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Effect of Disaster Management Training Intervention on Competency of Nurses working in Primary Health Care Centers

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Abstract: Background: Disaster nursing is a new specialty, the most common challenges faced by nurses in this regard are inadequate levels of preparedness, poor formal education, lack of research, ethical and legal issues and issues related to their role in disasters. **The purpose** of the study was to evaluate the effect of disaster management training intervention on competency of nurses working in primary health care centers. **Design:** A quasi-experimental design was used. **Sampling and setting:** All sixty nurses working in the two primary health care centers (named Quiply and Bahary) at Shebin El-kom district, Menoufia Governorates, Egypt was recruited after using a multistage sampling technique to select study settings. **Instruments:** Four instruments were used: as A structured interviewing questionnaire, Disaster Management Knowledge Questionnaire, Disaster Nursing Competencies Questionnaire and Nursing Skills Checklist Measurement, **Results:** The total score of knowledge about internal disaster preparedness guidelines among nurses revealed a highly significant improvement ($p<0.000$) in all knowledge items including the five subgroups, as well as grand total knowledge score that was increased from a range of 1.7% - 6.7% pre intervention to 31.9%- 78.3 post intervention and the effect of disaster management training nursing intervention on total score levels of competency (subdomains as well as grand total score) about disaster management among studied nurses pre and post intervention revealed a highly significant improvement ($p<0.000$) in all competency items including the ten subdomains. The grand total competency score that was increased from a range of 1.7% - 25% pre intervention to 64.1%- 107.4% post intervention **Conclusions:** Application of disaster management training intervention is beneficial in improving knowledge and enhancing competencies among nurses working in primary health care centers. **Recommendations:** Conducting continuous training intervention about disaster management that aims to raise levels of knowledge and competency of nurses and how to treat with any disaster situations is very urgent in PHC.

Key words*: Disaster management, Nurses knowledge, Nurses competency, Primary health care centers.*

Introduction

A disaster is a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts, The effect of the disaster can be immediate and localized, but is often widespread and could last for a long period of time. The effect may test or exceed the capacity of a community or society to cope using its own resources, and therefore may require assistance from external sources (Aronsson et al., 2022).

Disasters can lead to short-term and long-term effects on physical and mental health and can indirectly affect health and wellbeing as a result of evacuation, social disruption, financial loss, lifestyle change, damage to health-care facilities, They can encompass the death of so many people, high costs over time, great economic and political impacts, social and psychological disorders, destruction of infra-structure, damage to the residential houses, loss of properties, and generally the disruption of social life in societies (VanLandingham et al., 2022). Among all these, the consequences that may harm the people's health and lives are vital, following a disaster, a significant number of people will need proper healthcare, the risk of outbreak is often more in emergencies, disasters reduce the physical health of survivors with injuries, intensifying chronic diseases and decreasing access to the health services (Leppold et al., 2022).

Disaster management is a process of effectively preparing for and responding to disasters. It involves strategically organizing resources to lessen the harm that disasters cause. It also involves a systematic approach to managing the responsibilities of disaster prevention, preparedness, response, and recovery, disaster management involves examining and managing causal factors, it requires assessing the extent to which a community can withstand a disaster as some communities are more vulnerable than others and involves analyzing exposure to loss (WHO, 2020).

Egypt has been susceptible to a multiplicity of natural and man-made disasters. It is prone to flash floods, earthquakes, droughts, landslides, sandstorms, extreme temperature, windstorms, and epidemics have also been witnessed in the past few decades. Egypt will be exposed to risks posed by climate change and is prone to natural shocks such as heat waves, cold waves, flash floods, earthquakes, and anticipated sea level rise in the northern region, The massive landslide, in Cairo, in 2008; the Alexandria train collision in August 2017, near Khurshid station, in the suburbs of the eastern edge of Alexandria; lastly, the Ramses railway station disaster that occurred on February 2019 (Samaan, 2019). Finally, spread of pandemic diseases such as covid-19 make horror worldwide and consider as a big disaster in the world, these events killed thousands of Egyptian people and cost the nation millions of dollars. (Andrade, 2020)

On 11 March 2020, the Egyptian Red Crescent issued an emergency

alert and activated its Central Emergency Operations Center (EOC) as well as the Emergency Operations Rooms at the Branches. The continued severe weather, including heavy rain, strong winds and thunderstorms caused widespread flooding across Egypt, killing at least 40 people. According to Ministry of Social Solidarity (MoSS), 10 people died and more than 400 injured in Cairo, 3 people died and 5 were injured in Qena Governorate (central Egypt). The remaining fatalities occurred in Giza, Ismailia, Sharkeia, New Valley, Menofia, and South Sinai Governorates, 12 people missing. The train service was suspended nationwide, as heavy rain caused a train collision in northern Giza, injuring 13 people (IFRC, 26 Mar 2020).

Nurses need to be competent to deal with disastrous situations, so competency refers to the actual performance of a person in a specific role, in each situation. It is defined as the ability to act by combining knowledge, skills, values, beliefs, and experience acquired as a nurse" and explained that competency can be viewed as an integrated performance reflecting the professional nurse's feelings, thoughts, and judgment (Jang etal .2022).

