Developing a Disaster Management Plan and Implementing Educational Program in Emergency Unit

Doaa Mohammed Elzagh [1] *, Mona Mostafa Shazly [2], Safaa Mohamed Abd Elrahman [3] , Mona Thabet [4]

1. Assistant lecture,Faculty of Nursing- Minia University, Egypt
2. Professor of Nursing Administration, Faculty of Nursing, Ain Shams University, Egypt
3. Professor of Nursing Administration, Faculty of nursing – Minia University, Egypt
4. Lecturer in Nursing Administration Faculty of Nursing, Minia University

Corresponding author E-mail: Doaaelzagh@yahoo.com

Abstract

Background Recently, hospitals often have a prominent but also vulnerable role in disaster management. In general, they receive disaster victims in addition to their normal patient inflow. Disaster planning in most hospitals is primitive and is frequently geared to meet minimal standards as determined by the government. **Aim:** to develop a disaster management plan and to implement an educational program of the Emergency Unit at Mini University Hospital. **Setting**: The study was carried out in the Emergency Unit at Minia University Hospital. **Subject:** all available health care team who work in the Emergency Unit at Minia University Hospital (n=69) and purposive sample of (31) who are experts in the disaster management plan. **Tools:** three tools were used in this study; an Interview Questionnaire, Observational Checklist, and Opinionnaire Sheet. **Results**: the present study showed that highest percent of the study subjects (physicians, nursing personnel, and workers) had low or moderate level of knowledge, awareness and expectation in pre-program and in post-program the highest percentage of them had high level with statistical significant difference. The present study revealed that the total Cronbach's Alpha value for the proposed disaster management plan was (0.875) with good reliability. **Conclusion**: the present study concluded that the validity and the reliability of the developed the proposed disaster management plan was satisfactory and effective. **Recommendations:** hospital should develop an essential rapid disaster management plan and provide simulation scenario exposure to apply the plan periodically throughout the year.

Key words: Disaster, education program, Emergency unit, management plan

Introduction

Numerous emergencies and disasters occur every day around the world. While emergencies and disasters are used interchangeably, researchers and practitioners denote distinctive differences. Disasters are catastrophic, deadly, and disruptive events that occur when hazards interact with vulnerabilities requiring extensive resources. Disasters have a more significant impact on individuals, families, organizations, and societies **(Fan, et al., 2021).**

Emergencies are small disasters with limited impact and required resources. Disasters can be caused by natural, technological, political, economic, or human-made causes. When hazards interact with vulnerable people and weak infrastructure, they result in harm, damage, and disruption. To prevent and minimize the consequences of these vulnerabilities; people, communities, and governments have to create many preventive and recovery strategies. Regardless of the adopted approaches, the final goal is to manage disasters effectively **(Al Kurdi, 2021)**.

Disaster management; is the body of policy and administrative decisions and operational activities pertain to the various stages of a disaster at all levels. Disaster management approaches may vary between countries depending on hazard profile, policies, vulnerabilities, and risk reduction plans. Also, the disaster management cycle illustrates the ongoing process by which governments, businesses, and civil society plan for reducing the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred (**Carada, 2020)**.

Appropriate actions at all points in the cycle lead to greater preparedness, better warnings, reduced vulnerability, or the prevention of disasters during the next iteration of the cycle. The complete disaster management cycle includes the shaping of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure (**Carada, 2020).**

Therefore, the care of casualties from a disaster requires the health care provider to integrate into the larger, predominantly nonmedical multidisciplinary response. This demands a knowledge base far greater than medicine alone. To operate safely as part of coordinated disaster response, either in a hospital or in the field, an understanding of the basic principles of emergency management is necessary. To respond properly and efficiently to disasters, all health care personnel should have a fundamental understanding of the principles of disaster management (which incorporates emergency management in its practice) and what their particular role would be in the response to different types of disasters **(Ciottone, 2016).**

So, educational programs had a pivotal role in reducing disasters and achieving human security, and to achieve sustainable development. Previous studies have shown the positive effects of education in disaster risk management. All people who have been taught about the phenomenon of disasters and how to react to those situations have proved to be able to respond promptly and appropriately, thereby warning others and protecting themselves during times of emergencies **(Yanger, 2018).**

Significance of the Study

Nowadays, the concept of the disaster becomes threatened the whole society like a ghost, because there are no plans for the preparedness of any disaster and the element of surprise is the majority of each event that threaten the life of the entire human race. In 2018 a fire broke out inside Al

Hussein University Hospital which resulting in one patient death due to cardiac arrest during the fire, and 60 patients were transferred to neighboring hospitals; which consider part of medical negligence in hospitals due to the absence of supervision and monitoring by the concerned authorities.

This was not only a terrible incident alone, but there are many fires in other places such as Al-Qasr Al-Aini Hospital in January 2017 and Al-Abbasiya Hospital in May 2018. Through my experience as an assistant lecturer, over a period of last four years, it was observed that the Minia University Hospital departments haven't disaster management plan, and all health care team were not aware of the safe transfer of patients, which may expose patients to the injury during evacuation.

So, the researcher decided to conduct this research titled by develop a disaster management plan and implement an educational program for the Emergency Unit.

Aim of the study:

The aim of the study is to develop a disaster management plan and to implement an educational program for the Emergency Unit.

Research Hypotheses:

- It is expected that the preparedness, expectation, and awareness of study subjects about disaster management will be increased after implementing the educational program.
- It is expected that the disaster management plan will be applicable to be followed after the validation of the plan.

Subjects and Methods

Research Design:

A quasi- experimental research design was utilized in this study.

Setting

The study was conducted at the Emergency Unit, Minia University Hospital.

Subjects

- All available health care team was included in study subject (total no = 69) who work in the Emergency Unit at Minia University Hospital, and they were classified as follows; nursing personnel (40), physicians (20), and workers (9).
- A purposive sample of (31) who are experts in the disaster management plan to take the advantages and benefits of jury group experience in the field of disasters; and obtaining the validity and applicability of the proposed disaster management plan in the emergency unit.

Tools of data collection:

Three tools were used in this study; an Interview Questionnaire, Observational Checklist, and Opinionnaire Sheet.

Tool I: Interview Questionnaire, this tool was adopted from Mostafa, (2003) &Mostafa, (2009) and modified by the researcher to assess study subjects' knowledge, expectation, and awareness of the disaster preparedness in the study setting. This tool was included four parts as follows:

1st part the personal data of the studied subjects (nursing personnel, physicians, and workers); it was including (age, gender, marital status, and years of experience).

