

KNOWLEDGE OF DISASTER PREPAREDNESS AMONG NURSES AT TWO TERTIARY CARE HOSPITALS IN LAHORE

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ABSTRACT

Background and Objective: Increasingly happening disasters around the globe are one of the major threats to human health and life. Nurses being largest group in the healthcare team, play a vital role in disaster preparedness and response. Nurses must be equipped with proper knowledge and skills in order to prepare them for their effective role during large-scale disasters and mass casualty events. This study was designed to explore the disaster preparedness knowledge among nurses at two tertiary care hospitals in Lahore and to assess nurses' education and training needs in preparation for disasters.

Methodology: A descriptive survey approach was adopted; using a questionnaire distributed to a convenient sample of 200 registered nurses working in two tertiary care hospitals in Lahore.

Results: The research findings demonstrated that 48 percent of nurses had inadequate knowledge, 42 percent of them had moderately adequate knowledge and only ten percent of them had adequate knowledge on disaster preparedness. Statistically significant differences in the knowledge scores were observed based on the respondents' level of professional education. The Four Year BScN graduates scored significantly better than diploma and Post-RNBSn graduates. Majority (91%) of nurses acknowledged that they were inadequately prepared for disasters but were aware of the need for such preparation. Disaster training and education was considered extremely important by 73% of nurses. They recognized that disaster specific courses (69%) and disaster drills (44%) are useful tools for disaster preparedness.

Conclusion: Nurses in two tertiary care hospitals in Lahore have inadequate knowledge regarding disaster preparedness and are inadequately prepared for disasters but are aware of the need for such preparation. Nurses in Pakistan, should be provided with knowledge and skills necessary to improve their ability to perform effectively in the event of a disaster.

Keywords: Disaster, Disaster preparedness, Disaster preparedness training, nurses, questionnaire, survey, Knowledge.

INTRODUCTION

Major natural disasters in the last two decades have affected at least 800 million people worldwide, causing thousands of deaths and economic losses. The earthquake of the west coast of Sumatra in 2004 resulted in an estimated total of 214,000 deaths and another 142,000 people were recorded as missing. The earthquake of October 8, 2005 claimed more than 87,000 lives, an estimated 69,000 people were injured and about 2.8 million were left homeless in Pakistan alone. Events such as the terrorists' attack of 11th September 2001, on the World Trade Centre, combined with the threat of suicide bombers has brought a whole new meaning to terrorism, which is currently one of the major causes of man-made disasters. The prevention of a disaster is difficult. However, its devastating effects can be minimized through disaster preparedness and by effective and timely response.

There is a growing awareness that disasters can strike anytime and anywhere. On an average, a disaster occurs every day somewhere in the world. Asia and the Pacific are among the most disaster prone regions in the world where every year disasters of all kinds result in a massive loss of lives and property in the region. The region accounts for only 30 percent of the world's landmass but the disaster impacts in the region are significantly higher than the other regions. Khan et al. (2008) pointed out that Pakistan is one of the most severely affected countries by disasters that continue to suffer from extensive natural and man-made disasters. The human impact of natural disasters in Pakistan can be judged by the fact that in the period 1993 to 2002, a total of 6,037 people were killed and 8,989,631 affected. Pakistan also has been a victim of violence by sectarian motives. Over 4,000 people have been killed in the past two decades in sectarian violence. In addi-

ion, terrorist violence resulted in a death toll of 19,165 people between 2003 and 2009, including civilians, security force personnel and terrorists. According to Pakistan Institute of Peace Studies (PIPS) security report, 2,113 terrorist attacks were reported from across the country in 2010, that killed 2,913 people and another 5,824 were injured.

Many developing countries have limited preparedness for disaster response. According to United Nations Development Program (2004), in Pakistan, there is no comprehensive, integrated disaster management policy and proper system for disaster preparedness at the national level. This situation strongly advocates the need for a disaster management structure, a comprehensive preparedness strategy and policy. Pakistan is a country where a massive influx of casualties in a relatively short time span has become a regular feature of the hospital system. With an average of five suicide bombings per month, the need for adequate training of health care workers who are directly involved in managing the victims of disasters cannot be ignored.