As nurses are the largest group of healthcare providers, they play significant roles in preparing for disasters, including identifying risks, analyzing identified risks, creating plans, conducting drills, participating in education, and training activities, and identifying areas for development and improvement, nurses should be equipped with the necessary knowledge and abilities to work in a disaster and to meet the needs of the respective serving community (Shaw et al., 2022). Likewise, providing effective action during a critical event or disaster, nurses must know how to respond, communicate, and formulate a new plan if the situation changes suddenly, for nurses to be capable of initiating a disaster plan, they must participate in its creation, as well, beside the proper execution of a plan requires continuous evaluation, education, training, and drills (Langan, 2022).

Significance of the study

Disasters are a universal issue with impulsive impact especially for the affected communities. Egypt has been susceptible to a multiplicity of natural and man-made disasters (Petkova,2016). Historically, Egypt witnessed several types of disastrous events that hit the country till nowadays. Examples of such events include, but not limited to the Alexandria train collision in August 2017. Ramses railway station disaster that occurred on February 2019 and The 2020 Middle East storms happened on 12 March 2020 and the following days, bringing heavy rain, thunderstorms, floods, and sandstorms, to northern Egypt, Israel, Lebanon, Jordan, Syria, State of Palestine and Iraq. These events killed thousands of Egyptian people and cost the nation millions of dollars. Finally, spread of pandemic diseases such as covid-19 make horror worldwide and consider as a big disaster in the world.

Recent studies indicated that Egypt will be exposed to risks posed by climate change and is prone to natural shocks such as heat waves, cold waves, flash floods, earthquakes, and anticipated sea level rise in the northern region. As nurses constitute the largest and

major group of health care providers, their readiness to respond to disaster and to participate in management and recovery activities are significant in making a community more resilient against disaster (International Federation of Red Cross, 2017).

Therefore, this study will be conducted to evaluate the effect of disaster management training on competency of nurses working in primary health care centers.

Purpose of the Study

To evaluate the effect of disaster management training on competency of nurses working in primary health care centers.

Research Hypotheses

H1: Nurses who receive the disaster management training intervention will have a higher level of knowledge post intervention than pre intervention.

H2: Nurses who receive the disaster management training intervention will have a higher level of competency post intervention than pre intervention.

Methods

Research Design:

A quasi-experimental (one group pre/post-test) design was used to accomplish the purpose of the study.

Research Setting:

The study was carried out in two primary health care centers at Shebin El-kom district, Menoufia Governorate, Egypt.

First setting was the primary health care center named Quiply Shebin El-kom at Gamal Abdel Naser street near Egypt air company that contains two floors, the first floor consists of dermatology clinic, dental clinic and family medicine while second floor contains of family planning clinic, pediatric clinic and obstetric clinic.

Second setting was the primary health care center named Bahay Shebin El-kom next to old traffic blocks that contains two building first health office contains one floor contain pediatric clinic for checking children and providing vaccination and contain file room.

The second building called maternity and childcare center that contains three floor, first floor contains dermatology clinic and family medicine then second floor contains dental clinic, audiometric clinic and pediatric clinic then third floor contains family planning clinic and obstetric clinic.

Study Sampling:

Sixty nurses working in the two primary health care centers at Shebin El-kom district, Menoufia Governorates, Egypt was recruited.

Assignment of study setting

Multistage random sampling was selected randomly one district (Shebin El-kom district) out of the 10 districts of Menoufia Governorates (first stage sample), then the two primary health care centers at Shebin El-kom district, Menoufia Governorates, Egypt was selected (second stage sample).

All sixty nurses working at the two PHC centers was recruited (third stage sample).

