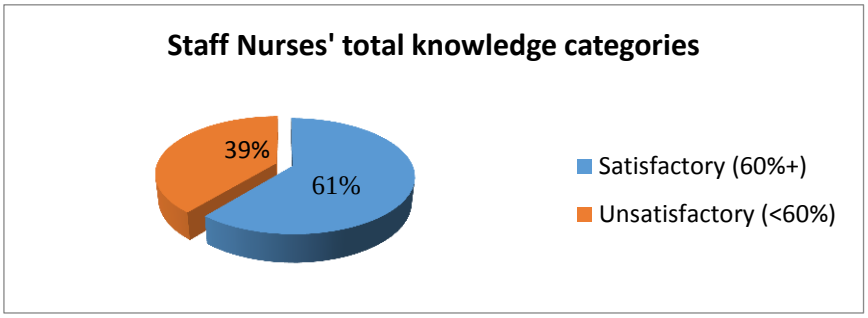

Figure (1): Staff Nurses' total knowledge categories sample (n=185).

Table (1): Staff nurses' frequency to exposure to different hazards sample (n=185).

Frequency to Exposure to different hazards	No.	%
physical hazards	162	87.5
chemical hazards	144	77.8
biological hazards	146	78.9
psychological hazards	107	57.8
social hazards	145	78

Table (2): Staff Nurses' total practice of safety measures sample (n=185).

practice of safety measures	No.	%
Hand washing	109	58.9
Gloving	80	43.3
Eyes cover	105	56.7
Masking	109	58.9
Gowning	103	55.6
Total:	9688	52.447.6
Adequate (60%+)		
Inadequate (<60%)		

Table (3): Staff Nurses' total practice of instrument and equipment processing sample (n=185).

Practice of instrument and equipment processing	No.	%
Cleaning	54	60.0
Autoclave	56	62.2
Use sharp container	56	62.2
Total:		
Adequate (60%+)	52	57.8
Inadequate (<60%)	38	42.2

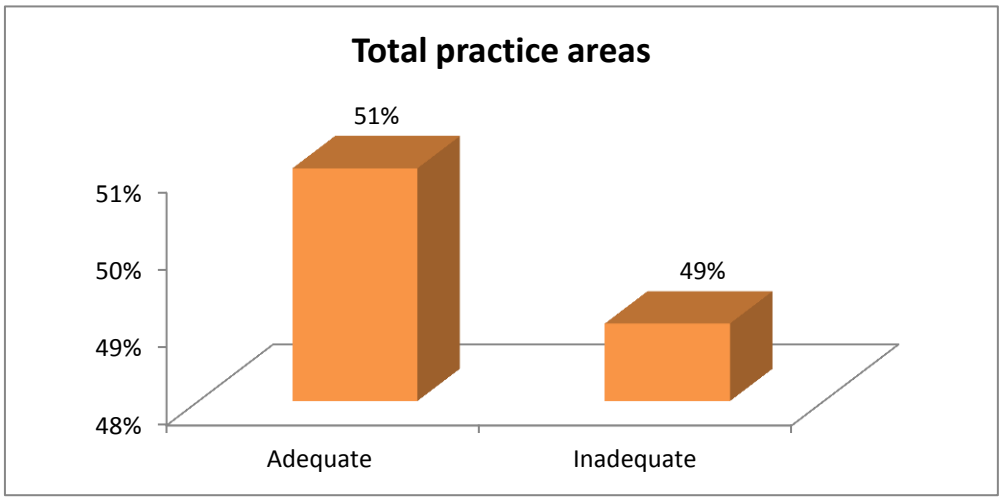

Figure (2): Staff Nurses' total practice areas sample.

Table (4): The relations between staff nurses' total knowledge categories and total practice areas items sample (n=185).