Disaster preparedness is highly needed to handle these unpredictable calamitous situations effectively. To meet this aim, many professionals need to support this plan of disaster preparedness. Since nurses are the highest number of healthcare providers, they have the responsibility to be the first line of response in the event of any catastrophic health crisis. They can make essential decisions in emergency situations because of their qualification, assessment skills, communication skills, collaboration and critical thinking skills. However, evidences show that nurses are not trained properly to work efficiently in disasters. Moreover, there is a paucity of published data on disasters and disaster training and that evidence-based literature is lacking about the best methods to train nurses in disaster response. Veenema (2006) emphasized that all nurses must have a basic understanding of disaster science and the key components of disaster preparedness. Moreover, nurses must possess skill sets that will allow them to respond to large-scale disasters and mass casualty events. Educational programs must be set in place to address the existing knowledge deficits of nurses related to disaster preparedness. Enhancing nurses' professional capability and competency through training and education will ensure the provision of adequate healthcare services in disasters.

Knowledge and preparation is the key to survival in the event of a catastrophe. Healthcare professionals require a unique knowledge base to function effectively during a hospital's response to mass-casualty disasters. Being part of the health team, nurses must have sufficient knowledge and skills to respond efficiently to different catastrophic situations. Lack of knowledge and preparedness will make nurses feel vulnerable when having to face the unexpected. Evidences suggest that nurses' knowledge about disasters is limited and

that nurses are faced with learning deficiencies in this regard. The knowledge level of nurses about disaster preparedness in Pakistan is currently unknown due to very limited or no research on this issue. Measuring knowledge is essential to determine estimate their education and training needs in this regard.

Objectives of the Study

- To assess the disaster preparedness knowledge of registered nurses (RNs) at two tertiary care hospital in Lahore.
- To explore nurses' perceived level of disaster preparedness.
- To assess nurses' education and training needs in preparation for disasters.

Study Design

This is a descriptive cross – sectional research study design.

Participants

A convenience sample of 200 nurses was selected based on inclusion and exclusion criteria. The study participants were selected from Sheikh Zayed Hospital and Shalimar Hospital in Lahore, working at different levels including bedside nurses, head nurses and nursing supervisors. These nurses were working in different units like medical, surgical, critical care, emergency, operation theatre, obstetrics-gynecology and others. Nurses having foreign qualifications were excluded because of the difference in the academic education. The duration of the study was 12 months.

Selection and Development of the Tool

The tool used for the present study is a self-administered structured questionnaire on aspects of disaster and disaster preparedness to assess the knowledge of nurses. All questions were developed based on an extensive review of the related literature, consultation with subject experts in emergency care, intensive care, nursing education, public health and statistician. The final questionnaire comprised of three sections. Section-1 consisted of 9 questions that solicited data on demographics. Section-2 consisted of 24 objective-knowledge-based questions to assess the knowledge of nurses on various aspects of disaster preparedness. Sixteen out of the 24 questions were presented in a "multiple choice answers" format with a single correct answer whereas 8 were true-or-false questions. Section-3 consists of four questions. There are two scaled response questions using a Likert scale. The first question asks about the nurses' perceived level of disaster preparedness based on a three-point Likert-type scale (not prepare at all to fully prepare for disaster). The second question is about their perceived importance of disaster training and education using four-point Likert-type scale (not important to extremely important).

There are two tick box questions to assess the nurses' educational and training needs regarding disaster preparedness in terms of specific disaster courses and related activities.

Validity and Reliability of the Tool

The study instrument was reviewed and validated by experts in emergency care, intensive care, nursing education, public health and statistician. The questionnaire was piloted amongst a group ($n = 20$) of senior nurses. This process ensured that the questions in the questionnaire were clear and concise. Minor amendments were made to the tool after expert review to further clarify questions. Mostly these were grammatical errors that were corrected. Reliability of the tool was computed using Cronbach's α .