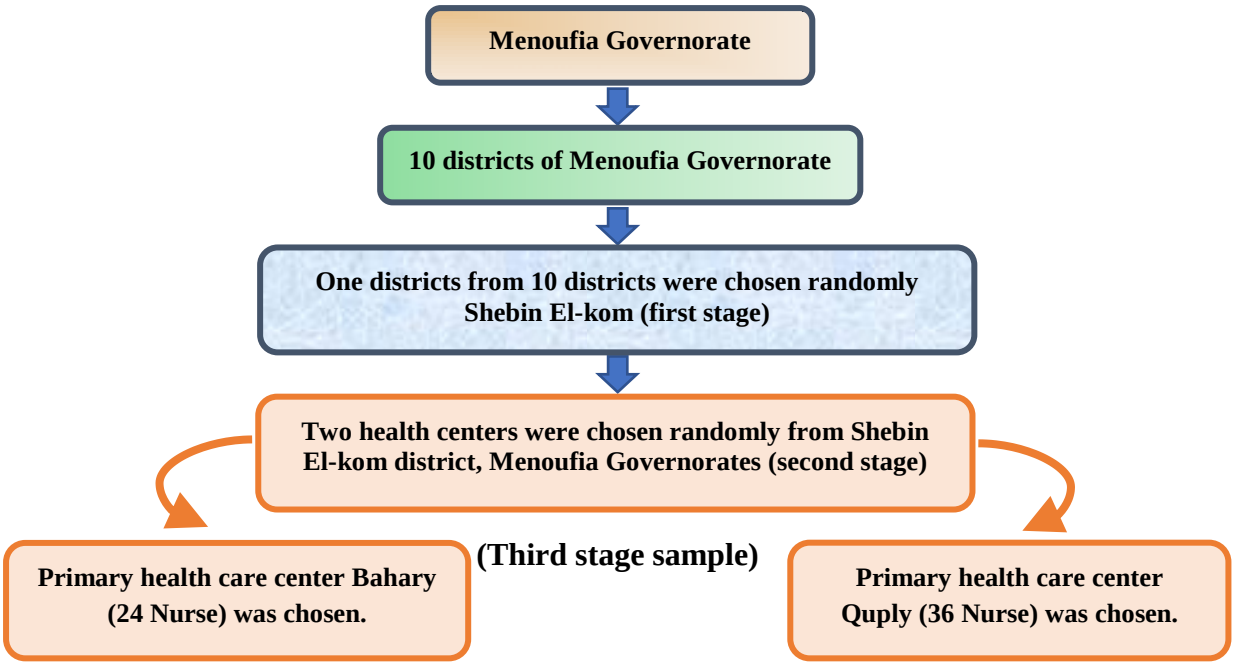


Fig (1): Method of implementation the multistage random sample in order to select the required sample of study settings with included nurses.

In the current study nurses who are on sick leaves for any reason at the time of conducting the study were excluded

Study instruments

Four instruments were included as follows:

<u>Instruments I:</u> A Structured Interviewing questionnaire

The questionnaire was developed by the researcher after reviewing the related national and international literature, discussion with experts to collect data about the subjects and wrote in simple Arabic language to suit level of understanding of the participants and includes socio-demographic characteristics of nurses and data about primary health care centers.

- **Part one: Socio demographic characteristics of studied nurses:** It consists of nurses' age, marital status, level of education, residence, place of work, work hours and social income. It also includes questions about nurses' attendance for training courses about disaster management, main source of information about disaster management.
- **Part two: Data about primary health care centers:** If the primary health care centers contain disaster management unit, If the primary health care centers contain an emergency plan for having any anticipated hazards and the content of disaster management plan.

<u>Instruments II:</u> Disaster Management Knowledge Questionnaire (DMKQ)

The instrument was developed by Ahmed, 2001) to check the major components of the preparedness disaster guidelines. The questionnaire was used to assess knowledge and awareness about internal disaster preparedness guidelines among nurses. The questionnaire sheet consists of 25 questions divided into five subgroups regarding knowledge and awareness of the main components of disaster preparedness guidelines within primary health care centers.

Scoring system:

Nurses group response for each item of this instrument submits to one of two options yes or no. For knowledge and awareness questions, the responses scored ―1 for correct answers and ―0 for incorrect answers. A subject considered as having satisfactory knowledge if the total score >75th percentile and unsatisfactory knowledge and awareness‖ if the total score ≤75th percentile. Then, arithmetic means were calculated for each subscale, and a global mean was calculated that represents an overall measure of knowledge either pre or post intervention.

Instruments III - Disaster Nursing Competencies Questionnaire (DNCQ):

The questionnaire was structured according to the International Council of Nurses (ICN) (2009) competency framework, which is composed of 88 items in 10 domains. The competencies were content validated by an expert panel for their relevance to the role requirements of nurse's generalist in disasters (WHO & ICN, 2009).

Scoring system

These competencies items were converted into self-assessment statements. Participants were asked to rate their ability to perform each of the competencies based on a 5-point Likert scale, which ranged from 1, do not know anything about it; 2, have heard something about it; 3, have some knowledge but no skills; 4, have the relevant knowledge and skills; 5, effective application of knowledge, skills, and judgment. Higher scores indicate higher levels of disaster readiness. The total dimension score, as well as the grand total competency of each nurse was categorized into "Unsatisfied level" when he/she achieved < 75% of points of the total dimension score, those who had points > 75 of points of the total dimension score were considered as "Satisfactory level".

Instruments IIII: Nursing Skills Checklist Measurement Backage which included four sections:

- **Section one:** Infection Control procedures including hand washing procedures (22 steps), wearing a mask (13 steps), wearing a gown (13 steps), and performing closed gloving Checklist (13 steps) (Kozier ,2011).
- **Section two:** Basic life support (CPR) for adults (8 steps), and infant's Checklist (7 steps), (Kozier ,2011).
- **Section three:** Evacuation Procedures Checklist (13 steps), (Acar et al., 2019)
- **Section four:** Emergency Preparedness Checklist that consist of five subscales (IFRC, 2020) including:
  - Call the Emergency Management Office or American Red Cross Checklist (5 steps).
  - Emergency Plan Checklist (12 steps).
  - Prepare a Disaster Supplies Kit Checklist (12 steps).
  - Evacuation Checklist (8 steps).
  - Fire Safety Checklist (10 steps).