2nd part: Preparedness for Internal Disasters a **Questionnaire (PIDQ);** this part consisted of (41) multiple-choice questions to assess knowledge of study subjects about the various aspect of internal disaster preparedness. The responses (answer) were as (1 for correct scored, and zero for incorrect). The scoring system of this part was classified as follows; low knowledge level, if the study subject had scored (<50%), moderate knowledge level (≥50% to ≤75%), and high knowledge level (>75%).

3rd part Disaster Expectation Assessment (DEA); this part was used to assess the study subjects' expectations regarding the possible occurrence of disaster in the setting. This part consisted of (18 items) categorized into (2 subscales) namely, natural disasters, and manmade disasters. The responses were rated on (3) points Likert scale as (high=3, moderate =2, and low=1). The expectation score of this tool was divided as follows; low expectation of disaster ranged from (18 to 29), the moderate expectation of disaster ranged from (30 to 41), and high expectation of disaster ranged from (42 to 54).

4th part: Awareness of the Internal Disaster Preparedness (AIDP); to assess the study subjects' awareness regarding the internal disaster preparedness. This part consisted of (174 items) categorized into (9 subscales) namely, Disaster Preparedness Plan, Nurse Role, Documentation System, Training, Hospital Preparedness, Hospital Prevention Measures, Preparation for Outage of Power, Earthquake Preparedness Measures, and Evacuation Plan. The responses were checked as ("yes"=1, "no"= 0, don't know= 0). The awareness score divided as follows; low awareness level of the internal disaster preparedness if study sample had score (<50%), moderate awareness level of the internal disaster preparedness, if the score was (≥50% to ≤75%), and high awareness level of the internal disaster preparedness, if the score was (>75%).

Tool II: Observational Checklist, this tool was developed by **Mostafa, (2003)**, and it was modified by the researcher and used to check the availability of various resources needed for internal disaster management in the Emergency Unit of Minia University Hospital. This tool consisted of (174 items) categorized in (5 subscales) namely, Medical devices, permanent supplies, Consumables Supplies, Medication emergency locker, and crash cart. The responses were checked by (Yes =1, and No = zero) for following categories (1) availability, (2) working effectiveness, (3) presence of different size / concentrations, (4) accessibility, and (5) quality of storage. The scoring system for the tool was divided as follows: low if the score was (<50%), moderate if score was (≥50% to ≤75%), and high if score was (>75%) for each category and for the total score of the tool.

Tool III: Opinionnaire Sheet, this tool were developed by **Mekky, (2009)**, to assess the validity of designed proposed plan by the jury group, and it was be modified by the researcher. The tool divided into three parts in this study:

1st part the personal data for jury group; it was including (age, gender, marital status, and years of experience).

2nd part the face validity of the proposed disaster plan; this part consisted of (9 items) categorized into (6subscales).

3rd part the content validity of the proposed disaster plan; this part consisted of (123 items) categorized into (11subscales). The scoring system of this tool was divided as follows: Each item was assessed on (4) points likert scale as (Very high = 4, High = 3, Moderate = 2, low =1), the range seems to be:

- Low validity levels of a proposed plan by the jury group if the score ranging from (1 to 132).
- Moderate validity levels of a proposed plan by the jury group if the score ranging from (133 to 264).
- High validity levels of a proposed plan by the jury group the score ranging from (265 to 396).
- Very high validity levels of a proposed plan by the jury group if the score ranging from (397 to528).

Validity and reliability

The tools of the interview questionnaire, observational checklist, and opinionnaire sheet were tested for validity by five jury experts in the nursing administration field who are experts in disaster management. The jury consisted of one professor and one Assistant Professor at the Department of Nursing Administration - Faculty of Nursing - Minia University, and three Assistant professors, Department of Nursing Administration - Faculty of Nursing - Tanta University.

Internal consistency of the interview questionnaire and opinionnaire sheet was assessed by Cronbach's alpha coefficient. The reliability for the tools was (0.965) for Interview Questionnaire, and (0.977) for Opinionnaire Sheet.

Pilot Study

The pilot study was conducted on (10%) of study subjects in which they were selected randomly from the study setting in order to check and ensure the clarity and applicability of the tools; as well as to identify obstacles and problems that may be encountered during data collection and estimate the time needed to fill the questionnaires.

For tools (I, II) the pilot study was conducted with an interview questionnaire sheet on (seven of study subjects) as two physicians and five nursing personnel. And in the light of the pilot study findings, no modification was done in the tools and the tools had its final form; so the pilot study results were included in the actual study results.

For the tool (III) the pilot study was done on (three of jury group) who is expert in the disaster management; and according to their modification on the tool, the subjects who participated in the pilot study were excluded from the actual study.

Procedure

Official permissions were obtained from the Dean of Faculty of Nursing at Minia University and from the Director of Minia University Hospitals to carry out the study. The study was conducted in five phases; Assessment phases, designing phase, validity phase, implementation phase, and evaluation phase.

Phase (I): Assessment:

- Reviewing the literature as well as assessing the Emergency Unit of Minia University Hospital was done as an initial step to obtain information regarding disaster preparedness and management and modify the study tools.
- Then the validity of the tools was done by a five jury who are expert in disaster management from the field of Nursing Administration. As well as the pilot study for the tools were done.
- Reviewing the scientific literature using textbooks, e-books, journals, periodicals, and websites, to initiate a draft for the proposed disaster management plan.
- An interview with the director of the Emergency Unit and the nursing director at Minia University Hospital was done by the researcher to obtain their permissions to conduct the study after explaining the purpose of the study.
- The researchers established a rapport with health care team as physicians, nurses, and workers of the Emergency unit- Minia University Hospital, and obtain their consent after explaining the importance and purpose of the study.
- A pre-test was done to all available health care team who work at the Emergency unit of Minia University Hospital using tool (I). The data was collected in two months from the beginning of October 2019 to the end of December 2019.
- The researcher clarified items of questionnaire tool to the participants if they asked to enable them to understand the questionnaire. This tool filled from each study subject within (20 to 40) minutes.
- Then the researcher assessing the various resources needed for internal disaster management for the Emergency unit of Minia University Hospital by using tool II (observational Checklist) which filled within 30 to 40 minutes in the presence of the nursing director or assistant director of the unit.