Ethical Considerations

The study was approved by the ethical review committee of University of Health Sciences Lahore. Written permission was obtained from the respective heads of concerned institutions and Chief/Deputy Nursing Superintendent (Matron) before data collection for this study. An informed written consent was obtained from all the selected participants. Proper explanation was provided to all the participants before taking the consent. They were briefed that their participation is voluntary, and were ensured that confidentiality shall be strictly maintained.

Data Collection Process

Data was collected from 20th May, 2010 to 30th June, 2010 after obtaining permission from the concerned authorities of the hospitals. Participants were properly guided regarding the questions asked in the questionnaire for proper understanding and responding. Incomplete responses and selecting multiple options for the same question were considered incorrect. Certain difficulties arose during the data collection period. Initially, a total of 200 questionnaires were distributed. There were 10 dropouts and did not return the questionnaires. 12 participants refused to take part after giving initial consent. 7 of them returned the questionnaires unfilled. The investigator had to continue collecting data until he got the required sample.

Data Analysis

Descriptive and inferential statistics were used for data analysis, using Statistical Package for the Social Sciences (SPSS) for storage and analysis. Data in section-1 (demographics) and section-3 (disaster education and training needs of nurses) were analyzed using descriptive statistics by computing frequencies, mean and standard deviation and has been presented in the form of tables, bar diagrams and pie diagrams. The data in the section-2 (knowledge regarding disaster preparedness) were analyzed by calculating the frequency of correct answers, and comparing the knowledge of dif-

ferent demographic groups by conducting independent samples t -tests and analysis of variance.

RESULTS

Demographic Data

Out of the total 200 nurses, 174 (87%) were females and 26 (13%) were male nurses. The age-range of participants was from 20-60 years. Among the total respondents, 110 (55%) had diploma in General Nursing (RNs), 21 (10.5%) had bachelor's degree with Post-RN BScN and 69 (34.5%) had bachelor's degree with Four Years BScN. Majority of them that is, 165 (82.5%) had 1-5 years of experience, 18 (9%) had 6-10 years, 8 (4%) had 11-15 years and 9 (4.5%) had more than 15 years of experience. Bedside nurses comprised the bulk of the sample i.e. 171 (85.5%), 25 (12.5%) were head nurses and only 4 (2%) were nursing supervisors. Nurses working in the medical unit were 65 (32.5%), 38 (19%) in the surgical unit, 30 (15%) were in the emergency unit, 33 (16.5%) in the intensive care unit and 34 (17%) were working in other units like obstetrics, gynecology, neurology, oncology, psychiatry, pediatrics unit etc. Among the total respondents, 121 (60.5%) attributed media (radio, television and newspapers) as their source of information about disaster preparedness, 51 (25.5%) as books, 9 (4.5%) journals and 19 (9.5%) attributed other sources of information such as friends, colleagues etc. A large percentage of the respondents i.e. 138 (69%) had never participated in any disaster response while 62 (31%) of them had experienced disaster previously. Among the total respondents, 176 (88%) of them did not have any previous disaster training courses whereas only 24 (12%) informed that they had conducted disaster-training courses.

Knowledge of Disaster Preparedness

The mean knowledge score of respondents was 11.72 ± 3.75 (SD). The minimum knowledge score was 3 and the maximum score was 20 out of a total score of 24. More than 79% of the respondents correctly answered question pertaining to the organization's needs assessment regarding disaster preparedness (Question 22) and the question pertaining to nurse administrator's responsibilities related to emergency and disaster plan (Question 23). Question 23 received the largest number of correct answers. Approximately 51% of the respondents correctly answered questions related to the definition of disaster (Question 1), identifying natural disaster (Question 2), identifying man-made disaster (Question 3), defining the acronym MCI (Question 9), recognizing the local ambulance service which provides rescue and transportation services to the victims of accidents and disasters (Question 11), identifying nursing work force that may be recruited in the disaster relief effort in a mass casualty disaster response (Question 12), recognizing the roles of nurses in disaster preparedness (Question 13), identifying the immediate

response of a nurse if a disaster happens in the hospital (Question 14), identifying his/her immediate response when an individual has stopped breathing after an earthquake (Question 16), question related to

the nature of occurrence of disasters (Question 17), question related to the ways of dissemination of viruses that are used for terrorist purposes (Question 19), question pertaining to special groups of patients which

