Effect of an Educational Program on Knowledge and Practice of Paramedical Personnel Regarding Safety Measures

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Abstract

Background: Paramedical staff (like nurse aides and housekeepers) play a vital role in the functioning of the healthcare settings and are also exposed to several occupational hazards as biological, chemical, physical, and psychological hazards. **Aim:** This study aimed to evaluate the effect of an educational program on paramedical personnel regarding safety measures. **Research design:** A quasi-experimental research design was used in this study. **Sample**: A purposive sample of 73 paramedical Personnel Setting: It was conducted at Baheya Hospital (Haram branch) in Giza Governorate. **Tools:** Two tools were used**: Tool I: (Knowledge assessment for paramedical personnel of safety measures interviewing questionnaire):** included two parts: **1st part:** Demographic characteristics and medical history, **2nd part:** Knowledge assessment for paramedical of safety measures**, Tool II: Direct Observational paramedical safety measures checklist. Results**: The study's findings revealed that there was a highly significance improvement in knowledge scores of paramedical personnel increasing mean of 29.7 ± 5.3 to 43.2 ± 5.1 (t=38.2, p value<0.001) and the practice scores improved from 38.9 ± 7.2 to 78.1 ± 6.9 (t=21.530, p value 0.000).**Conclusion:** Paramedical knowledge and practices about safety measures improved post applying an educational program. **Recommendations**: Continue an educational program for paramedical regarding safety measures in all healthcare settings.

Key words: Educational program, Occupational Hazards, Paramedical, Safety Measure

Introduction

Paramedical workers, a vital part of healthcare workers, form the backbone of the healthcare system, dedicating their time and expertise to enhancing the high-quality care in environments that often expose them to several health hazards. In addition to work-related hazards, workplace activities, materials, substances, processes, or conditions can probably increase the risk of illness and injury. It can arise from one's employment. **(World Health Organization (WHO), 2021).**

Occupational health hazards are the potential dangers to a paramedical's wellbeing and safety associated with their work environment, as physical hazards, which include noise, temperature, electricity, and radiation, chemical hazards, as detergent and cleaning products; ergonomic hazards as heavy lifting and carrying, awkward postures, stretching, vibrations and excessive repetitive motions **(Abd El-Wahed et al., 2020).**

A work-related hazard is defined as a risk to a person's health that is caused by their job. It refers to the process or condition in which workers are exposed to accidents or sickness at work. Unsafe working conditions and dangerous work activities cause health risks. There is an unsafe working environment. Workplace dangers and injuries can be avoided by using adequate personal protective equipment and applying safety measures (**Kalejaiye, 2021)**

The occupational hazards were classified as biological, physical, Chemical and psychological. The biological hazards include sharp-related injuries, direct contact with infected specimens/bio hazardous materials, and nosocomial infection. The non-biological hazards include physical/ergonomic, chemical, and psychosocial hazards. The physical/ ergonomic hazards include radiation, noise, light, temperature, ventilation, and pressure extremes. Finally, the ergonomic hazards are related to the design of tools, inappropriate lifting, poor posture, and the work environment. Chemical hazards are frequent and include vapors, gases, solids, dust, and disinfectants **(Çoban & Ortabag, 2023).**

Health care organizations, like other high-danger work environments, are described by exposure to an elevated level of occupational hazards that significantly endanger the health status and life of healthcare workers, and occupational hazards may be the

leading cause of death and mortality. The WHO confirms that hospitals are the primary priority in preventing workplace hazards **(Eyi, 2020).**

Nursing aides and housekeepers serve as the backbone of daily patient care by providing essential, hands-on support under the supervision of registered nurses and doctors. Their responsibilities include helping patients with mobility, maintaining personal hygiene, assisting with meals, and ensuring a clean and safe environment. Paramedical personnel often build strong relationships with patients, offering emotional support and companionship, which can greatly enhance patients' mental and emotional well-being. Additionally, paramedical play a key role in infection control by following safety protocols as hand hygiene and proper handling of medical waste. Through their commitment and hard work, these paramedical staff members contribute significantly to the overall quality and continuity of patient care **(Hamid et al., 2022).**

Occupational Health and Safety (OHS) education program is an important part of any health care setting for safety strategy; the basic goal of any occupational safety education program is to decrease workplace injuries and illnesses by teaching workers methods for work safely and to identify and manage any probable hazards. To achieve this goal, the program should tailor to meet the needs of the workplace and its employees. This can be achieved through training sessions, online resources, and other educational materials. OHS education programs play a vital role in enhancing the safety and health of workers in different work settings. **(Alqahtani et al., 2024)**

Occupational Health Nurses (OHNs) are specialists who practice in industrial and community settings to help improve the health and safety of workers and other community groups. Some of the most common roles and responsibilities of OHNs include observation of workers doing their job tasks, development of health and safety programs, and management of work-related diseases, disaster and emergency planning, environmental health planning, assistance with rehabilitation, coordination of employee treatments and referrals .in addition to play an important role in health promotion, protection, disease prevention, and control **(Madkour et al., 2023).**

Significance of the study:

According to the World Health Organization and the International Labor Organization's projects on the global burden of occupational injuries and diseases, more than 2.9 billion employees worldwide are exposed to mechanical, chemical, physical, and mental hazards. Every year, 140.000 to 355.000 people die as a result of workplace injuries. In Egypt in 2020, the total number of workplace injuries was 19.7% **(Madkour et al., 2023).**

In Egypt and worldwide, most HCWs give maximum attention to infection and biological hazards without giving much care to physical hazards. Deficient infrastructure for old university hospitals subjects HCWs to many health hazards in their workplaces. Workplace hazards are, therefore, a threat to a large proportion of the world population. It was estimated that around 1.2 million work-related deaths, 250 million accidents, and 160 million work-related diseases occur worldwide each year **(WHO, 2020).**

Paramedical staff provides essential support in patient care by assisting with daily tasks and environmental hygiene around the patients. These workers ensure patient comfort, hygiene, and safety. Paramedical staff help reduce the burden on nurses and doctors, enhance the efficiency of care, and contribute to a more compassionate and responsive healthcare environment **(Ahram, 2021).** Therefore, it was important to evaluate the effect of an educational program on the knowledge and practice of paramedical personnel regarding safety measures

Aim of the study:

This study aimed to evaluate the effect of an educational program on the knowledge and practice of paramedical workers regarding safety measures through:

1. Assess paramedical knowledge and practices about safety measures.
2. Design an educational program regarding safety measures for paramedical workers.
3. Implement an educational program regarding safety measures for paramedical workers.
4. Evaluate the effect of an educational program regarding safety measures on the knowledge and practice of paramedical personnel.