Phase II: Designing the plan:

- After reviewing the literature and analyzed the pretest of study subjects (nursing personnel, physicians, and workers) data, the researcher developed a proposed plan for disaster management for the Emergency Unit of Minia University Hospital.
- The researchers establish rapport with all available jury groups who have experience in the disaster management plan, and obtain written consent to participate in the study after explaining the importance and purpose of the study.
- Then the validity of tool III (Opinionnaire Sheet) was obtained by three juries who have experience in the disaster management plan.
- Accordingly, the proposed content of the disaster management plan was designed by the researchers as the initial phase which presented to the supervisors for examining the content coverage, the sequence of elements, clarity, fit, applicability, wording, length, form, and overall appearance; then making the modification.

Phase III: Validity of proposed plan:

- The proposed disaster management plan was presented to the jury group to express their opinion on the content of the plan.
- A jury group consisted of (31) evaluated the validity and reliability of the proposed disaster management plan by using the opinionnaire sheet (tool III).

- Then the statistical analysis of the opinionnaire sheets from the jury group was done to measure the validity and reliability of the proposed plan.
- In the initial form; the content of the proposed disaster management plan consisted of (109 items) categorized into (9 subscales). After the modifications of the jury group and statistical analysis there were (14) invalid items omitted and added two domain, and (28) items.
- In the final form of the proposed disaster management plan content consisted of (123) items categorized into (11 subscales) as follows: an introduction of the Minia University Emergency Hospital, the emergency cases in the disaster management plan, Disasters generally, the proposed disaster management plan, the stages of disaster management in the proposed plan, the stages of implementing the proposed disaster management plan, the content of the proposed evacuation plan , different types of disasters with the proposed plan, scenario facing a fire inside of Emergency unit at Minia University Hospital at intensive Care Department, job cards for the tasks and responsibilities of all employees, and an engineering diagram of the Emergency unit at Minia University Hospital is clear and comprehensive.
- After completing the design of the proposed disaster management plan, a guided booklet was prepared about internal disasters at the Emergency Unit of Minia University Hospital which encompasses all important information about the proposed disaster management plan**.**

Phase IV: Implementation of the program:

- According to the content of the proposed disaster management plan an educational program was planned for the study subjects (physicians, nurses, and workers). Also, the booklet was distributed at the beginning of the educational program for all study subjects.
- The program has been implemented by dividing the study subject into three categories according to their specialties (physician, nurses, and workers). The study subjects were divided according to their categories (physicians, nurses, and workers) into small sub-groups; each small sub-group included from four to five members.
- There were (two) groups of each study subjects trained each day during morning and evening shifts according to their scheduled and break time. Each group attended (10) sessions that lasted for (8) weeks during November and December (2020).
- At the beginning of the each session, the researcher made a summary of the previous session. Additionally, at the end of each session, the researcher summarized the content of the session and asked the study subjects for any question.

Phases V. Evaluation

At the end of the program implementation for the study subjects (physicians, nurses, and workers) the researcher collected the post-test by using the interview questionnaire sheet (preparedness, expectation, and awareness of internal disaster management); this data was collected during January 2021.

Ethical considerations

- This study was granted approval by the Ethical Committee of the Faculty of Nursing, Minia University.
- Informed consents were obtained from all the participants before the data collection.
- The study participants were reassured that their participation was voluntary and they had the right to withdraw from the study at any time if they want that.
- The study participants were reassured that their anonymity was maintained although the study and collected information wouldn't be used except for the purpose of this study and written consent was obtained.

Statistical Analysis

Data entry and statistical analysis were performed using computer software, the statistical package for social sciences (SPSS), version 22. Suitable descriptive statistics were used such as; frequency, percentage mean and standard deviation was utilized in analyzing data pretended. The chi-square test was used to detect the relation between the variables. In addition, a correlation coefficient (r) test was used to estimate the close association between variables. The level of significance (p-value) threshold of significances was fixed at the (5%) > 0.05 indicates non-significant while ≤ 0.05 indicates significant relationship.

Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability so the internal consistency of the Opinionnaire Sheet was assessed with Cronbach's alpha coefficient. Cronbach's alpha coefficient of (0.00) indicates no reliability and a coefficient of (1.00) indicates perfect reliability. However, a reliability coefficient of (> 0.70) is acceptable **(Bujang et al., 2018).**

In addition, the Goodness of Fit Index (GFI) is a measure of fit between the hypothesized model and the observed covariance matrix. The adjusted goodness of fit index (AGFI) corrects the GFI, which is affected by the number of indicators of each latent variable **(Donthu et al., 2021).**

The GFI and AGFI range between 0 and 1, with a value of over (0.9) generally indicating an acceptable model fit. Relative fit indices (also called "Incremental Fit Indices" (IFI) and "Comparative Fit Indices" (CFI) compare the chi-square for the hypothesized model to one from a "null", or "baseline" model. This null model almost always contains a model in which all of the variables are uncorrelated, and as a result, has a very large chi-square (indicating poor fit) **(Grotzinger, et al. 2019).**

Relative fit indices include the normed fit index and comparative fit index. CFI values range from (0) to (1), with larger values indicating better fit. Previously, a CFI value of (0.90) or larger was considered to indicate an acceptable model fit **(Mihalca, 2021).**

Root Mean Square Error (RMSE) is the standard deviation of the residuals (prediction errors). Residuals are a measure of how far from the regression line data points are. Root mean square error is commonly used in forecasting, and regression analysis to verify experimental results **(Ulloa et al. 2018).**

Results

Table (1): Percentage distribution of personal data of study subjects (physicians, nurses and workers) (n=69)

Personal data	Study subjects (n=69)					
	Physicians (n=20)		Nurses (n=40)		Workers (n=9)	
	No	%	No	%	No	%
Age						
• 20 <30	20	**100.0**	32	**80.0**	2	22.3%
• 30 < 40	0	0.0	8	20.0	7	**77.7%**
Gender						
• Male	18	**90.0%**	28	**70.0%**	1	11.1%
• Female	2	10.0%	12	30.0%	8	**88.9%**
Marital status						
• Single	15	**75.0%**	22	**55.0%**	0	0.0%
• Married	5	25.0%	18	45.0%	6	**66.7%**
• Divorced	0	0.0%	0	0.0%	3	33.3%
Years of experiences						
• 1 to <10	20	100.0%	32	80.0%	6	66.7%
• 10 to 19	0	0.0%	8	20.0%	3	33.3%

Table (1) shows regarding age that all (100.0%) of the physicians as well (80%) of nurses' group age between (20- < 30) years; (77.7%) of the worker group age between (30-< 40) years. For the gender (90%) of the physicians, as well as (70%) of nurses group are males; while (88.9%) of workers group are females.