Table 1: *Percent of nurses with correct answers to knowledge-based Questions, disaster preparedness survey.*

S/No	Questionnaire	Frequency of Correct Answers	Percentage
1.	What do you understand by the term disaster?	97	48.5%
2.	Which among the following is a natural disaster?	107	53.5%
3.	Which among the following is a manmade disaster?	100	50%
4.	How can the impact of disaster be lessened?	85	42.5%
5.	What is disaster preparedness?	69	34.5%
6.	What is a disaster plan?	85	42.5%
7.	What is a disaster drill?	68	34%
8.	Which of the following should not be included in a disaster kit?	70	35%
9.	What does the disaster acronym MCI stands for?	96	48%
10.	What is/are the agent(s) used in bioterrorism?	70	35%
11.	Which one among the following is the ambulance service established by the Government of Punjab, providing rescue and transportation services to the victims of accidents and disasters?	101	50.5%
12.	In a mass casualty disaster response, who may be recruited in the disaster relief effort?	98	49%
13.	Which of the following(s) is/are the role(s) of nurses in disaster preparedness?	118	59%
14.	What will be your immediate action if there is a disaster in the hospital?	96	48%
15.	What is the immediate protective measure if a bomb, blasts in your locality?	70	35%
16.	What should you do if an individual has stopped breathing after an earthquake?	98	49%
17.	Disasters are unpredictable events that can happen anywhere at any time	106	53%
18.	All victims of a Chemical Biological Radiological (CBR) incident will be decontaminated at the scene of the incident prior to their arrival to hospital	71	35.5%
19.	The viruses used for terrorist purposes can be disseminated in the air by contaminating commonly used materials & objects	95	47.5%
20.	Nurses are involved in duties outside of their normal roles during a disaster	85	42.5%
21.	Pregnant women, aged and the disabled, are among the special groups of patients that are uniquely vulnerable during a disaster event:	103	51.5%
22.	It is not necessary for an organization to assess the needs regarding disaster preparedness regularly	158	79%
23.	It is the responsibility of the nurse administrator to be sure that each unit for which he or she is responsible has a written emergency and disaster plan	160	80%
24.	Familiarity with use of all types of communication devices e.g. Phone, fax, email, satellite phone etc is important in a disaster situation	129	64.5%

are uniquely vulnerable during a disaster event (Question 21) and question related to familiarity with use of all types of communication devices (Question 24).

Less than 40% correctly answered questions pertaining to recognizing the strategy by which the impact of disaster can be lessened (Question 4), defining disaster preparedness (Question 5), defining disaster plan (Question 6), defining disaster drill (Question 7), recognizing the materials that should not be included in the disaster kit (Question 8), identifying the agents.

Used in bioterrorism (Question 10), identifying the immediate protective measure if a bomb blasts in the locality (Question 15), question related to decontamination of victims of a Chemical Biological Radiological (CBR) incident (Question 18) and question related to nurses atypical roles during a disaster (Question 20) (see Table. 1).

The knowledge level has been arbitrarily divided into three categories based on the scores in the structured questionnaire as inadequate knowledge (<50% score), moderately adequate knowledge (50% -75% score) and adequate knowledge (> 75% score).