Research Hypothesis:

Improvement of knowledge and practices among paramedical about safety measures is expected to occur after implementing the educational program.

Subject and Methods:

Research design :

A quasi-experimental pretest-posttest design was used for this study due to the nature of the available sample. The quasi-experimental design was used because there is no control group and no randomization (**Ewusie et al., 2020)**.

Research setting:

The current study was applied at Baheya Hospital (Haram branch) in Giza Governorate, a donation and non-governmental organization (NGO) affiliated with the Ministry of Health, which depends on donations for financial support.

Study Sample:

A purposive sample of 73 paramedical. The inclusion criteria were paramedical personnel who agreed to participate and could communicate effectively, ensuring active engagement with the researcher.

Data collection tools:

To achieve the aim of this study, after reviewing a national and international review of the literature and recent articles, two tools were developed by the researcher.

Tool (I): Paramedical structured interviewing questionnaire:

A- Demographic data and medical history of the studied paramedical consisted of 8 items, included age, job, place of residence, sex, educational level, and years of experience.

Part 2: Knowledge assessment for paramedical about work hazards and safety measures: It is divided to 5 sub-items:

A- Paramedical knowledge about general safety consisted of 5 closed-ended questions included the purpose of safety protocols, identify a potential health hazard, review the hospital's safety guidelines, common workplace health hazards.

B- Paramedical knowledge about infection control consisted of 15 closed-ended questions, included the purpose of hand hygiene, duration for washing hands, method of infection control**,** wearing gloves in a hospital environment**, and** disposal of PPE**.**

C- Paramedical knowledge about chemical safety consisted of 10 closed-ended questions, included precautions before using a new cleaning chemical**,** the purpose of a material safety data sheet, whether chemicals should be stored in the hospital, the correct action if a chemical spill occurs, and PPE should

be worn when handling hazardous chemicals**.**

D- Paramedical knowledge about waste management consisted of 14 closed-ended questions. These questions included the type of waste that should be disposed of in a biohazard bag, what is considered bio hazardous waste, the proper way to dispose of sharps waste, and the replacement of bags. Color-coded bags are typically used for bio hazardous waste.

E- Paramedical knowledge about personal protective equipment consisted of 10 closed-ended questions included necessary to wear PPE**,** the correct order for donning PPE**,** importance to wear gloves when handling chemicals**.**

Scoring system it included 54 questions; the answer score 1 point for a correct answer, and zero points to incorrect answer. The total score of paramedical 54 points of knowledge regarding safety measures divided into two levels as the following:

- Inadequate knowledge < 60 % (< 32 scores).
- Adequate knowledge ≥ 60 % (≥ 32 scores).

Tool (II: safety practice observational checklist of the studied paramedical regarding safety measures: It divided to 11 sub-items:

A- Paramedical general practices consisted of 9 items to be observed including closed ended questions included follow the hospital's cleaning schedule, check and restock the cleaning supplies before starting shift, use hospital-approved cleaning products at all times, report any maintenance issues (e.g., leaks, broken equipment) that come across during cleaning duties, clean patient rooms from clean to dirty areas as per protocol.

B- Paramedical infection control practices consisted of 19 items to be observed, including closed-ended questions, included change gloves between cleaning different areas or rooms, perform hand hygiene after removing gloves, disinfect high-touch surfaces in patient areas with the appropriate disinfectant, and strictly follow isolation protocols when cleaning isolation rooms.

C- Paramedical chemical safety practices consisted of 9 items to be observed, including closed-ended questions included read the label and material safety data sheet, handle chemical spills properly, store chemicals in their designated storage area after use, wear appropriate PPE

when handling cleaning chemicals, check the expiration dates on cleaning chemicals before use.

D- Paramedical environmental safety practices consisted of 10 items to be observed, including closed-ended questions included place wet floor signs after mopping, dispose of sharp objects in the specific safety box container, keep electrical cords away from water sources while cleaning, report frayed or damaged electrical cords immediately, and using proper body mechanics when lifting heavy objects.

E-Paramedical PPE Practices consisted of 10 items to be observed, including closed-ended questions, included wear gloves when handling waste, wear appropriate footwear to prevent slips and falls, change my gloves immediately if they become damaged, remove PPE properly to avoid contamination, wear PPE during all cleaning tasks that involve chemicals**.**

F-Paramedical personal hygiene practices consisted of 9 items to be observed, including closed-ended questions, included washing hands before and after handling waste, keeping nails short and clean, changing uniform/work clothes daily, avoiding wearing jewelry, and following proper hand hygiene before and after eating.

G- Paramedical waste management practices consisted of 14 items to be observed, including closed-ended questions, such as disposing of regular waste in the correct trash bins, handling bio hazardous waste according to hospital protocols, checking that sharp containers are not overfilled, and segregating different types of waste.

H-Paramedical hazardous materials handling practices consisted of 7 items to be observed, including closed-ended questions that included access the MSDS for any chemical use, use PPE when handling hazardous chemicals**,** dilute chemicals according to the manufacturer's instructions, and never mixing different chemicals.

I- Paramedical radiation practices consisted of 5 items to be observed including closed-ended questions, included awareness of areas in the hospital where radiation is used, and the application of the safety protocols for entering areas with radiation.

J-Paramedical ergonomics practices consisted of 5 items to be observed including closed-ended questions, included adjust the work environment to reduce strain and

injury, take rest to prevent fatigue and decrease the risk of injury.

K- Paramedical safe work practices consisted of 5 items to be observed, including closed-ended questions included avoid running in the hallways to prevent accidents, always use proper lifting techniques to avoid injury, and reporting slippery floors or spills immediately.