Regarding marital status, there are (75%) of the physicians as well as (55%) of nurses group are single; while (66%) of the worker group married. Speaking about years of experience, all (100%) of the physicians, (80.0%) of nurses group as well as (66%) of workers group have (1-< 10) years of experiences.

Table (2): Percentage distribution of personal data of jury group

Personal data	Jury group (n=31)	
	No	%
Age		
• 20 <30	7	22.6%
• 30 < 40	24	**77.4%**
Gender		
• Male	19	**61.0%**
• Female	12	39.0%
Marital status		
• Single	5	16%
• Married	26	**84.0%**
Years of experiences		
• 1 to <10	10	32.0%
• 10 to 19	21	**68.0%**

Table (2) shows regarding age of jury group that (77.4%) of them are in the age group between (30-< 40) years; for the gender, there are (61%) of them are males. Regarding marital status, there are (84%) of jury group married; about years of experience, there are (68%) of the jury group have (10 - 19) years of experiences.

Table (3) Cronbach's Alpha values, mean and standard deviations for the proposed disaster management plan

The proposed disaster management plan	Cronbach Alpha α	Mean	±SD	Total Cronbach's α
An introduction of the Minia University Emergency Hospital	0.883	21.8	2.3	0.875
The emergency cases in the disaster management plan	0.945	35.8	4.2	
Disasters generally	0.949	46.9	5.2	
The proposed disaster management plan	0.844	24.9	2.9	
The stages of disaster management in the proposed plan	0.977	54.4	6.7	
The stages of implementing the proposed disaster management plan	0.963	53.0	6.9	
The content of the proposed evacuation plan	0.990	130.0	18.6	
Different types of disasters with the proposed plan	0.985	94.9	13.6	
Scenario facing a fire inside of Emergency unit at Minia University Hospital at intensive Care Department	0.978	3.4	0.5	
Job cards for the tasks and responsibilities of all employees	0.947	7.2	1.1	
An engineering diagram of Emergency unit at Minia University Hospital is clear and comprehensive	0.990	3.6	0.55	

Note : * an excellent reliability; cronbach's @ of ≥0.9 is excellent ; Cronbach's @ of ≥0.8 is good; Cronbach's @ of ≥0.7 is acceptable Cronbach's @ of ≥0.6 is questionable, Cronbach's @ of ≥0.5 is poor and Cronbach's @ of ≥0.4 is unacceptable.

Table (3) reveals that the total Cronbach's Alpha value for the proposed disaster management plan is (0.875) with good reliability; where the specific reliability coefficients of the proposed disaster management plan dimensions rang from (0.844 to 0.990).

Table (4): Goodness of fit indicator of proposed disaster management plan

Tool	X^2	Df	X^2/ df	IFI	CFI	RMSEA
Initial	1715	325	5.3	0.67	0.62	0.125
Modified	1125	515	2.2	0.93	0.91	0.02

Note: denote to significances (i.e . p< 0.05).,CFI: comparative fit index.,IFI incremental fit index.RMSEA: root means squared error of approximation.

Table (4) presents that the value of the RMSEA index is (0.125), the CFI is (0.62) and IFI is (0.67) at the initial disaster management plan are reasonable compared with an acceptable value of two fit indices of the CFI and IFI which are (≥ 0.90). The final disaster management plan is satisfactory (X2 (515) = 1125, P-Value < 0.02*) in which the CFI and IFI increase slightly, but RMSEA decrease to (0.02*).

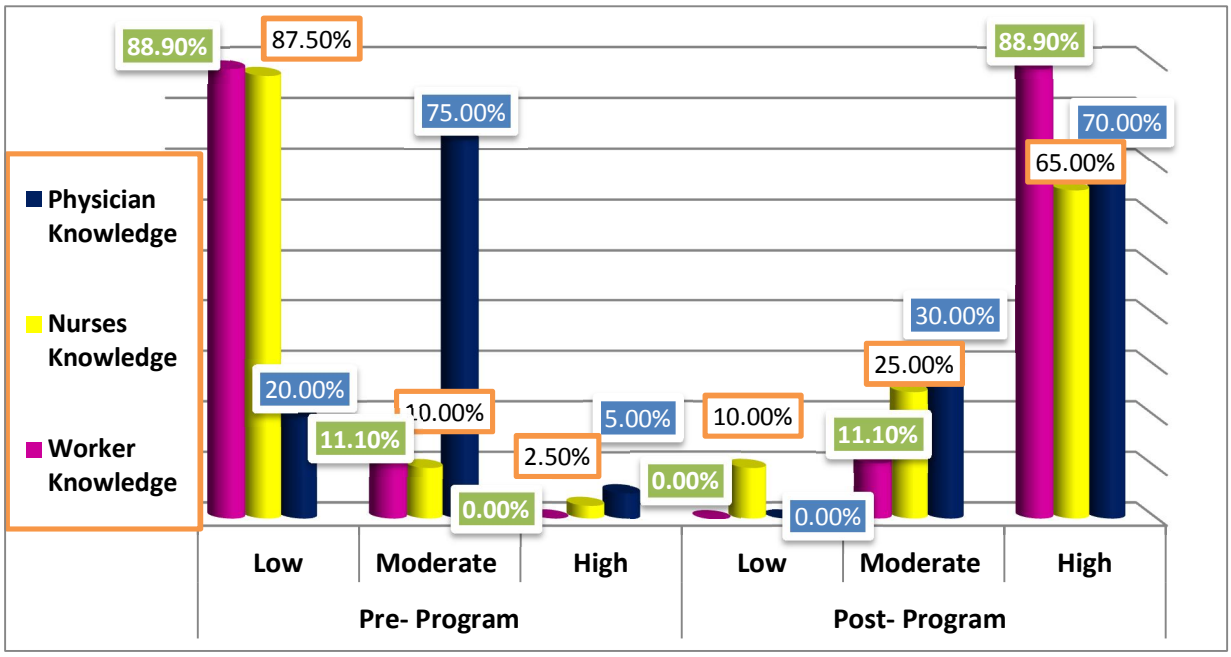

Figure (1): Total knowledge level of studied sample (physician- nurses- workers) regarding preparedness of disaster pre and post-program

Figure (1) presents that (75%) of the studied physician have a moderate knowledge level and (20%) have a low knowledge level in the pre-program; while in the post-program there are (70%) of them have a high Knowledge level and (30%) have a moderate knowledge level with highly statistically significant differences (P= 0.0001**).