Scoring system

Nurses group response for each item of this instrument submits to one of three options. The responses scored ―0 for not done answers and ―1 for not done completely answers and ―2 for done completely answers. A subject considered as having satisfactory level if the total score >75th percentile and unsatisfactory level if the total score ≤75th percentile.

Concerning evaluation of nurses' procedures, it was done through performing descriptive statistics (mean ± SD), Minimum, and Maximum range values of the scores for each procedure.

Validity of the Instruments

The data collection instrument that was translated and modified by researcher was reviewed after translation by Arabic/English speaker specialist and the suggested modifications were carried out. After revision for translation, the data collection instrument was revised for content validity by a jury of two experts from the Community Health Nursing and one expert from Nursing Administration department who was judge the instruments for the content and internal validity. They were also asked to judge the items for completeness and clarity. Suggestions was given, and their recommended modifications were carried out.

Reliability of the Instruments

Reliability of the instruments was applied by the researcher to test the internal consistency of the instruments, using (test-retest) reliability and these methods was done by administrating the same instruments to the same subjects under similar conditions on one or more occasions. Data collection instruments was tested using Cronbach' alpha test. The reliability of the ICN disaster nursing competencies domains was 0.92.

Pilot study

A pilot study was conducted on 10% of the total sample (6 nurses) to test the feasibility, applicability, and understandability of the instruments. The subjects of the pilot study were not included in the actual study sample.

Ethical considerations

- An official letter to conduct the study obtained from the dean of the faculty of nursing and approval of the study was obtained from the Ethics committee of scientific research in the faculty of Nursing, Menoufia University before starting of the study.
- An approval letter was performed to the administrator of each primary health care center to permit collecting of research data.
- Verbal and written informed consent were obtained from the study subjects
- Apply the rights of privacy and safety of subjects were secured and they were allowed to withdraw from the study whenever they wanted.
- There were informed about confidentially of their information and assure that their information was used for research purpose only.

Data collection procedure

- An official permission to carry out the study was obtained from the director of each setting after submitting an official letter from the Dean of the Faculty of Nursing Menoufia University explaining the purpose of the study and the method of data collection.
- An arrangement to conduct the study was discussed with the authorized person of each study setting.
- At the beginning of the study, the researcher was introducing herself and explain the purpose and nature of the study to the nurses.
- Written informed consent was obtained from each nurse after explaining the purpose of study.
- Interviewing phase: all nurses was interviewed in the mentioned primary health care centers. A data collection instruments was filled by

the nurses. Use self-administered questionnaire to collect necessary data related to items under the study.

- Base line assessment data (pre-test) was carried out before nursing intervention using the following instruments: an interviewing questionnaire, disaster management knowledge questionnaire and disaster nursing competencies questionnaire.
- Nursing intervention was given to nurses in the form of nursing education using power point presentation and posters and educational videos and booklet and performing workshop about disaster management training intervention. Then asking questions and getting answers.
- The educational training intervention increased the nurses' preparedness containing their knowledge, and skills in responding to disasters. The disaster preparedness training will be implemented. The training was conducted in the form of three-days per week 'workshop for two hours. After the education training, the nurses' level of readiness, including their knowledge immediately after the end of workshop, and competency was re-evaluated using the same questionnaires after one month.
- The components of training intervention were including special concepts of disaster and the effects of disaster on health, disaster management and its stages, assessment of possible hazards and vulnerabilities, and stages of planning in disasters. At the end of the lecture, different scenarios of incidents in primary health care, such as power outages and fire will discuss based on the learning contents
- One month after the end of the intervention, the questionnaire was completed by nurses working at health care centers to collect post - test data.

Statistical Analysis:

- Data was entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 22. Graphics were done using Excel program.
- Quantitative data were presented by mean (X) and standard deviation (SD). It was analyzed using student t- test for comparison between two means, and ANOVA (F) test for comparison between more than two means.
- Qualitative data were presented in the form of frequency distribution tables, number and percentage. It was analyzed by chi-square ($\chi 2$) test. However, if an expected value of any cell in the table was less than 5, Fisher Exact test was used (I f the table was 4 cells) , or Likelihood Ratio (LR) test (if the table was more than 4 cells). Level of significance was set as P value <0.05 for all significant tests.

Results:

Table (1): show the socio demographic characteristics of the studied nurses. Majority of them were aged 40 – 50 years (56.6%), females (98.3%), have Diploma education (95%), and had experience > 10 years (96.6%). Regarding their marital status, majority of them were married (85%).

Table (2): highlighted the efficacy of disaster management training intervention for the total score of knowledge about internal disaster preparedness guidelines among nurses. The table demonstrated that post - intervention revealed a highly

significant improvement (p<0.000) in every knowledge item in all the five subgroups, as well as grand total knowledge score. The post intervention' Satisfactory knowledge response was increased from a range of 1.7% - 6.7% pre intervention to 31.9%-78.3 post intervention and the difference was highly significant statistically (P<0.0001). In addition, the mean total knowledge score increased from 7.5 ± 4.1 pre intervention to 21.4± 1.9 post intervention and the difference was highly significant(P<0.0001). This result approved current first research hypothesis which stated, "Nurses who receive the disaster management training intervention will have a higher level of knowledge postintervention than pre intervention."