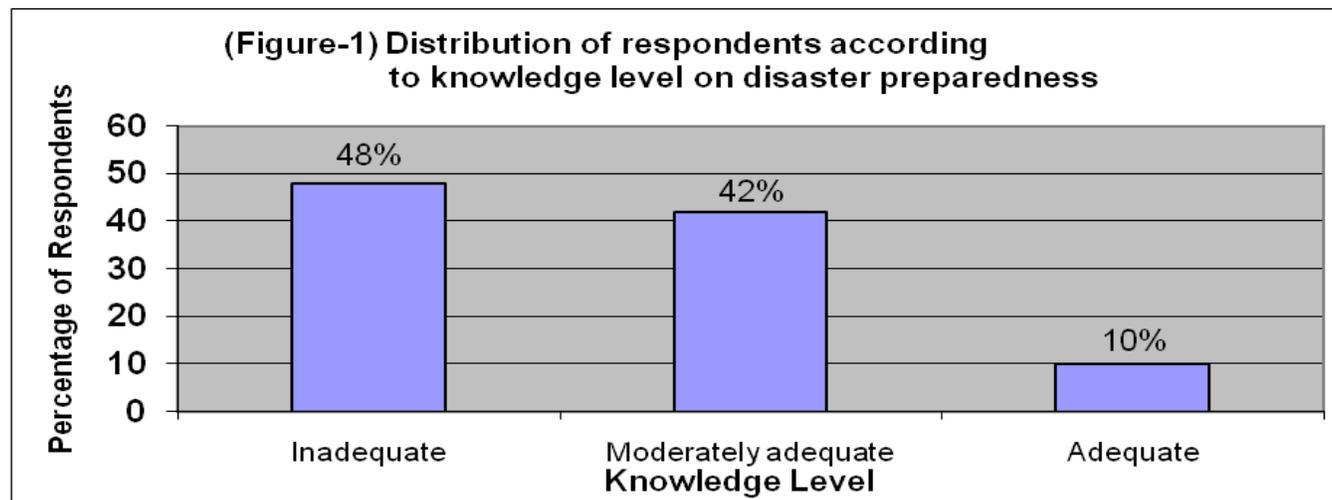
According to arbitrary categorization of knowledge level, based on the scores in the structured questionnaire, 96 (48%) out of total 200 respondents had inadequate knowledge, 84 (42%) of them had modera-

tely adequate knowledge and only 20 (10 %) of them had adequate knowledge on disaster preparedness (see Fig. 1).

The means of percent knowledge scores were computed in order to evaluate the group differences based on different demographic categories. By applying One-way ANOVA test, it was observed that there were significant differences in the mean percent knowledge scores based on nurses' level of professional education (see Table 2).

Multiple Comparisons

After applying Post Hoc Tukey's test, significant differences were observed in the mean percent knowledge scores of diploma (RN) and Four Years BScN graduates and Post-RN BScN and Four Years BScN graduates (P<0.001). On the other hand no significant difference was observed in the mean percent knowledge scores of diploma (RN) and Post-RN BScN graduates. The results showed that Four Years BScN graduates were placed closely superiorly on the hierarchy of mean percent knowledge scores and Post-RN BScN graduates were placed inferiorly. Independent t-test results showed no statistically significant differences in overall percentage of mean knowledge score based on gender, participation in disaster event (although nur-



Comparison of the Mean Percent Knowledge Scores Based on Demographics.

Table 2:

Demographic Characteristics	Demographic Category	n (%)	Mean percent knowledge score(SD)	p-value
Level of Education	RN	110 (55)	45.37 (14.94)	< 0.001
	Post RN BScN	21 (10.5)	42.49 (11.98)	
	Four Year BScN	69 (34.5)	55.47 (15.24)	
	MScN	NA		

ses who previously participated in a disaster response scored better than did those nurses without disaster participation), disaster training, professional experience, employment status, working unit, etc. and source of disaster information.