Regarding the total knowledge level of Nurses, it was observed that (87.5%) of studied nurses have a low knowledge levels in pre-program; while in post-program (65%) of them have a high knowledge levels with highly statistically significant differences (P=0.0001**).

Also, regarding the total knowledge level of workers, there are (88.9%) of studied workers have a low knowledge level in pre-program; while in post-program (88.9%) of them have high knowledge level with highly statistically significant differences (P=0.0001**).

Table (5): Total expectation level of studied sample (physician- nurses- workers) regarding the possible occurrence of disaster pre and post program

Total expectation level	Expectation Level of Studied Sample												Fisher	*P*-value
	Pre						Post							
	Low		Moderate		High		Low		Moderate		High			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Total Physicians' expectation	0	0.0	16	80.0	4	20.0	0	0.0	9	45.0	11	55.0	2.849	0.04*
Total Nurses' expectation	2	5.0	31	77.5	7	17.5	0	0.0	20	50.0	20	50.0	10.632	0.005**
Total Workers' expectation	0	0.0	9	100.0	0	0.0	0	0.0	6	66.7	3	33.3	3.600	0.05*

Table (5) shows regarding total physicians' expectations, that (20%) of the studied physician have a high level of expectation in pre-program compared to (55%) have a high level of expectation in post-program with statistically significant differences (P-value = 0.04*). Regarding total nurses' expectations, there are (17%) of the studied nurses have a high level of expectation in pre-program compared to (50%) have a high level of expectation in post-program with highly statistically significant differences (P-value = 0.005*).

Also, regarding total workers' expectations, all (100%) of the studied workers have a moderate level of expectation in pre-program compared to (66.7%) have a high level; and (33.3%) have a moderate level of expectation in post-program with statistically significant differences (P-value = 0. 05*).

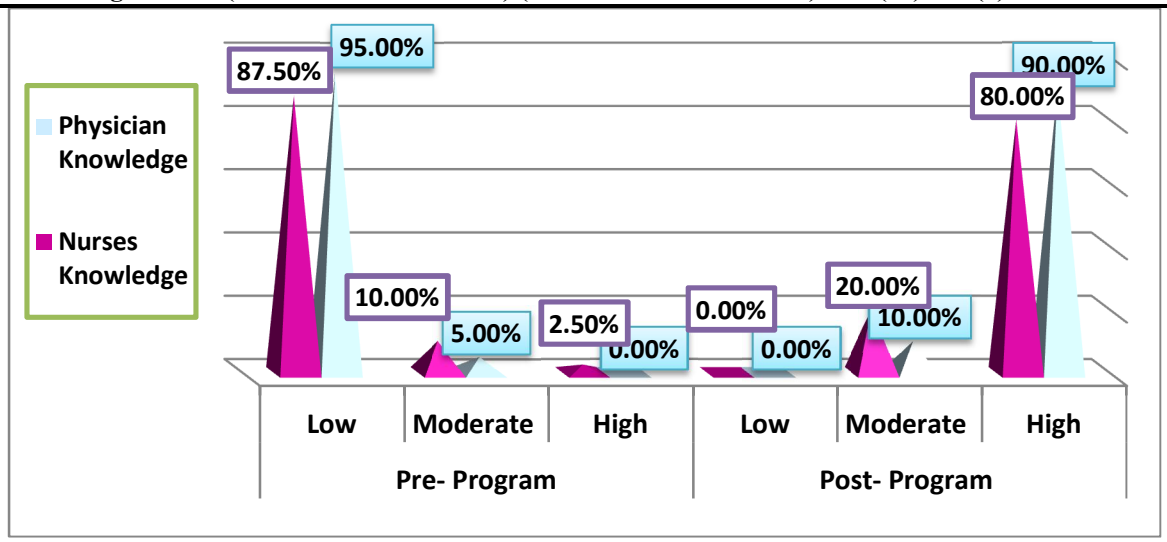

Figure (2): Total awareness level of studied sample (physician- nurses- workers) regarding preparedness of disaster pre and post-program

Figure (2): reveals regarding total awareness level of physicians, that (95.0%) of studied physicians have low awareness level in pre-program; while in post -program (90.0%) of them have high awareness level with highly statistically significant differences(P=0.0001**). Also, regarding the total awareness level of Nurses, (87.5%) of studied nurses have low awareness level in pre-program; while in post -program (80.0%) of them have high awareness level with highly statistically significance differences (P=0.0001**).

Table (6): Correlation between physicians, nurses and workers knowledge level with their expectation and awareness level regarding disaster pre and post-program

Variables	Study subjects Total Knowledge score					
	Physicians		Nurses		Workers	
	Pre	Post	Pre	Post	Pre	Post
	r(P – value)	r(P – value)	r(P – value)	r(P – value)	r(P – value)	r(P – value)
• Expectation of natural disaster	0.152(0.349)	0.344(0.03*)	0.089(0.710)	0.475(0.04*)	0(1.00)	0.362(0.338)
• Expectation of man-made disaster	0.250(0.119)	0.412(0.05*)	0.344(0.138)	0.521(0.001**)	0.014 (0.972)	0.033(0.933)
• Awareness	0.370(0.019*)	0.150(0.354)	0.277(0.237)	0.469(0.037*)	NA	NA

Table (6) reveals that there are fair positive associations for physician and nurses between their knowledge level in post-program and their expectation of natural disaster (r= 0.344 & P – value < 0.03*), and (r= 0.475 & P – value < 0.04*) respectively. Also, the table shows that there is a fair positive association for physicians between their knowledge level in post-program and their expectation of man-made disaster (r= 0.412 & P – value <0.05*), and there is a moderate positive association between nurses knowledge level in post-program and their expectation of man-made disaster (r= 0.521 & P – value < 0.001**).

This table also presents a fair positive association between physician knowledge level in pre-program and their awareness regarding hospital disaster (r= 0.370 & P – value <0.019*), and nurses knowledge level of post-program and their awareness regarding hospital disaster (r=0 .469& P – value < 0.037*).