Table (3): highlighted the efficacy of disaster management training nursing intervention on total score levels of competency (subdomains as well as grand total score) about disaster management among studied nurses pre and post intervention. The table demonstrated that post -intervention revealed a highly significant improvement (p<0.000) in every competency item in all the ten subdomains, as well as grand total competency score. The post intervention' Satisfactory competency response was increased from a range of 1.7% - 25% pre intervention to 64.1%-107.4% post intervention and the difference was highly significant statistically (P<0.0001). In addition, the mean total competency score increased from 101.6 ± 9.1pre intervention to 256.6 ± 8.3 post intervention and the difference was highly significant(P<0.0001). Again, these results approved current second hypothesis which stated, "Nurses who receive the disaster management training intervention will have a higher level of competency postintervention than preintervention."

Table (4): highlighted the efficacy of disaster management training nursing intervention on total mean score of skills related competencies as well as grand total score about disaster management among studied nurses pre and post intervention. The table demonstrated that post -intervention revealed a highly significant improvement (p<0.0001) on total mean score of skills related competencies, as well as grand total competency score. The total mean score of skills related competencies about infection control measures skills increased from 51.9 ± 4 pre intervention to 76.6 ± 3.5 post intervention. In addition, the total mean score of skills related competencies about basic life support skills including resuscitation increased from 9.2 ± 2.5 pre intervention to 17.9 ± 2.1 post intervention. In addition, the total mean score of skills related competencies about evacuation skills increased from 8.4± 2.1 pre intervention to 16.7± 1.8 post intervention. In addition, the total mean score of skills related competencies about emergency preparedness measures skills increased from 29.9± 3.4 pre intervention to 60± 4.2 post intervention. As well as grand total competency score increased from 99.4± 7.1 pre intervention to 171.1± 6.5 post intervention. Again, these results approved current second hypothesis which stated, "Nurses who receive the disaster management training intervention will have a higher level of competency postintervention than preintervention."

Figure (1): demonstrated a moderate positive significant correlation between grand total knowledge. Score and grand total competency score post intervention (r=0.26, p<0.05).

Table (1): Distribution of socio-demographic characteristics among the studied nurses (n= 60)

Socio Demographic Characteristics		No.	%
Age (Years)	20 - < 30 years 30 - < 40years 40 – 50 years	19 7 34	31.7 11.7 56.6
Gender	Male Female	1 59	1.7 98.3
Education	Diploma Technical. Institute University education	57 2 1	95 3.3 1.7
Marital status	Married Single Widow	51 2 7	85 3.3 11.7
Work experience(years)	1 - < 5 years 5 - ≤ 10 years > 10 years	1 1 58	1.7 1.7 96.6
Total		**60**	**100**

Table (2): Effect of Disaster management training intervention on total score levels of knowledge among studied PHC nurses pre and post intervention (N=60).

Levels of Knowledge (subgroups and grand total)	Pre intervention				Post intervention				χ^2	P value
	Unsatisfactory kn.		Satisfactory Knowledge		Unsatisfactory kn.		Satisfactory Knowledge			
	N0.	%	N0.	%	N0.	%	N0.	%		
Awareness of guidelines structures	59	98.3	1	1.7	13	21.7	47	78.3	73.5	<0.0001*
Evacuation process	57	95	3	5	20	33.3	40	66.7	49.6	<0.0001*
Fire protection	56	93.3	4	6.7	11	18.3	49	81.7	56.4	<0.0001*
preventive measures	59	98.3	1	1.7	36	60	24	40	78.3	<0.0001*
Interventions during disaster management	57	95	3	5	29	48.3	31	51.7	31.9	<0.0001*
Grand total knowledge levels	59	98.3	1	1.7	12	20	48	80	75.6	<0.0001*