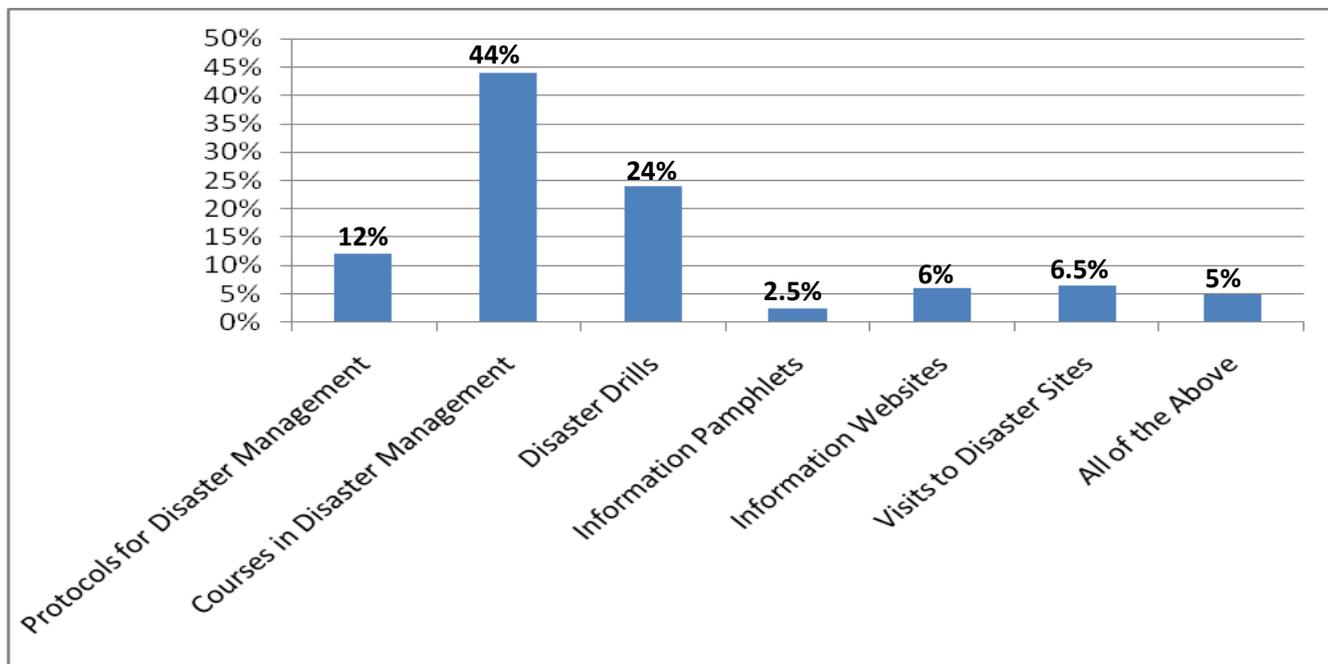


Fig. 2: Respondents' Preferred Disaster Preparedness Activities or Materials.

Disaster Education and Training Needs

Among the total respondents, 102 (51%) of them acknowledged that they were in-adequately prepared for disasters, 80 (40%) believed that they were somewhat prepared. Majority of the respondents (73%) stated that disaster training and education was extremely important for nurses. With regard to specific materials and activities related to disaster preparedness, 88 (44%) of the participants considered that courses in disaster management were necessary, 48 (24%) believed that disaster drills and exercises were important, 24 (12%) mentioned that protocols for disasters were necessary to prepare nurses for disasters (see Fig-2).

Table 3: Participants' Specified Disaster Preparedness Courses.

Specified disaster preparedness courses	Frequency	Percent
First aid	17	8.5
Basic life support	15	7.5
Field triage	13	6.5
Advanced trauma care nursing	12	6
Post-traumatic psychological care	5	2.5
All of the above	138	69

All the respondents agreed that disaster specific courses that should be taken by nurses in order to be prepared for disasters. First Aid was preferred by 17

(8.5%) nurses, Basic Life Support by 15 (7.5%), Field Triage by 13 (6.5%), Advance Trauma Care Nursing by 12 (6%), Post-traumatic psychological care by 5 (2.5%). A large majority of the participants (69%) considered that all these courses are necessary for disaster preparedness (see Table-3).

DISCUSSION

The key findings emerged from the data are that nurses in Pakistan have insufficient knowledge about disaster preparedness and they are in-adequately prepared for disasters. However, they are aware of the need for disaster training and education in terms of preparedness activities such as disaster drills and disaster related courses to prepare nurses for disaster events.