Scoring system, it included 102 questions; 1 point for done and 0 point to not done answers. The whole scores of paramedical 102 points practices about safety measures classified into two levels:

-Competent practices ≥ 60 % (≥ 61 points).

-Incompetent practices < 60 % (< 61 points).

Content validity and reliability

Validity of the tools: The study tools were constructed based on a scientifically relevant review of the existing English-related literature and using the available textbooks, articles, journals, and evidence-based scientific research. A panel of five professors in two fields of oncology and three in Community Health Nursing evaluated the content validity of the produced instruments.

Pilot study:

The pilot study was done on 10 % of the sample, equal to 7 paramedical to observe the clarity of questions and time needed to complete the study tools. Paramedical in pilot study were included in the main study sample because no modifications were done.

Reliability of tools:

Reliability was applied for testing the internal consistency of the tools by administration of the same tools to the same subject under similar conditions two times. Cronbach alpha was used to assess the internal consistency of the tools. It was found to be 0.91 for knowledge tool and equal to 0.87 for practices.

Ethical Consideration:

Official permission to conduct the proposed study was obtained from the Committee of Scientific Research Ethics of Helwan -Faculty of Nursing approval (Number 20230516,34) and also official permission from the Baheya Hospital Ethical Committee to conduct the study in it(IRB number:202401150003). The researcher explained the purpose and nature of the study, and emphasis was made that participation in this study is voluntary; each healthcare worker has the right to withdraw from the study at any time. Written informed consents were obtained from the

participants. Anonymity and confidentiality were assured through coding the data. Paramedical personnel were assured that this data would not be reused in another research without their permission, and the data collected was used for the current research only.

Operational phases:

Preparatory phase:

It included revising related literature and theoretical knowledge of several aspects of the study using books, articles, the internet, and magazines to develop tools for information collection.

Field work:

A written approval letter was obtained from the Dean of the Faculty of Nursing, Helwan University, for practicing the study in the Faculty of Nursing. Written letter should be sent to director of Baheya Hospital (Haram branch) in Giza Governorate, a donation and Non-Governmental Organization (NGO) affiliated with the Ministry of Health for conducting the study including the aim of the study to obtain the permission to visit the hospital and conduct the study, including the aim of the study, obtained from paramedical workers after the researcher introduces her for them and after explaining the purpose of the study.

The researchers collected data 3 days per week (Tuesday, Wednesday, and Thursday) delivered over a total of 9 months, the 9 sessions completed for every group that consisted of 8 paramedical personnel and post-practice evaluations also done; formal acceptance to be included in the study was obtained after explaining the purpose and the nature of the study.

The interviewing questionnaire took about 30 minutes, according to the paramedical personnel's tolerance, and every nurse-aid and housekeeper was allowed to ask any questions to clear up any misunderstandings and to fill out the questionnaire.

Educational program conducted in the following phases:

Preparatory phase: Tools of information collection based on review of the past & current related literature reviewing several aspects of nurse aid and housekeepers including education at Baheya Hospital (Haram branch) in Giza Governorate, a donation and non-governmental organization (NGO) affiliated with the Ministry of Health, done using available books, journals, articles, and magazines. The aim was to become

acquainted with the research problem to develop the study tools.

Assessment phase: Using a pre-testing survey to assess paramedics' knowledge and practices about safety measures. The researcher first met the paramedical personnel and explained the purpose of the study briefly. Paramedical personnel were assured that got information would be kept confidential and used only for the study.

Planning phase: Based on the results obtained from the assessment phase, the researchers planned the educational program contents according to the paramedics' needs. Noticed needs, requirements, and were illuminated and discussed in the form of a booklet. Fillings of the booklet were selected on the basis of identified needs. The booklet involved of knowledge about safety measures as the concept of hospital hazards, importance of occupational safety measures, the benefits of implementing safety practices in healthcare facilities, common hospital hazards and their potential risks, safety measures effectively across various departments in health care facilities, proper use of PPE in clinical and non-clinical settings, safety measures for handling all type of examination, chemical spillage and waste segregation, operating eye wash stations, and managing hazardous materials, the educational program in their daily practice, infection control practices to minimize biological hazards, physical and ergonomic risks in the workplace, and effectiveness and outcomes of the educational program. Teaching methods used as lectures, open discussion, brainstorming, demonstrations, and role play as a simulation were frequently applied during sessions. Media as PowerPoint, data-show, pictures, video, and a booklet prepared by researchers.

Implementation phases: After developing the health education program contents.

- Actual field work carried out in the period from February 2024 to September 2024, three days per week for three weeks for every group (Tuesday, Wednesday, and Thursday), divided into 9 groups, sessions 45 minutes, and made sessions according to the available time of the paramedical to provide their educational program.
- The educational program improved paramedics' knowledge and practices about safety measures and aimed to explain to all participants. Based on

the result of the pre-test questionnaire, the researchers.

- Post-test done later after sessions. The study sample,73 paramedical personnel divided into 9 groups, contained about 8 paramedical personnel.

-The educational program includes 9 sessions (five theoretical and four practical sessions).

- Five theoretical sessions by the end of these sessions, each paramedical known the knowledge about safety measures as concept of hospital hazards, types of work hazards importance and objectives of occupational safety measures, the benefits of implementing safety practices in healthcare facilities, common hospital hazards and their potential risks, and safety measures effectively across various departments in healthcare facilities.

- Four practical sessions by the end of this session every paramedical personnel applied practices proper use of PPEs in clinical and non-clinical settings, apply safety measures for handling all type of hazards ex: chemical and biological spillages, operating eye wash stations, and managing hazardous materials, infection control practices to minimize biological hazards, waste segregation practice, physical and ergonomic risks in the workplace and proper lifting and transferring.

- By the end of every session, the paramedical personnel were informed about the content of next sessions and its time.

-Feedback was given at the beginning of each session about the previous one and at the end of each session about the current session, and different methods of evaluation were selected to be suitable for the paramedical personnel's needs and the aim and contents of the educational program.

Evaluation phase: This phase aimed to evaluate the paramedical personnel's knowledge and practices, after applying an educational program for paramedical regarding safety measures.