Table (7): The availability of various resources needed for internal disaster management for the emergency unit at Minia University Hospital

Dimensions of resources	Resources needed for internal disaster management									
	Availability		Work efficiently		Different size		Accessibility		Proper storage	
	No	%	No	%	No	%	No	%	No	%
Medical devices (n=13)										
• Yes	12	92.3%	9	69.2%	6	46.1%	9	69.2%	4	30.8%
• No	1	7.7%	4	30.8%	7	53.9%	4	30.8%	9	69.2%
Permanent supplies (n=20)										
• Yes	11	55%	9	45%	6	30%	9	45%	7	35%
• No	9	45%	11	55%	14	70%	11	55%	13	65%
Consumable supplies (n=26)										
• Yes	19	73.1%	19	73.1%	9	34.6%	13	50%	14	53.8%
• No	7	26.9%	7	26.9%	17	65.4%	13	50%	12	46.2%
Emergency wheel (n=44)										
• Yes	21	47.7%	21	47.7%	21	47.7%	21	47.7%	0	0.0%
• No	23	52.3%	23	52.3%	23	52.3%	23	52.3%	44	100.0%
Crush cart (n=73)										
• Yes	38	52.1%	31	42.4%	21	28.8%	24	32.8%	1	1.4%
• No	35	47.9%	42	57.6%	52	71.2%	49	67.2%	72	98.6%
Total resources needed (n=176)										
• Yes	101	57.3%	89	50.5%	63	35.7%	76	43.1%	26	14.7%
• No	75	42.7%	87	49.5%	113	64.3%	100	56.9%	150	85.3%

Table (7) reveals that the total resources needed for internal disaster management; regarding the availability of the resources, more than half (57.3%) of resources are available. For the resources work efficiently, the half of recourses (50.5%) are working efficiently. While the highest percentage of the resources have no different size (64.3%); no accessibility (56.9%); and not have proper storage (85.3%).

Discussion

Disasters are unexpected events since it is unknown when, where, and how they will occur. They create chaos, risk of injury or illness, and loss of life or property. When disasters occur, there is often a mismatch between resources and needs, magnifying the chaos, risks, and losses. In addition, the number and distribution of victims over time or location can vary. Insidious disasters such as radiation accidents can continue to yield victims over a longer period of time, and sudden disasters can produce a high number of victims at one time. In these cases, the demands on and organization of medical capacity take very different forms. Disasters predominantly resulting in human injuries or illness are termed Mass Casualty Incidents (MCIs) **(Bahramnezhad, et al., 2019).**

For the socio demographic data of studied sample; regarding age, more than three quarters of jury group as well as workers aged between (30-< 40) years. While all physicians as well as majority of nurses aged between (20- < 30) years. Regarding gender, more than two thirds of nurses, jury group as well as the majority of the physicians were males, while the majority of workers group were females.

As regards to the current marital status, the majority of jury group as well as more than two thirds of the worker group were married, while three quarters of the physicians as well as more than half of nurses group were single. Regarding years of experience, all physicians, the majority of nurses group, as well as more than two thirds workers group had years of experiences between (1-< 10) years; while more than two thirds of the jury group had years of experiences between (10 - 19) years.

Regarding disaster management plan reliability; in the current study, regarding Cronbach's Alpha values, mean and standard deviations for the proposed disaster management plan; it was noted that the total Cronbach's Alpha value for the proposed disaster management plan was (0.875) with good reliability; where the specific reliability coefficients of the proposed disaster management plan dimensions ranged from (0.844 to 0.990).

This result might be attributed to proof that all items of the tool were relevant to the proposed plan, in a logical sequence, and following a scientific manner. The reliability estimated used in the current study was the internal consistency reliability guided by Cronbach's Alpha coefficient and item-total correlation which assessed the consistency of the results across items within a test. In internal consistency reliability estimation, the proposed disaster management plan at the emergency unit was administered to the jury group to analyze its reliability.

Cronbach's alpha coefficient is the most frequently used statistic to show internal consistency reliability **(Brink & Wood, 1998).** Cronbach's alpha generally increases as the inter-correlations among test items increase and is thus known as an internal consistency estimate of the reliability of test scores. Because inter-correlations among test items are maximized when all items measure the same construct, Cronbach's alpha is widely believed to indirectly the degree to which a set of items measures a single unity (dimensional latent construct) **(Polit & Beck, 2004).**

In this line, **Cronback, (1951)** mentioned that the alpha is the most appropriately used test when items measure different dimensions within a single construct. Cronbach's alpha's reliability coefficient normally ranges between (0 and 1); however, there is actually no lower limit to the coefficient. The closer Cronbach's alpha coefficient is to 1.0, the greater the internal consistency of the items in the scale. Based upon the given formula, the size of alpha is calculated by rk / [1+ (k-1)r] and determined by both the number of items considered and (r) is the mean of the inter-items correlations.

Regarding disaster management plan validity; in the current study regarding to Goodness of Fit Indicator (GFI) of the proposed disaster management plan; it was noted that the value of the RMSEA index was 0.125, the CFI was 0.62 and IFI was 0.67 at the initial disaster management plan were reasonable compared with the acceptable value of two fit indices of the CFI and IFI which were ≥ 0.90. The final disaster management plan was satisfactory (X^2 (515) = 1125, P–Value < 0.02*) in which the CFI and IFI increased slightly, but RMSEA decreased to (0.02*).

This result might be attributed to the fact that the absolute correspondence of the proposed plan, the indicators applied in a competent strategic analysis was: Goodness of Fit Index (GFI) and the Index of Corresponding Values and Approximate Error Expressed as in the Root Mean Square Error of Approximation (RMSEA). In GFI, the higher the value is the higher one with correspondence where the (GFI) value is between 0 to 1 and closeness to indicate a very good fit **(Bartholomew & Tzamourani, 1999)**.

Accordingly in the current findings, the obtained value for the modified the proposed disaster management plan was satisfactory [X2 (515) = 1125, P < 0.02]. The (CFI) and (IFI) increased slightly, but (RMSEA) decreased to 0.02. RMSEA is an indicator based on an appreciative error that occurs due to the expected degree of freedom within the population **(Sivo, et al., 2006)**.

The lower the indicator is, the higher the correspondence is. Acceptable correspondence is under the value of (0.08), but some authors agreed with the value is even under (0.10). In the current study, the modified tool had a value of (0.04) which was according to **(Sivo, et al., 2006)** was considered as an indicator of good correspondence.

After application of all needed statistical tests and further modifications, the finalized the proposed disaster management plan was satisfactory and effective from the jury group recommendation.

Regarding total knowledge level about the preparedness of disaster; this study revealed that there was more than three-quarters of study subjects (nurses, workers) had low knowledge levels except for physicians who had moderate knowledge levels in pre- program. This result might be due to the studied subject (physicians, nurses, workers) over workload in the emergency department and the lack of opportunities to train them to cope with disasters. The difference of doctors in total knowledge level may be due to the different level of qualification.