The results of this study were well supported by previous research studies. Majority of the respondents in this study demonstrated insufficient knowledge on disaster preparedness. The findings of this are comparable to the work of Hammad et al. (2010) who concluded in their study that South Australian emergency nurses had a low level of disaster knowledge. They further explained that the findings from their study were relevant for all health professionals involved in disaster. Sinha et al. (2008) provided similar evidence in their study by assessing the present level of knowledge about disaster preparedness and mitigation among undergraduate medical students. They concluded that undergraduate medical students had little knowledge about disasters and disaster preparedness. Johnson-Campbell et al. (2007) in their study disclosed that members of the health team in St James lacked kno-

wledge of the disaster management plans in their places of work.

In contrast, Moabi (2008) did a survey on knowledge of disaster preparedness among health care workers and concluded that the participants were quite knowledgeable about disasters, disaster plan, disaster preparedness, disaster drills and their function during drills. However, this better level of knowledge of the participants in her study can be related to the reason that all the participants in her study were from hospital management. Nurses included in her study were also only the senior nurses like the theatre matron, senior sisters etc. Health workers at the management level may likely be more knowledgeable due to differences in the level of education and work experience.

Majority of nurses (48%) in the current study scored poorly on the disaster preparedness knowledge test. There are several reasons that might have contributed to the findings of inadequate disaster preparedness knowledge. Firstly, the lack of previous disaster experience might have influenced this deficient knowledge of nurses as 69% of nurses in the current study stated that they did not participate in any previous disaster response. Duong (2009) believed that lack of previous disaster response experience might be responsible for diminished confidence and knowledge of nurses. The work experience of the majority (82.5%) of the respondents was 1-5 years. This might have been the reason for limited opportunities to participate in a disaster response. Husna et al. (2011) supported that the experience in direct care and exposure to an event contribute to the capability of more efficiency and mastery of skills in nursing practice. Secondly, an overwhelming majority of nurses (82%) reported that they had not attended in any disaster preparedness-related courses and thus the insufficient knowledge level can be interpreted in this way. Smith (2006) argued that appropriate disaster education appears to be the essential ingredient in preparing a confident work force. Finally, a large portion of nurses (60.5%) in the current study attributed media as their only source of information related to disaster preparedness and very few mentioned to have read journal articles or books on this topic that provide a more authentic and updated source of knowledge.

The reason that could best explain the finding on the poor disaster related knowledge is inadequate training and education in this regard. Burstein (2006) emphasized that evidence-based disaster planning and training is necessary to improve the effectiveness of health care providers' response to disasters.

The insufficient level of knowledge of majority of the respondents in this study reflects deficiencies in the educational programs at different levels in Pakistan. There is neither a natural spreading of knowledge on disaster preparedness in the academic courses already existing nor in the continuing education of

nurses. Wetta-Hall et al. (2006) argued that continuity of disaster nursing education tends to be the most feasible preparedness strategy that facilitates nurses to be knowledgeable and skillful in this area.

Comparison of the mean percent knowledge scores demonstrated that Four Years BScN graduates scored significantly better than did diploma (RN) and Post-RN BScN graduates. Limited existing knowledge of diploma level graduates in our study can be related to insufficiency of skills in seeking information and a lack of mastery on their existing knowledge. Chan (2009) found that the nurses whose education were the diploma level showed lower level of knowledge and skill than baccalaureate, master or doctoral students in clinical management systems. The reasons why nurses with Four Year BScN degrees had scored better than Post-RN BScN nurses are unclear as both categories are bachelor graduate nurses. It might be related to the differences in their basic educational levels or schooling background. Gul et al. (2009) reported similar views of their study participants that BScN graduates have a stronger educational background might have better professional impact later on as compared to those with no stronger foundation upon entry to nursing. However, future research studies are needed to validate the impact of schooling background on future professional capabilities of nurses and to better determine the factors that relate to these observed differences in the knowledge scores of nurses.

Surprisingly, no statistically significant differences were found in the knowledge scores based on previous disaster training courses and previous disaster experience. However, because it was a self-administered questionnaire, the participants who reported that they had undertaken disaster specific courses and participated in disasters were not further explored about what types of courses they completed and how frequently they participated in a disaster response. Stothard & Nicholson (2001) argued that content and quality of training affects learning.