III) Administrative item:

After explanation of the study aims and objectives, an official letter from the Dean of the Faculty of Nursing, Helwan University, was directed to the director of Baheya Hospital in Giza, Egypt, to obtain permission to conduct the study after explaining its purpose.

IV) Statistical item:

Recorded data were analyzed using the Statistical Package for Social Sciences, version (± 29). Quantitative

data were expressed as mean ± standard deviation (±SD). Qualitative data were expressed as frequency and percentage. The following tests were done:

-The Chi-square test was used to compare qualitative data .

-Pearson's correlation coefficient (r) test was used to assess the degree of association between two sets of variables.

-Cronbach's Alpha: Reliability statistics were used to assess using Cronbach's Alpha test: used to assess the reliability of the tools.

The confidence interval was set to 95% and the border of error accepted was set to 5%. So, the p-value was considered significant as follows:

Probability (P-value)

≤ 0.001 (highly significant).

≤ 0.05 (significant.)

> 0.05 (insignificant)

Results:

Table (1): Enumerated that the mean age of the studied paramedical was 27.4 ± 6.7 years & 57.5 % of them were married. Also, 93.2 %of them had a diploma in the education level. Additionally, 83.6 % of them were from urban areas, and 64.4 % of the studied nurses' jobs were nurse aides.

Figure (1): Shows that 59.3 % of paramedical had adequate knowledge pre apply an educational program, which improved and became 65.8 % of them had adequate knowledge post applying an educational program, where 29.7 ± 5.3 to 43.2 ± 5.1 (t=38.2, p value<0.001).

Figure (2): Shows that the total practices of 23.0% of the studied paramedical staff for radiation safety practice pre-educational program, which improved and became 65.1% of them post educational program, and 64.5% of them used personal protective equipment pre-educational program, which improved and became 91.0 % of them post educational program.

Figure (3): Illustrates that 91.8 % of the studied paramedical had incompetent with total practices pre applying the educational program. While 97.3 % of them had competent total practices after applying the educational program, where 38.9 ± 7.2 to 78.1 ± 6.9 (t=21.530, p value 0.000).

Table (2): Shows that there was a statistically significant relation among the studied paramedical's total knowledge about safety measures post- educational program through all

items where p-value = 0.005, respectively.

Table (3): Shows that there was a statistically significant relation among the studied paramedics' total practices about safety measures after-educational program through all items, where p-value = 0.005, respectively.

Table (4): Shows that there is a significant direct positive correlation among knowledge of studied paramedical and their practices with R 0.51 & P 0.00.

Table (1): Frequency Distribution of Demographic Data and Medical History of Studied Paramedical (n=73).

Demographic data	No.	%
Age		
20≥29	42	57.5
30≥39	20	27.4
40≥49	11	15.1
Mean ±SD 27.4 ± 6.7		
Job		
Housekeeper	26	35.6
Nurse aid	47	**64.4**
Residence		
Rural	12	16.4
Urban	61	**83.6**
Education		
Bachelor degree	4	5.5
Diploma	68	**93.2**
Preparatory school	1	1.4
Marital status		
Married	42	**57.5**
single	31	42.5
Years of experience		
1>5	53	**72.6**
5≥10	20	27.4
Mean ±SD 4.3±3.5		
Medical condition	**No.**	**%**
No complain	51	**69.9**
Back pain	8	10.9
Needle stick	5	6.8
DM	4	12.4
Hypertension	3	4.1
Asthma	2	2.7

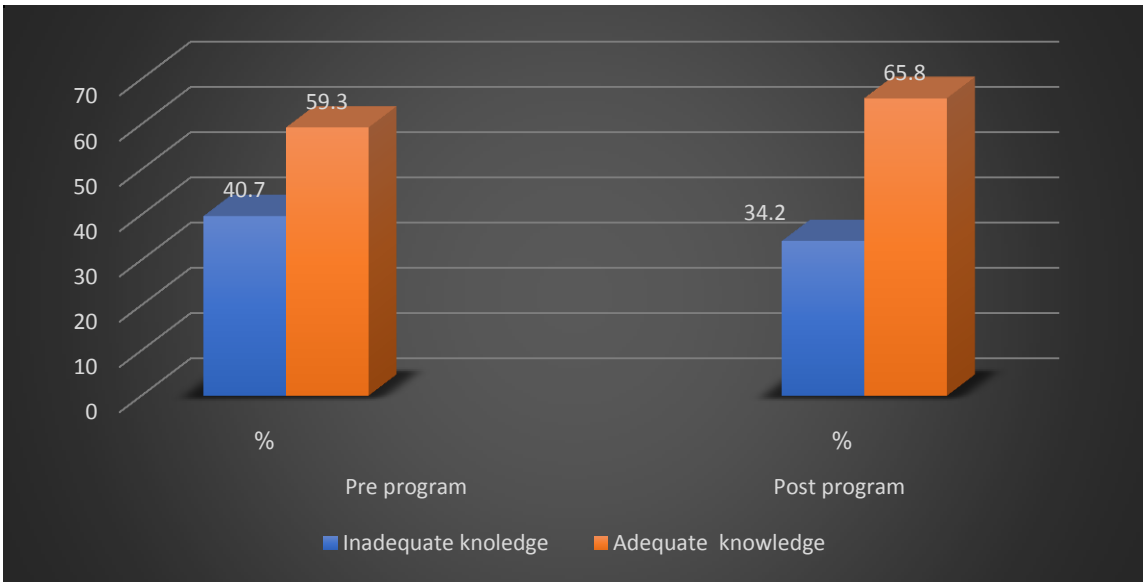
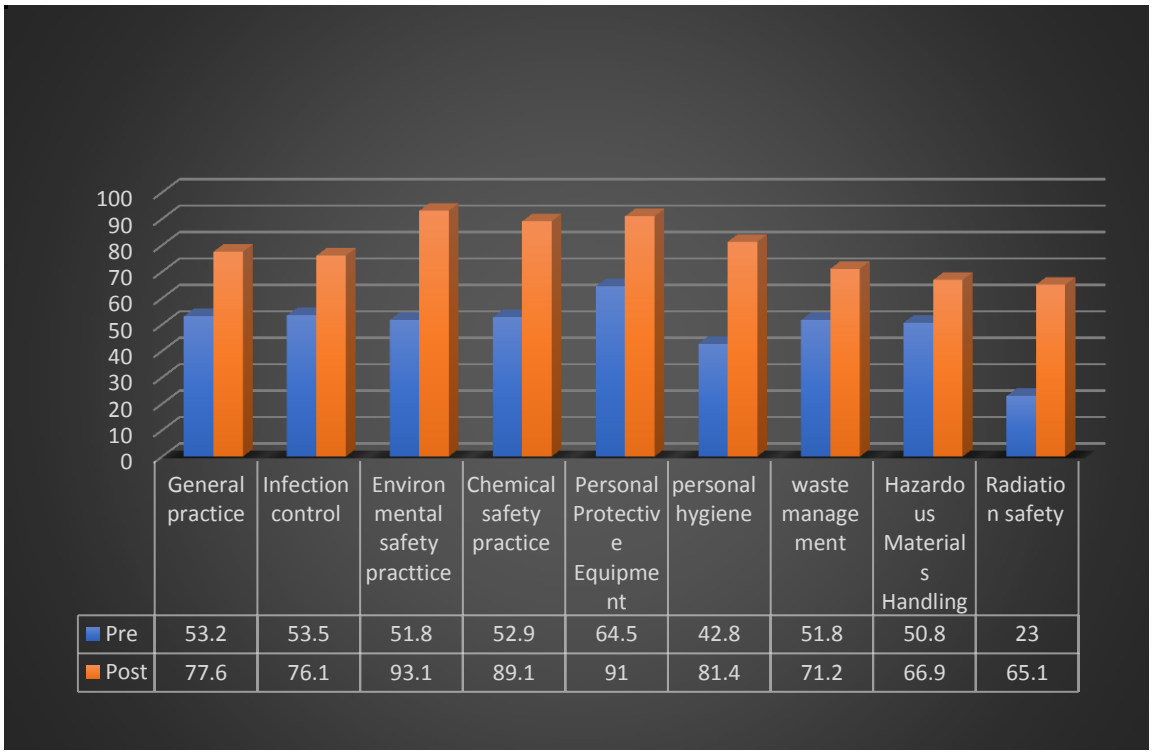