This result is in agreement with **Alzahrani and Kyratsis, (2017)** who done a study in Mecca, Saudi Arabia and found that the health care team in four major hospitals had

deficient knowledge concerning disasters and emergency, as well as their related roles. Also, a similar deficient knowledge of disasters was found by **Aluisio, et al., (2016)** among health care teams who were trained in India.

Regarding total knowledge level about the preparedness of disaster, this study revealed that there was a highly statistically significant difference between study subjects before and after the implementation of the program. This explained that the effectiveness of an educational program of disaster management can helped the study subject to know their role during disaster strikes, types of emergency cases levels, and defines disasters and a disaster management plan. This result can be proved that the health care team had the ability to comprehend the importance of disaster management and know their needs.

This is congruent with the results of **Hubloue (2020)** who stated that disaster and mass casualty events necessitate exceptionally knowledge and skills from health care team to provide health care in a primitive or aggressive environment and the capability to systematize disaster response.

Moreover, **Nejadshafiee et al. (2020)** indicated that health care professional education and training had a limited focus on the preparation of health professionals for disaster through undergraduate education. **Nejadshafiee et al. (2020)** also stated that disaster education and training for health professionals may boost the level of disaster preparedness and help to make Emergency Medical Services (EMS) professionals confident in their abilities to respond effectively in such devastating events.

This result was consistent with **Rebmann et al., (2016);** who asserted that knowledge and awareness of medical staff concerning disaster management are low, indicating that disaster-related educational programs should be initiated and implemented at universities with an emphasis on its usefulness. In another study by **Zarezadeh et al. (2017)** who mentioned that medical staff considered disaster education, first aid skills, epidemic control and prevention, post-disaster psychological problems, and discharge principles as essential educational needs.

Regarding the total expectation level of the possible occurrence of the disaster; this study revealed that there was a highly statistically significant difference between study subjects before and after the implementation of the program. This explained that there was increasing in the total expectation level regarding the possible occurrence of the disaster. This might be due to the increase of their knowledge and awareness about the lack of resources and their requirements of disaster management which lead to increase their expectation level of the disaster. Also, this result can explain the effectiveness of the educational program of disaster management for providing enough knowledge about disaster management.

This was supported by **Wu et al., (2020),** who found that intensive targeted training courses have demonstrated significant improvements in health care team knowledge and awareness as reported in an educational intervention for health care teams on the Eastern Egyptian borders.

Regarding total awareness level about the preparedness of disaster; this study revealed that there was a highly statistically significant difference between study subjects before and after the implementation of the program. This result can be attributed that the study subject had a high awareness level of disaster preparedness after the implementation of the program; and this might be related to different teaching methods used during disaster management program, by showing a video with an illustrative scenario from the workforce for occupational safety and health, using of positive reinforcement during sessions, encouragement the study subject to express their opinions about the preparedness of emergency unit to confront disaster, and assuring the importance of training on preparedness to disaster.

This is consistent with **Hassan Gillani et al., (2020),** who reported that integrating disaster preparedness in training make graduates student able to improve disaster preparedness. Moreover, **Brinjee et al., (2021)** considered preparation for disastrous events as the highest priority for healthcare professionals.

Regarding correlation, the present study reported that there were statistically significant correlations between knowledge level of post-program and their expectation of natural disaster and also their awareness. Also, this result reported that there was a highly statistically significant fair positive association for nurses between knowledge level of post-program and their expectation of man-made disaster. This finding might be due to the nurse who had good knowledge background of disaster preparedness can be definitely more able to identify the resources needed for its application, which would increase her awareness.

On the other hand, a nurse with good awareness of disaster preparedness could have more enthusiasm to improve related knowledge. In congruence with this, an Egyptian study by **de Rooij et al., (2020**) revealed that the training of nurses led to higher knowledge and better attitudes and awareness towards a mass infection disaster.

Conclusion:

The present study concluded that the validity and the reliability of the developed proposed disaster management plan was satisfactory and effective from the jury group recommendation. As well, the study subject (physicians, nurses, and workers) had an improvement in their levels of disaster preparedness's knowledge, expectation, and awareness after the implementation of the program than the pre-program with statistically significant differences.

In addition, it was noted that the highest percentage of total resources needed for disaster management were available and work efficiently; but highest percentage of these resources were not accessible, have no different size, and not store properly.

There were positive correlations between levels of knowledge among physicians, and nurses and their expectation level in post-program. Also, there was a positive correlation between physician's levels of knowledge and their awareness level in pre-program; while nurses have a positive correlation in post-program between their knowledge level and awareness level.

Recommendations

Based on the findings of the current study it was recommended that:

- Hospitals should ensure that the organization's annual budget will include adequate resources to implement, evaluate, and apply of the proposed disaster management plan.
- All hospitals should develop an essential rapid updating plan to confronting any disaster according to their special structure and system.

- Continuous training program should be performed to all health care team of all hospital and other hospitals on disaster management.
- The Ministry of Higher Education should add a curriculum for crises and disasters management at all educational levels.

References

(1) Al Kurdi, O.F. (2021). A critical comparative review of emergency and disaster management in the Arab world. Journal of Business and Socio-economic Development; 1(1): 24-46. https://doi.org/HYPERLINK "https://doi.org/10.1108/JBSED-02-2021-0021"10HYPERLINK "https://doi.org/10.1108/JBSED-02-2021-0021".HYPERLINK "https://doi.org/10.1108/JBSED-02-2021-0021"1108HYPERLINK "https://doi.org/10.1108/JBSED-02-2021-0021"/JBSED-HYPERLINK "https://doi.org/10.1108/JBSED-02-2021-0021"02HYPERLINK "https://doi.org/10.1108/JBSED-02-2021-0021"-HYPERLINK "https://doi.org/10.1108/JBSED-02-2021-0021"2021HYPERLINK "https://doi.org/10.1108/JBSED-02-2021-0021"-HYPERLINK "https://doi.org/10.1108/JBSED-02-2021-0021"0021

(2) Alzahrani F. and Kyratsis Y. (2017) : Emergency nurse disaster preparedness during mass gatherings : a cross - sectional survey of emergency nurses ' perceptions in hospitals in Mecca , Saudi Arabia . BMJ Open; 7 (4): c013563 . doi : 10.1136 / bmjopen - 2016-013563.

(3) Aluisio, A.R., Daniel, P. , Grock, A. , Freedman, J. , Singh, A. , Papanagnou, D. & Arquilla, B. (2016). Case - based Learning Outperformed Simulation Exercises in Disaster Preparedness Education Among Nursing Trainees in India A Randomized Controlled Trial . Prehosp Disaster Med; 31(5):516-523. https://doi:10.1017 / S1049023X16000789.