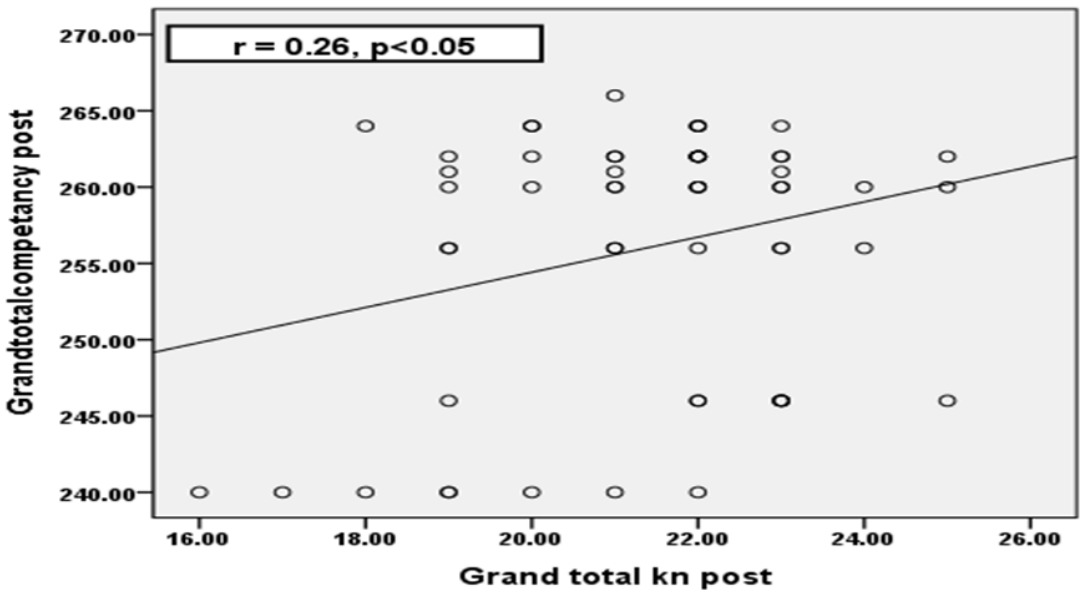
Table (3): Effect of the Disaster management training intervention on total score levels of competency (subdomains as well as grand total score) about disaster management among studied PHC nurses pre and post intervention (N=60)

Subdomains as well as grand total competency	Pre intervention Competency				Post intervention competency				χ^2	P value
	Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory			
	N	%	N	%	N	%	N	%		
Risk reduction	59	98.3	1	1.7	2	3.3	58	96.7	107.4	<0.0001
Policy and Planning	57	95	3	5	4	6.7	56	93.3	99.9	<0.0001
Ethical, Legal Practice	58	96.7	2	3.3	3	5	57	95	100.3	<0.0001
Communication and Information Sharing	57	95	3	5	2	3.3	58	96.7	100.2	<0.0001
education and preparedness	55	91.7	5	8.3	3	5	57	95	89.5	<0.0001
Care of the Community	51	85	9	15	1	1.7	59	98.3	84.1	<0.0001
care of Individuals and Families	50	83.3	10	16.7	2	3.3	58	96.7	77.5	<0.0001
Psychological Care	49	81.7	11	18.3	4	6.7	56	93.3	67.9	<0.0001
care of vulnerable populations	45	75	15	25	2	3.3	58	96.7	64.1	<0.0001
Long-Term Individual, Family and Community Recovery	53	88.3	7	11.7	3	5	57	95	83.0	<0.0001
Grand total Competency	**51**	**85**	**9**	**15**	**4**	**6.7**	**56**	**93.3**	**73.5**	**<0.0001**
Mean ± SD grand total competency	**101.6 ± 9.1**				**256.6 ± 8.3**				**t = 35.4**	<0.0001

Table (4): Effect of the Disaster management training intervention on total mean score of skills related competencies about disaster management among studied PHC nurses pre and post intervention (N=60)

Subdomains & grand total competency	N0. Of items	Pre intervention Competency				Post intervention competency				tpaired intervention	P value
		Mean	± SD	Minimum	Maximum	Mean	± SD	Minimum	Maximum		
Infection Control Measures Skills	4	51.9	4	44	62	76.6	3.5	67	85	**t = - 39.8**	<0.0001
Basic Life Support Skills Including Resuscitation	2	9.2	2.5	3	15	17.9	2.1	13	23	**t = - 65.3**	<0.0001
Evacuation Skills	1	8.4	2.1	4	13	16.7	1.8	14	20	**t = - 32.9**	<0.0001
Emergency preparedness Measures Skills	5	29.9	3.4	23	38	60	4.2	52	70	**t = - 65.3**	<0.0001
Grand total Competency	12	99.4	7.1	83	113	171.1	6.5	155	189	**t = - 84.6**	<0.0001

Figure 2: Correlation between grand total knowledge score post intervention with grand total competency score post intervention with regression line. (N=60)



Discussion:

Disaster management is a process of effectively preparing for and responding to disasters, it involves strategically organizing resources to lessen the harm that disasters cause reduces, or avoid, the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery (Sun et al.,2020).

With disasters occurring more frequently threatening people around the world, the need to prepare nurses for disaster has never been greater, nurses should be equipped with the necessary knowledge and abilities to

work in a disaster and to meet the needs of the respective serving community, nurses need to be competent to deal with disastrous situations, so the Purpose of the study is to evaluate the effect of disaster management training on competency of nurses working in primary health care centers (Huh et al., 2019).

Regarding to the socio-demographic characteristics of the studied nurses, the results of present study revealed that the majority of the studied nurses aged between 40 to 50 years (56.6%). This finding was consistent with (Willson et al., 2021) who studied disaster management in rural and remote primary health care who found that the majority of nurses were age 40 years and above. This consistency interpreted that; this age might be the main age category of nurses who worked in primary health care centers.

Regarding the gender, the results of present study revealed that the majority of the studied nurses were females (98.3%). This finding was consistent with (Lestari et al., 2022) who studied the application of hospital safety index for analyzing primary healthcare center (PHC) disaster and emergency preparedness who reported that, more than three quarters of nurses were female. This consistency interpreted that; the culture assigned the nursing work related to female more than male.in primary health care centers.