Figure (1): Percentage Distribution of Total Knowledge among Studied Paramedical regarding Safety Measures Pre & Post Applying Educational Program (N=73).



	General practice	Infection control	Environmental safety practtice	Chemical safety practice	Personal Protective Equipment	personal hygiene	waste management	Hazardous Materials Handling	Radiation safety
Pre	53.2	53.5	51.8	52.9	64.5	42.8	51.8	50.8	23
Post	77.6	76.1	93.1	89.1	91	81.4	71.2	66.9	65.1

Figure (2): Percentage Distribution of Safety Practice among Studied Paramedical regarding Safety Measures Pre & Post Applying Educational Program (N=73).

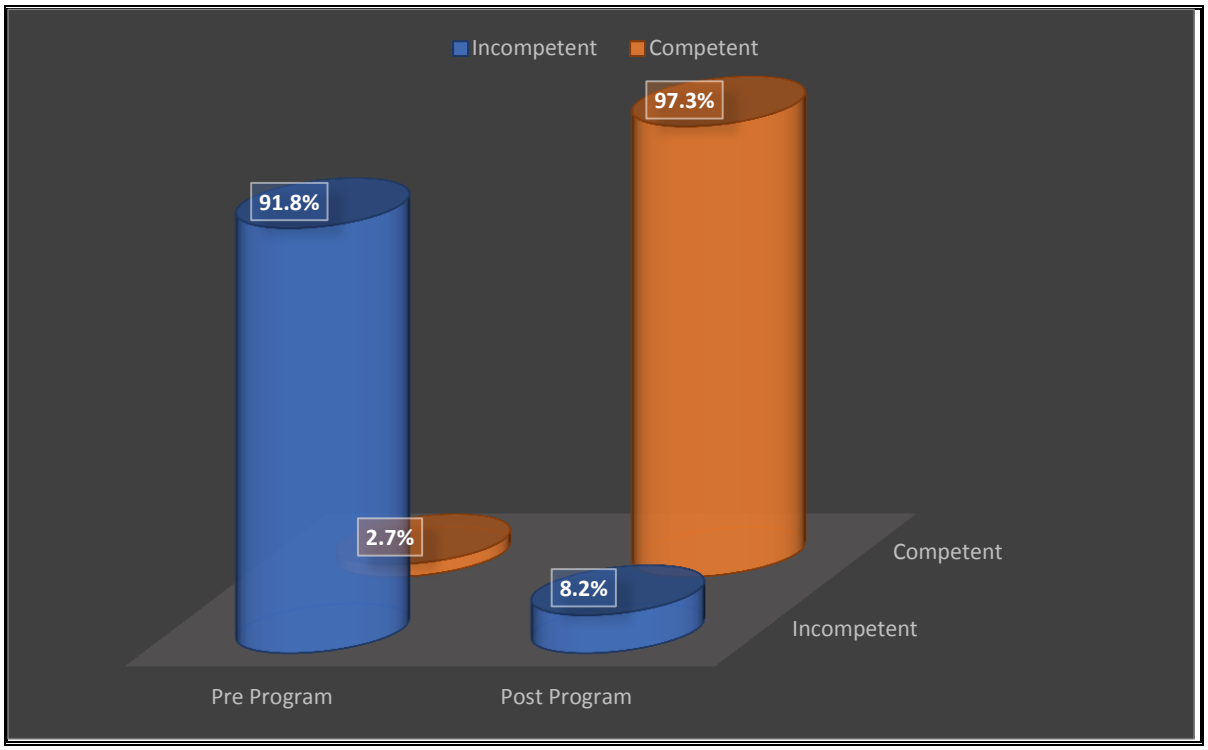


Figure (3): Percentage Distribution of Total Practices among Studied Paramedical Regarding Safety Measures Pre and Post Applying Educational Program (N=73).