Total Practice areas	**Total knowledge categories**				**X^2 Test**	**P-value**
	Satisfactory (60%+)		**Unsatisfactory (<60%)**			
	No.	**%**	**No.**	**%**		
practice regarding safety measures:						
Adequate **(60%+)**	18	36	76	64		
Inadequate**(<60%)**	22	24.3	69	75.7	1.25	0.25
practice regarding instrument and equipment processing:						
Adequate **(60%+)**	31	33.3	63	66.7		
Inadequate **(<60%)**	27	28.7	64	71.3	0.16	0.692
body mechanics:						
Adequate **(60%+)**	37	39.5	57	60.5		
Inadequate**(<60%)**	19	21	72	79	3.61	0.065
Total practice:						
Adequate **(60%+)**	38	40.4	56	59.6		
Inadequate**(<60%)**	19	20.2	75	79.8	3.98	0.046*

(*) Statistically significant at p <0.05

Table (5): The relations between staff nurses' total practice areas and total knowledge categories sample (n=185) .

Total Knowledge categories	Total practice areas Adequate (60%+)		Inadequate (<60%)		X^2 Test	P-value
	No.	%	No.	%		
occupational hazards:						
Satisfactory **(60%+)**	30	52.6	27	47.4		
Unsatisfactory **(<60%)**	67	52.3	61	47.7	0.00	0.991
universal precautions and measures:						
Satisfactory **(60%+)**	42	73.5	15	26.5		
Unsatisfactory**(<60%)**	50	43.8	78	56.3	6.37	0.016*
Total:						
Satisfactory **(60%+)**	39	68.4	18	32.1		
Unsatisfactory**(<60%)**	58	45.3	70	54.7	3.98	0.0461*

(*) Statistically significant at p <0.05

Table (6): Correlation matrix of knowledge categories scores.

Knowledge categories	Spearman's rank correlation coefficient occupational hazards
universal precautions and measures	.674**

(**) Highly statistically significant p<0.01

Table (7): Correlation matrix of practice areas scores.

Practice areas	Spearman's rank correlation coefficient practice to safety measures	practice to instrument and equipment processing body mechanics
practice to safety measures		
practice to instrument and equipment processing	.678**	
body mechanics	.675**	.660**

(**) Highly statistically significant p<0.01

Table (8): Correlation matrix of total knowledge and total practice scores**.**

Scores	Spearman's rank correlation coefficient Total Knowledge	Total practice
Total Knowledge		
Total practice	.107	

(**) Highly statistically significant p<0.01

Table (9): Correlation between staff nurses' scores of total knowledge, total practice and their age and Nursing educational level**.**

	Spearman's rank correlation coefficient Knowledge	practice
Age	-.053	-.060
Nursing educational level	.065	.137*

(*) Statistically significant at p <0.05

Discussion:

The Present study finding that staff Nurses' total knowledge, the slightly less than two third of them had satisfactory knowledge regarding occupational hazards and total knowledge categories. While more than one third of them had unsatisfactory knowledge regarding universal precautions and measures and total knowledge categories. This due to lack of knowledge about occupational hazards due to loss of attend of training and work overload. Similarly, to, **Aly, (2015),** who conducted a study work related hazards among nurses in general hospital ", and revealed in his study, that there was a low perception of work related hazards and generally unsatisfactory related knowledge among nurses.

This study results was disagreement with **Karki et al. (2018)** Which their results mean Majority of the nurses were aware about the physical hazards and over sixty percent have knowledge regarding occupational health hazards and 95%of the nurses are aware about physical hazards can be trace from the study awareness of occupational hazards among nurses by **Kumar (2015).** Additionally, this Study results disagree with **Karki et al. (2018)** which his study entitled / Knowledge and Preventive Practice of Occupational Health Hazards among Nurses in different teaching hospitals which revealed that, slightly half of the nurses have knowledge regarding the guidelines on prevention of occupational hazards out of which twenty percent of the nurses knows about universal precaution guidelines.