(4) Bahramnezhad, F., & Abbasi Dolatabadi, Z. (2019). Letter to Editor: A Report on the First Meeting on the Role of the Nurses Working in the Intensive Care Units in Emergencies and Disasters in Iran. Health in Emergencies and Disasters; 5(1):1-4.

(5) Bartholomew, D. J., & Tzamourani, P. (1999). The goodness of fit of latent trait models in attitude measurement. Sociological Methods & Research; 27(4): 525-546.

(6) Bhatia, G. (2018). Preparedness of Chandigarh Against a Deliberate or Accidental Release of a Biological Agent and Responsible Consequence Managemen (Doctoral dissertation, Chitkara University).

(7) Brink, P. J., & Wood, M. J. (1998). Descriptive designs. Advanced design in nursing research:100-110

(8) Brinjee, D., Al Thobaity, A., Almalki, M. & Alahmari, W. (2021). Identify the Disaster Nursing Training and Education Needs for Nurses in Taif City, Saudi Arabia. Risk Management and Healthcare Policy; 14(1): 2301-2310.

(9) Carada, M. C. (2020).Analyzing climate change and disaster management policies in the development of the ecotourism industry in the Philippines. Journal for information, study and discussion of Global Resource Management, Doshisha University;6(1): 2-17.

(10) Cronback, L. J. (1951). Coefficient review: getting the most from a panel of experts. Applied nursing research; 5(4): 194-197.

(11) Ciottone, G. R. (2016). Introduction to Disaster Medicine. Ciottone's Disaster Medicine: 2–5. https://doi.org/HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"10HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7".HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"1016HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"/BHYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"978HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"-HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"0HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"-HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"323HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"-HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"28665HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"-HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"7HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7".HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"00001HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"-HYPERLINK "https://doi.org/10.1016/B978-0-323-28665-7.00001-7"7

(12) de Rooij, D., Belfroid, E., Hadjichristodoulou, C., Mouchtouri, V. A., Raab, J. & Timen, A. (2020). Educating, training, and exercising for infectious disease control with emphasis on cross-border settings: an integrative review. Globalization and health; 16(1):1-49.

(13) Fan, C., Zhang, C., Yahja, A. & Mostafavi, A. (2021). Disaster City Digital Twin: A vision for integrating artificial and human intelligence for disaster management. International Journal of Information Management; 56(36):102049.

(14) Gowing, J.R., Walker, K. N., Elmer, S.L. & Cummings, E.A. (2017). Disaster Preparedness among Health Professionals and Support Staff : What is Effective ? An Integrative Literature Review . Prehosp Disaster Med; 32 (3): 321-328. doi : 10.1017 / S1049023X1700019X . Epub 2017 Mar 16.

(15) Habib, R. R., Halwani, D. A., Mikati, D. & Hneiny, L. (2020). Sex and gender in research on healthcare workers in conflict settings: a scoping review. International journal of environmental research and public health; 17(12): 4331.

(16) Hassan Gillani, A., Mohamed Ibrahim, M. I., Akbar, J. & Fang, Y. (2020). Evaluation of disaster medicine preparedness among healthcare profession students: A cross-sectional study in Pakistan. International journal of environmental research and public health;17(6): 2027.

(17) Hubloue, I. (2020). Disaster medicine as an academic discipline: looking for the evidence. Saudi Journal of Emergency Medicine; 1(1):3-4.

(18) Kim, Y., Park, J., & Park, M. (2016). Creating a culture of prevention in occupational safety and health practice. Safety and health at work; 7(2):89-96.

(19) Mekky, W. (2009). Designing and validating A Disaster Plan for nursing department at Al - quds hospital . (Doctoral Thesis Submitted to Faculty of Nursing , Ain Shams University).

(20) Mostafa, H. (2009). Designing and validating an internal Disaster Plan for the Emergency Hospital at Al - Mansoura University. (Doctoral Thesis Submitted to Faculty of Nursing , Ain Shams University) .

(21) Mostafa, J. (2003). Designing and validating a Disaster Plan for the Emergency Hospital at Al - Mansoura University. (Doctoral Thesis Submitted to Faculty of Nursing , Ain Shams University).

(22) Mustchin, S. & Martinez, Lucio, M. (2020). The evolving nature of labour inspection, enforcement of employment rights and the regulatory reach of the state in Britain. Journal of Industrial Relations; 62(5):735-757.

(23) Nejadshafiee, M., Mirzaee, M., Aliakbari, F., Rafiee, N., Sabermahani, A. & Nekoei-Moghadam, M. (2020). Hospital Nurses' Disaster Competencies. Trauma Monthly; 25(2):89-95.

(24) O'Connor, A. M., & Evans, A. D. (2020). Perceptions of older adult jurors: the influence of aging stereotypes and jury laws. Psychology, Crime & Law; 26(7): 648-666.

(25) Polit, D. F., & Beck, C. T. (2004). Nursing research: Principles and methods. Latin BooK Central Library and Document Center of Kerman University of medical Sciences, 5th ed. Lippincott Williams & Wilkins.

(26) Rebmann, T., Elliot, M., Artman, D., Vannatta, M. & Wakefield, M.(2016). Impact of an Education Intervention on Missouri K-12 School Disaster and Biological Event Preparedness. Journal of School Health; 86(11):794–802.

(27) Shaw, R., Takeuchi, Y., Ru Gwee, Q. & Shiwaku, K. (2011), "Chapter 1 Disaster Education: An Introduction", Shaw, R., Shiwaku, K. and Takeuchi, Y. (Ed.) Disaster Education (Community, Environment and Disaster Risk Management; 7(1): 1-22. https://doi.org/10.1108/S2040-7262(2011).

(28) Sivo, S. A., Fan, X., Witta, E. L., & Willse, J. T. (2006). The search for" optimal" cutoff properties: Fit index criteria in structural equation modeling. The Journal of Experimental Education; 74(3):267-288.

(29) Wu, C., Li, C., Cheng, F., Zhang, L., Du, Y., He, S. & Lang, H. (2020). Self-Identity and Career Success of Nurses in Infectious Disease Department: The Chain-Mediating Effects of Cognitive Emotion Regulation and Social Support. Frontiers in psychology; 11(Article 563558):1-8.

(30) Zarezadeh, Y., Nadaian, H., Karimi, G., Ghadimi, T., Yousefi, F. &Pooladi A.(2017) A course on "health management in crises" for medical students: a Delphi study. RDME; 6(2):80–86.