Concerning the educational level, the results of present study revealed that the majority of the studied nurses had diploma education (95%). This finding was agreed with (Susila et al., 2019) who studied perception of disaster preparedness and participation in training are associated with disaster preparedness among health workers who reported that about three quarters of nurses had diploma in nursing. This might be interpreted that in developing societies the families usually prefer to get married than to finish education.

As regard to years of experience, the results of present study revealed that the majority of the studied nurses had experience > 10 years (96.6%). This finding was in line with (Emaliyawati et al., 2021) who studied determinants of nurse preparedness in disaster management: a cross-sectional study among the community health nurses in coastal areas who reported that the majority of nurses had 15 years or more of experience. This consistency may be interpreted that, years of experience may be predictive factor could effect on their level of knowledge and competency of nurses working at primary health care centers.

Finally, concerning to marital status, the results of present study revealed that the majority of the studied nurses were married (85%). This finding was as the fame with (Khorram-Manesh et al., 2021) who studied disasters and public health emergencies—Current perspectives in preparedness and response. who reported that the majority of nurses were married. Also, this finding was consistent with (Kanbara et al., 2022) who studied care for disaster risk reduction and communication: lessons learned and way to forward who reported that the majority of nurses were married. This consistency may reflect the extra stress from family care suffered by studied nurses plus their nursing work.

Regarding awareness of guidelines structures, the results of present study revealed that more than two thirds of the studied nurses had good knowledge of awareness of guidelines structures postintervention and only thirteen nurses had poor awareness of guidelines structures with Mean total knowledge score (Mean ± SD) range from 2.1 ± 1.3 pre intervention to 6.3±0.7 post intervention.

These findings were consistent with Ali et al., (2020) who studied" knowledge of nurses regarding disaster management in tertiary health care hospitals of lahore" who reported that more than two thirds of the studied nurses had good knowledge of awareness of guidelines structures postintervention and only thirteen nurses had poor awareness of guidelines structures.

Furthermore, these findings were consistent with (Hassan et al., 2019) who studied "the effect of internal disaster management intervention program on nursing staff knowledge and skills" who reported that more than two thirds of the studied nurses had good knowledge of awareness of guidelines structures post intervention and only thirteen nurses had poor awareness of guidelines structures. This could be due to that; nurses are more interested in gathering knowledge on disaster management to become aware of updated knowledge at the present time also role of nurses to be competent to deal with any disastrous situations that may occur at primary health care centers.

Concerning to evacuation process, the results of present study revealed that two third of the studied nurses had good satisfactory knowledge about evacuation process and only one third of the studied nurses had unsatisfactory knowledge about evacuation process postintervention with mean total knowledge score range from 1.3 ± 1.1 pre intervention to 3.4±0.9 post intervention.

These findings were agreed with (Yazdani et al., 2020) who studied" Hospital evacuation modelling: A critical literature review on current knowledge and research gaps" who reported that the majority of studied nurses had good satisfactory knowledge about evacuation process after implementation of the intervention than pre intervention.

In addition to, this finding was congruent with (Perera et al., 2020) who studied that " Evaluation of gaps in early warning mechanisms and evacuation procedures for coastal communities in Sri Lanka" who reported that nursing staff lack knowledge about effective disaster management and evacuation process due to gaps in education preventing recruitment of nursing members to respond to a major disaster.

As regard to fire protection, the results of present study revealed that more than two third of the studied nurses had good satisfactory knowledge about fire protection and only eleven studied nurses had unsatisfactory knowledge about fire protection post intervention with mean total knowledge score range from 1.9 ± 1.5 pre intervention to 5.2 ± 0.8 post intervention.

These findings were as the same line with (Sun et al., 2020) who studied" A BIM-based simulation framework for fire safety management and investigation of the critical factors affecting human evacuation performance "who reported that the majority of studied nurses had good knowledge about fire protection after implementation of the intervention.

Regarding to preventive measures, the results of present study revealed that more than half of the studied nurses had good satisfactory knowledge about preventive measures and the minority of studied nurses had unsatisfactory knowledge about preventive measures post intervention with mean total knowledge score range from 1.2 ± 1.1 pre intervention to 4.1 ±0.9 post intervention.

These findings were as the fame with Ghezeljeh, et al., (2019) who studied" Effect of education using the virtual social network on the knowledge and attitude of emergency nurses of

disaster preparedness: A quasi-experiment study" who reported that the majority of nurses had good satisfactory knowledge about preventive measures. In addition to, this finding was inconsistent with Akter et al., (2019) who studied" Big data and disaster management: a systematic review and agenda for future research" who reported that large number of nurses had unsatisfactory knowledge about preventive measures due to insufficient numbers of working medical professionals and shortages of personal protective equipment and resources for emergency and for dealing with any disastrous situations.