Regarding staff nurses' frequency to exposure to deferent hazards. The present study results concerning to the highest percentages of them 87.5% having frequency to exposure to physical hazards. While the lowest percentages of them 57.8% having frequency to exposure to psychological hazards this, it was noticed by researcher this results may due to, the most frequent manifestation was sleep disturbances, due to rotation shifts which lead to disrupted sleep habit among nurses Loss of self-confidence and job stress. Similarly, this finding agree with ***Verhaeghe, Vlerick, DeBacker, et al. (2018),*** who emphasizes that job stress, is a harmful response physically and emotionally when the employee's skills, resources, and needs could not fulfill the requirement of the job.

The present study results concerning with staff Nurses' practice areas of safety. The percentages having adequate practice of safety measures ranged between 43.3% for gloving to 58.9% for hand washing and masking. It shows that the total practice of safety measures slightly more than half 52.4%. this due to lack of training regarding safety measures, and haven't information about steps of hand wash and wearing face mask, and lack of information about universal precaution and decrease facilities as gloves (surgical gloves) and also, lack of training about aseptic techniques and waste management.

This study results agree with **Chital Naresh et al. (2018**), who found in his study of Staff Perceptions, Awareness and Compliance to Safety: A Survey of Occupational Hazards in a Cancer Centre which conducted at Advanced Centre for Treatment, Research and Education in Cancer (ACTREC), Tata Memorial Centre, Mumbai, India showed that., In spite of the awareness among our staff about avoiding sharp injuries (not recapping needles, proper handling and disposal of sharps) being high, it was found that about 12% had sustained a sharp injury through their work years. Splashes of blood/body fluids to eye or mucous membranes carry a small risk of transmission of HIV and other viruses, after repeated training programmed by competent and expert staffs of the institute. The staffs are trained to decrease the percentage of their exposure to Injuries related to sharps in healthcare facility.

The present study results concerning to relations between staff nurses' total knowledge categories and total practice areas related to safety measures which

revealed that, there was a statistically significant relation between staff nurses total knowledge and practice. The study results agree with who **Elewa and El-Banan (2016)** demonstrated that there was Correlation coefficient between nurses knowledge and practice toward safety measures for prevention of occupational hazards throughout study phases, the study results revealed that there were statistically significant positive correlation between nurse's knowledge and practice, which revealed that when nurses ' knowledge is increased their practices toward safety measures for prevention of occupational hazards is enhanced and improved. This may be attributed to the good practice is mainly based on adequate and satisfactory knowledge.

The present study results concerning to the relations between staff nurses' knowledge regarding universal precautions and measures and their educational level which showed that, there was a statistically significant relation between staff nurses' knowledge regarding universal precautions and measures and their nursing educational level, nurses who have high educational level sometimes have experience and knowledge about safety measures.

This study results was agree with **Aluko et al., (2016)** where it concluded that the level of education influences the health and safety issues. who revealed that, nurses who were graduated and above had significantly higher ORs of adequate knowledge than who were undergraduate in agreement with the findings of This meant that those with high knowledge will translate the positive attitude and subsequently good behavior

Conclusion:

In the light of the study findings, it was concluded that slightly more than two third of them had satisfactory knowledge regarding total knowledge categories, and that slightly more than half 51% of studied staff nurses had adequate total practice. There was a statistically significant relation between staff nurses' total knowledge and practice $p<0.05$there was statistically significant weak positive correlation between knowledge and practice. While there was no statistically significant correlation between staff nurses' ages and their knowledge and practice.

Recommendations:

Based on the study findings, the following recommendations are proposed:

- Conduct training of staff nurses regards to occupational hazards and safety measures either in the form of workshops or seminars.
- Enhancing knowledge and skills of safety measures through the orientation for newly staff nurses as well as, continuous in-services training.
- Hospital management must establish safe environment through adequate infrastructure, equipment, and facilities.
- Further research is needed to investigate the effect of training intervention on knowledge and practices of safety measures of staff nurses.

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