Table (2): Relative between Demographic Characteristics and Total Knowledge of Studied Paramedical Post-Educational Program (N=73).

Demographic Characteristics	The studied paramedical Post-Educational Program				χ^2	P value
	Adequate (n=48)		Inadequate (n=25)			
	No.	%	No.	%		
Age (Years)						
20≥29	40	83.3	2	8.0	5.421	0.000
30≥39	0	0.00	20	80.0		
40≥49	8	16.7	3	12.0		
Job						
Housekeeper	20	41.7	6	24.0	6.254	0.000
Nurse aid	28	58.3	19	76.0		
Place of residence						
Rural	10	20.8	2	8.0	9.210	0.002
Urban	38	97.2	23	92.0		
Educational level						
Bachelor degree	0	0.00	4	16.0	9.001	0.001
Diploma	48	100.0	20	80.0		
Preparatory school	0	0.00	1	4.0		
Marital Status						
Married	20	41.7	22	88.0	6.559	0.000
Single	28	58.3	3	12.0		
Years of experience						
1> 5	48	100.0	5	20.0	8.112	0.000
5>10	0	0.00	20	80.0		
Medical condition						
No complain	40	83.3	11	44.0	9.658	0.005
Back pain	3	6.3	5	20.0		
Needle stick	0	0.00	5	20.0		
DM	4	8.3	0	0.00		
Hypertension	0	0.00	3	12.0		
Asthma	1	2.1	1	4.0		

Table (3): Relation between Demographic Characteristics and Total Practices of Studied Paramedical Post- Educational Program (N=73).

Demographic Characteristics	The studied paramedical Post-Educational Program				χ^2	P value
	Competent (n=67)		Incompetent (n=6)			
	No.	%	No.	%		
Age (Years)						
20≥29	42	62.5	0	0.00	3.246	0.000
30≥39	20	30.0	0	0.00		
40≥49	5	7.5	6	100.0		
Job						
Housekeeper	20	29.9	6	100.0	6.321	0.001
Nurse aid	47	70.1	0	0.00		
Place of residence						
Rural	6	9.0	6	100.0	5.410	0.000
Urban	61	91.0	0	0.0		
Educational level						
Bachelor degree	4	6.0	0	0.00	6.666	0.000
Diploma	62	92.5	6	100.0		
Preparatory school	1	1.5	0	0.00		
Marital Status						
Married	40	59.7	2	33.3	6.985	0.005
Single	27	40.3	4	66.7		
Years of experience						
1> 5	50	74.6	3	50.0	8.214	0.001
5>10	17	25.4	3	50.0		
Medical condition						
No complain	51	76.0	0	0.00	7.510	0.001
Back pain	4	6.0	4	66.7		
Needle stick	5	7.5	0	0.00		
DM	2	3.0	2	33.3		
Hypertension	3	4.5	0	0.00		
Asthma	2	3.0	0	0.00		

Table (4): Correlation between Total knowledge and Total Practices of Studied Paramedical (n=73).

Scores	Practice of paramedical	
Knowledge of paramedical	**R**	**p**
	0.51	0.00*

*Significant at p-value<0.05

Discussion:

Paramedical personnel play a vital role in supporting the healthcare system by assisting medical professionals in delivering patient care. This group includes nursing aides, lab technicians, radiology staff, ambulance workers, and other support personnel. Staff helps in performing diagnostic tests, monitoring patient conditions, and maintaining a safe and hygienic environment. Although staff do not hold medical degrees, their skills and responsibilities are essential for the smooth functioning of hospitals and clinics. Paramedical personnel often serve as the bridge between patients and physicians, especially in emergency and routine care settings. Their commitment and efficiency contribute significantly to patient outcomes and healthcare quality. Investing in their training and well-being is essential for ensuring safe and effective care delivery **(Ozimek et al., 2025).**

Evaluating the effect of an educational program on paramedical staff regarding safety measures is essential to enhance their knowledge, skills, and performance in healthcare settings. Paramedical personnel, including nursing aides and support workers like housekeepers, are frequently exposed to occupational hazards such as infections, injuries, and chemical exposures. Before the implementation of the program, many exhibited inadequate awareness and inconsistent practices related to safety protocols. The educational sessions focused on infection control, safe handling of equipment, emergency preparedness, and use of personal protective equipment (PPE). The program also emphasized the importance of reporting incidents and following institutional guidelines. Interactive learning methods such as demonstrations, discussions, and role-plays were used. Initial assessments highlighted knowledge gaps that guided the content of the intervention **(Malakoutikhah et al., 2024).**

Regarding socio-demographic characteristics of the studied paramedical, the findings of this study revealed that, marital status of the

studied paramedical more than half of them were married, these results matched with the results of conducted by **Bandery-Elsayed et al., (2024)** were 200 workers conducted a study in EL Sharqia governorate, Egypt about "Occupational Health Hazards among Workers in Chemical Factories in Egypt" and showed that, more than half of study sample were married. **From a researcher's point of view,** many people desire a life partner to share experiences, offer emotional support, and build a deep personal connection. Marriage can provide financial advantages, legal rights, and social security benefits.

Regarding medical condition of the studied paramedical, these findings indicate that, more than one quarter of them no complain, these results disagree with the results of conducted by **Strandås et al., (2024)** where 239 paramedics conducted a study in Madrid about "An integrative systematic review of promoting patient safety within prehospital emergency medical services by paramedics: a role theory perspective" and mentioned that, more than one quarter of study sample were suffer from back pain and varicose veins. **From a researcher's point of view,** some paramedical staff may perform tasks that are less physically intensive compared to nurses, leading to fewer musculoskeletal issues or other work-related conditions.

Regarding the effective of the program on total knowledge, the present study revealed that, more than half of paramedical had adequate total knowledge pre apply an educational program which improved and become, nearly two thirds of them had adequate total knowledge post apply an educational program and this finding was disagree with **Alakrawi et al., (2024)** whose conducted published study at Saudi Arabia under title of " Evaluating the efficacy of full-scale and tabletop exercises in enhancing paramedic preparedness for external disasters: A quasi-experimental study" showed that, 57.6 % of paramedical had adequate total knowledge pre apply an educational program which improved and become, 66.2 % of them had adequate total knowledge post apply an educational program. **From researchers' points of view,** the program was likely designed to directly address gaps in knowledge, focusing on appropriate and practical topics that paramedical staff encounter in their daily duties. This alignment with their real-world needs made the learning more effective.