The findings of the current study indicate that majority (91%) of nurses perceived themselves as inadequately prepared for disaster handling. This inadequate disaster preparation of the respondents is likely associated with the lack of educational opportunities (88%) and previous disaster experience (69%) indicated by the participants in the current study. However, a large majority (73%) of them believed that disaster training and education in terms of disaster preparedness courses and drills are extremely important for nurses to prepare them for disaster situations. Regarding nurses' education and training needs, the respondents highlighted the need to introduce courses in disaster management (44%), some of them (24%) opted for regular disaster drills and exercises, and others (12%) considered that a disaster management protocols is necessary. Majority (69%) of nurses agreed that

disaster specific courses such as first aid, basic life support, field triage, advanced trauma care nursing and post-traumatic psychological care, would be most beneficial form of disaster education and training for nurses.

The evidences in the literature about insufficient disaster knowledge and lack of preparedness among nurses indicate a global need for all nurses to be aware and prepared in advance for disasters. Recommendations in recent literature call for appropriate disaster education and training of nurses. In order to build a more cohesive and self-assured nursing workforce for disasters, nurses should be provided with high standard disaster education and training. This study demonstrates that nurses in Pakistan have not been adequately prepared for disasters and therefore, emphasizes that hospitals, government organizations and peak health bodies should address disaster preparedness for our frontline health professionals.

Recommendations

It is recommended that adequate disaster preparedness and management content should be incorporated in nursing curricula in Pakistan. Disaster training should be a part of the diploma and graduate nursing syllabus and a specialty in disaster nursing should be introduced. The integration of disaster education into curricula, specifically in community health nursing curriculum, is believed to be the most effective strategy of preparedness.

The hospital administrators should support the development of disaster protocols and should organize continuing education and training programs for all working nurses in the form of in-service lectures and regular disaster drills in order to meet the demands of a standardized level of preparedness. Hospital disaster preparedness should be a regular feature of the orientation and induction programs. Nursing faculty should realize that disaster preparedness is mandatory content for all professional nurses. They also need to acquire effective teaching strategies relating to disaster nursing. Nursing schools should integrate disaster drills into their courses to increase the disaster readiness and preparedness of nurses at student level. Collaboration between the nursing faculty and local emergency planners is required for this purpose. Nurses in all settings must prepare for all types of disasters as much as possible. Nurses should be encouraged to promote disaster preparedness as part of their daily responsibilities in their roles of managers, educators, advocates and researchers. A dedicated national budget should be allocated to fund hospital disaster preparedness across all hospitals in Pakistan. The combined effort by NGOs and health care providers will certainly reduce the devastating effects of disasters and the sufferings of disaster victims. Using the findings of this study, the Pakistan Nursing Council and the Higher

Education Commission in Pakistan must address the education and training needs of nurses in this highly disaster prone country. Future studies should be conducted using different study populations such as doctors, paramedical staff, community inhabitants, students in schools and colleges. Future research should also examine knowledge gained from educational programs so that more effective training strategies can be developed for nurses.

Limitations of the Study

This study is restricted to nurses in two hospitals only in Lahore. Therefore, it may not necessarily be representative of the population of nurses in Pakistan. However, with similar contextual background and demographic characteristics, generalizability of this study is possible. Moreover, previous research indicated that knowledge of disaster preparedness in health care providers is generally poor.

It is **concluded** that the findings of this study show that current knowledge of disaster preparedness among nurses in Pakistan is insufficient and perhaps left too much to free initiatives. However, nurses were aware of their education and training needs and were willing to take continuing education programs to prepare themselves for disasters. This study highlights limited disaster knowledge and preparedness among registered nurses of two hospitals in Lahore. The study findings can be used to infer that nursing workforce in the rest of the hospitals in Pakistan might be having more or less the same knowledge deficiencies with regard to disaster preparedness. This necessitates the provision of appropriate disaster education and training opportunities for nurses in Pakistan.

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Authors' Contribution

SK: Primary Author of the study. Involved in all the steps of the study from proposal writing to final conclusion of the study. SK: Tool development, Data Collection, peer review. MG: Tool development, Data Collection, peer review.

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