Concerning to intervention during disaster management, the results of present study revealed that more than half of the studied nurses had good satisfactory knowledge about intervention during disaster management and the minority of studied nurses had unsatisfactory knowledge about intervention during disaster management with mean total knowledge score range from 0.96 ± 0.7pre intervention to 2.4 ± 0.6 post intervention.

These findings were agreed with (Wafaa et al., 2019) who studied" Knowledge and Awareness of Disaster Preparedness among Faculty of Nursing Members: Designing of Disaster Management Guidelines" who supported that the majority of studied nurses had good satisfactory knowledge about intervention during disaster management.

A highly significant improvement ($p<0.0001$) in every knowledge item in all the five subgroups, as well as grand total knowledge score. The post program' Satisfactory knowledge response was increased from a range of 1.7% - 6.7% pre intervention to 31.9%-78.3 post intervention and the difference was highly significant statistically ($P<0.0001$). In addition, the mean total knowledge score increased from 7.5 ± 4.1 pre intervention to 21.4± 1.9 post intervention and the difference was highly significant($P<0.0001$). This result approved current first research hypothesis which stated, "Nurses who receive the disaster management training intervention will have a higher level of knowledge postintervention than preintervention."

Concerning the effect of disaster management training nursing intervention on total score levels of competency (subdomains as well as grand total score) about disaster management among studied nurses pre and post intervention. The result of the present study demonstrated that post - intervention revealed a highly significant improvement ($p<0.000$) in every competency item in all the ten subdomains, as well as grand total competency score. The post intervention' Satisfactory competency response was increased from a range of 1.7% - 25% pre intervention to 64.1%-107.4% post intervention and the difference was highly significant statistically ($P<0.0001$). In addition, the mean total competency score increased from 101.6 ± 9.1pre intervention to 256.6 ± 8.3 post intervention and the difference was highly significant($P<0.0001$). Again, these results approved current second hypothesis which stated, "Nurses who receive the disaster management training intervention will have a higher level of competency post intervention than pre intervention.

These findings were as the fame with Lee et al., (2020) who studied " The effects of disaster training education on the attitudes, preparedness, and competencies in disaster nursing of hospital nurses "who reported that there was improvement in every competency item in all the ten

subdomains post intervention than pre intervention.

Regarding the effect of disaster management training nursing intervention on total mean score of skills related competencies as well as grand total score about disaster management among studied nurses pre and post intervention. The result of the present study revealed a highly significant improvement ($p<0.0001$) on total mean score of skills related competencies, as well as grand total competency score. The total mean score of skills related competencies about infection control measures skills increased from 51.9 ± 4 pre intervention to 76.6 ± 3.5 post intervention. In addition, the total mean score of skills related competencies about basic life support skills including resuscitation increased from 9.2 ± 2.5 pre intervention to 17.9 ± 2.1 post intervention. In addition, the total mean score of skills related competencies about evacuation skills increased from 8.4± 2.1 pre intervention to 16.7± 1.8 post intervention. In addition, the total mean score of skills related competencies about emergency preparedness measures skills increased from 29.9± 3.4 pre intervention to 60± 4.2 post intervention. As well as grand total competency score increased from 99.4± 7.1 pre intervention to 171.1± 6.5 post intervention. Again, these results approved current second hypothesis which stated, "Nurses who receive the disaster management training intervention will have a higher level of competency post intervention than pre intervention."

These findings were as the same line as with Said, et al., (2020) who studied "The knowledge, skill competencies, and psychological preparedness of nurses for disasters: a systematic review". Who reported that there was significant improvement on total mean score of skills related competencies after receiving the disaster management training intervention.

As regard to correlation between grand total knowledge score post intervention with grand total competency score post intervention, the result of the present study showed that a moderate positive significant correlation between grand total knowledge. Score and grand total competency score post intervention.

These findings were agreed Bakr et al., (2022) who studied " Effect of Educational Program on Nurses' Knowledge, Attitudes and Practices Regarding Triage in Emergency Department in Omdurman Military Hospital" who supported there was positive significant correlation between grand total knowledge. Score and grand total competency score post intervention.

Conclusion

Based on the results of the present study, it was concluded that:

Application of disaster management training intervention is beneficial in improving knowledge and enhancing competencies among nurses working in primary health care centers. There was a significant difference between the knowledge and competencies post intervention than pre intervention.

Recommendations

Based on the findings of the present study, the following recommendations were suggested:

- Conducting continuous training intervention about disaster management that aims to raise levels of knowledge and competency of nurses and how to treat with any disaster situations is very urgent in PHC centers.
- Conducting an ongoing professional development program

should be developed to enhance disaster management nursing competency of healthcare workers especially nurses working at primary health care centers in response to any disaster situations and manipulate all domains of disaster management nursing competency.

- Further larger studies with higher sample size and more controlling of confounding factors are recommended in this field of research.
- Application and generalization of the proposed internal disaster management guidelines is also recommended.
- Nursing students, teaching staff and employees must have a professional comprehensive training to disaster management guidelines.
- Re applicability of the study research at different health setting.
- Generalizability of study finding on a wide range of nurses across primary health care centers.

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