Regarding the safety practice among studied paramedical regarding safety

measures, the present study revealed that, less than quarter of paramedical hadn't apply radiation safety practice pre-educational program, which improved and became less than two thirds of them post educational program and this finding was disagree with **Hasan et al., (2022)** whose conducted published study at Baghdad governorate under title of " Attitudes and practices regarding occupational hazards among a sample of medical and paramedical staff in Baghdad governorate: A quasi-experimental study" revealed that, 57.6 % of paramedical hadn't apply radiation safety practice pre-educational program, which improved and became 89.9 % of them post educational program. **From researchers' points of view,** the educational program likely enhanced the paramedical staff's understanding of the risks associated with radiation exposure and the importance of protective measures (e.g., lead aprons, shielding, distance, and time limitations).

Concerning the effectiveness of the program on total practices, the present study revealed that most of the studied paramedical personnel had incompetent results with total practices pre applying the educational program. While most of them had competent total practices post apply educational program, and this finding was agreed with **Strandås et al. (2024),** revealed that 88.9 % of the studied paramedical staff had incompetent total practices pre apply educational program. While 96.1 % of them had competent total practices post-applied the educational program. **From researchers' points of view,** the program included simulations, demonstrations, or real-life scenarios; these methods are highly effective in improving practical skills. Paramedical staff could practice techniques in a safe environment before applying them in actual settings.

Regarding the relation of the program on total knowledge and demographic characteristics, the present study showed that, there was statistically significant relation between studied paramedical total knowledge about safety measures post- educational program with all items and this findings was agreed with **Carnicelli et al., (2024)** whose conducted published study at Australia under title of "Paramedic Education and Training for the Management of Patients Presenting with Low-Acuity Clinical Conditions: A Scoping Review " revealed that, there was statistically significant relation between studied paramedical's total knowledge about safety measures post- educational

program with all items. **From researchers' points of view,** younger staff or those with less experience might have absorbed new knowledge more quickly, while older or more experienced staff may have related new information to existing practices, enhancing their understanding. This variation contributes to a significant relationship.

Concerning the relation of the program on total practices and demographic characteristics, the present study revealed that, there was statistically significant relation between studied paramedical total practices about safety measures post- educational program with all items and this finding was agreed with **Harwani, (2023)** published study at north India under title of "Impact of educational intervention on sensitization and ADR reporting among paramedics in a teaching hospital in north India" revealed that, there was statistically significant relation between studied paramedical's total practices about safety measures post- educational program with all items. **From researchers' points of view,** in some cases, variation in learning styles, motivation, or engagement between male and female staff might affect how well they react and change after educational interventions.

Regarding correlation between total knowledge and total practices post apply educational program, the present study showed there was a significant direct positive correlation between the knowledge of studied paramedical and their practices and this finding agreed with **Ygiyeva et al., (2024)** who published study at Kazakhstan under title **"**Evaluating the effectiveness of a first aid training program for individuals without a background in medical education", who reported there is a significant direct positive correlation between the knowledge of studied paramedical and their practices. **From a researcher's point of view,** increased knowledge enables staff to make better, safer, and more confident decisions in clinical situations, which directly translates into improved practices.

Conclusion

In light of the current study, it could be concluded that:

More than half of the paramedical had adequate total knowledge pre apply an educational program which improved and become, less two thirds of them had adequate total knowledge post apply an educational program. While most of studied paramedical had incompetent with total practices pre apply educational program. While, most of them had competent total

practices post-applied educational program.

Recommendations

In light of the results of the present study, the following recommendations are suggested:

-Ongoing health educational program for paramedical regarding safety measures in all health care settings.

- Provide paramedical with a booklet about safety measures and methods to reduce risks.

-Make posters or banners about practices of safety measures and put them in Outpatient clinics at Baheya Hospital in Giza under the observation of a community health nurse**.**

-Encourage group discussion sessions for paramedical about safety measures under the supervision of a community health nurse.

-Apply further research in a large sample and other settings for generalization**.**

References:

Alakrawi, G. A., Al-Wathinani, A. M., Gómez-Salgado, J., Alobaid, A. M., Abahussian, M., Alhazmi, R., ... & Goniewicz, K. (2024). Evaluating the efficacy of full-scale and tabletop exercises in enhancing paramedic preparedness for external disasters: A quasi-experimental study. *Medicine, 103*(49), e40777.

Abd El-Wahed, M. A., El-Sharkawy, M. F., & El-Sayed, N. M. (2020). Occupational hazards among healthcare workers: An overview. *Egyptian Journal of Occupational Medicine, 44*(1), 23-34.

Abdel-Rahman, M. A., El-Sayed, N. M., & Ahmed, S. A. (2020). Radiation safety awareness among healthcare workers in Egyptian oncology departments. *Egyptian Journal of Radiology and Nuclear Medicine, 51*(1), 45-52. https://doi.org/10.1186/s43055-020-00145-8

Ahram Online. (2021, March 15). Egypt's workplace injuries decreased by 19.7% in 2020: CAPMAS. Retrieved from http://english.ahram.org.eg/NewsContent/3/12/408123/Business/Economy/Egypt's-workplace-injuries-decrease-by--in--CAPMAS.aspx

Alhumaid, S., Al Mutair, A., Al Alawi, Z., Alsuliman, M., Ahmed, G. Y., Rabaan, A. A., ... & Al-Omari, A. (2021). Knowledge of infection prevention and control among healthcare workers and factors influencing compliance: a systematic review. *Antimicrobial Resistance & Infection Control, 10*(1), 86.

Al-Mutairi, S., Al-Qahtani, A., & Smith, J. (2020). General safety training and its impact on paramedical

staff in Saudi hospitals. *Journal of Occupational Health, 62*(4), e12145. https://doi.org/10.1002/1348-9585.12145

Al-Mohammed, A. A., Al-Qahtani, M., & Smith, J. (2021). Impact of radiation safety training on healthcare workers in UAE oncology departments. *Radiation Protection Dosimetry, 196*(2), 123-130. https://doi.org/10.1093/rpd/ncab089

Alqahtani, A. S., Al-Mutairi, M., & Smith, J. (2024). Occupational health and safety education programs: A review of effectiveness. *Journal of Safety Research, 88*, 45-53. https://doi.org/10.1016/j.jsr.2023.11.005

Arcanjo, M. G., Silva, A. R., & Santos, J. C. (2020). Knowledge and practice education program of nursing workers on occupational risks in primary health care. *Revista Brasileira de Enfermagem, 73*(5), e20190456. https://doi.org/10.1590/0034-7167-2019-0456

Bahçecik, N., & Öztürk, H. (2024). Occupational safety in healthcare settings: A Turkish perspective. *Journal of Nursing Management, 27*(6), 1234-1241.

Bandery Elsayed, N., Mohamed Mohamed, H., & Mohamed Sayed, S. (2024). Occupational Health Hazards among Workers in Chemical Factories. *Egyptian Journal of Health Care, 15*(2), 881-891.

Carnicelli, A., Williams, A. M. M., & Edwards, D. G. (2024, January). Paramedic Education and Training for the Management of Patients Presenting with Low-Acuity Clinical Conditions: *A Scoping Review. In Healthcare (Vol. 12*, No. 2, p. 176). MDPI.

Çoban, S., & Ortabag, T. (2023). Classification of occupational hazards in healthcare settings. *Journal of Healthcare Sciences, 11(*1), 45-53.

Dhahir, D. M., & Al Mayahi, H. T. (2021). Factors impacting safety precautions among healthcare workers in developing countries. *Iraqi Journal of Nursing, 10*(1), 34-42.

Egyptian Ambulance Organization (2023). Annual report on occupational hazards among ambulance workers. Cairo, Egypt: Egyptian Ambulance Organization.

Ewusie, J. E., Smith, J., & Jones, A. (2020). Quasi-experimental designs in health research: Applications and limitations. *Journal of Clinical Epidemiology, 128*, 45-53. https://doi.org/10.1016/j.jclinepi.2020.08.012

Eyi, S. (2020). Occupational hazards in healthcare: A global perspective. *Journal of Occupational Health Nursing, 10*(2), 34-42.

Hamid, A. A., Fekry, N. E., & Etway, E. A. (2022). Effect of ergonomics training programs on nurses' knowledge and safety practice in Egypt. *Egyptian Journal of Nursing, 19*(1), 45-53.

Harwani, R. S (2023). Impact of educational intervention on sensitisation and ADR reporting among paramedics in a teaching hospital in north India.

Hasan, S. M., Hassoun, S. M., & Ali, L. H. (2022). Attitudes and practices regarding occupational hazards among a sample of medical and paramedical staff in Baghdad governorate: A quasi-experimental study. *Health Education and Health Promotion,* 10(2), 385-393.

Jones, A., Smith, J., & Brown, A. (2020). Role of paramedical staff in infection control: Training and outcomes in US hospitals. *American Journal of Infection Control, 48*(9), 1234-1241. https://doi.org/10.1016/j.ajic.2020.05.012

Kalejaiye, P. O. (2021). Work-related hazards and safety measures in healthcare settings. African Journal of Occupational Health, 11(1), 34-42.

Kumar, R., Smith, J., & Jones, A. (2019). Role of paramedical staff in waste management: Training needs in Indian hospitals. *Waste Management & Research, 37*(8), 789-796. https://doi.org/10.1177/0734242X19856789

Lari, S., Yamagani, P., Pandiyan, A., Vanka, J., Naidu, M., Senthil Kumar, B., ... & Jonnalagadda, P. R. (2023). The impact of the use of personal protective equipment on the minimization of effects of exposure to pesticides among farm-workers in India. *Frontiers in Public Health, 11*, 1075448.

Madkour, A. A., Mahmoud, S. A., & Abd-Elzaher, N. M. (2023). Occupational health nursing: Roles and responsibilities in improving worker safety. *Egyptian Journal of Community Medicine, 41*(1), 34-42.

Malakoutikhah, A., Ahmadi Lari, L., Baharloo, P., Al-Amer, R., Alnaiem, M., Khaluei, H., & Dehghan, M. (2024). Healthcare Workers' General Health and Its Relation with Anxiety, Anger, and Posttraumatic Stress Disorder during the COVID-19 Outbreak in *Southeast Iran. Mental Illness, 2024*(1), 2335969.

Nsengimana, V. I. P., & Raphela, S. F. (2024). Knowledge, Attitudes, and Perceptions about Occupational Hazards and The Use of Safety Measures among Healthcare Workers in a Teaching Hospital in Rwanda. *African Journal of Biomedical Research, 27*(1), 13-19.

Ozimek, D., Bowers, H., Good, L., Kelch, B., & Valcourt, M. (2025). Building Consensus on the Essential Quantitative Competencies, Skills, and Practices for Entry-Level Nurses. *Nursing Education Perspectives, 10*-1097.

Ramadan, M. Z., Mahfouz, E. M., & Taha, N. M. (2018). Effect of safety measures program for prevention of occupational hazards among new graduate bachelor nurses. *Journal of Nursing Education and Practice, 8*(9), 45-53. https://doi.org/10.5430/jnep.v8n9p45

Strandås, M., Vizcaya-Moreno, M. F., Ingstad, K., Sepp, J., Linnik, L., & Vaismoradi, M. (2024). An integrative systematic review of promoting patient safety within prehospital emergency medical services by paramedics: a role theory perspective. *Journal of multidisciplinary healthcare*, 1385-1400.

World Health Organization (WHO). (2021). Occupational health hazards in healthcare settings. Geneva, Switzerland: WHO.

Ygiyeva, D., Pivina, L., Messova, A., Omarov, N., Batenova, G., Jamedinova, U., & Dyussupov, A. (2024). Evaluating the effectiveness of a first aid training programme for individuals without a background in medical education. *Advances in Medical Education and Practice*, 773-782.