Knowledge of Nurses in Hospital Preparedness in Emergency Response in Saudi Arabia: Basis for Staff Program Development

Jocelyn M Medina, Mohammed Saeed Essa Aljohani, Khadega Ahmed Hefnawy Alhefnawy

Medical Surgical Department, Taibah University, Madinah City Kingdom of Saudi Arabia

*Corresponding author: jocelynm1023@gmail.com

Received February 19, 2021; Revised March 22, 2021; Accepted March 30, 2021

Abstract

Objective: The study assessed the level of knowledge of nurses in hospital emergency response based on WHO standard and determine what staff program development may propose to enhance the knowledge of nurses in hospital emergency response.

Methods: The study utilized quantitative type of research and used the descriptive evaluative design.

Results: Results of the study revealed that respondents are knowledgeable in 2 categories of hospital preparedness in emergency response, the safety and security (WM=2.5443, SD=.13295)) during MCI and the human resource during MCI (WM=2.9266, SD=.13901).

Conclusion: With the findings of the study the respondents need to have more training related to hospital preparedness in emergency response. The training should focus on incident command system, communication, triage during MCI, surge capacity during MCI, continuity of essential service, logistics and supply and post disaster recovery. The training should situate the Health Emergency Response Recovery Plan (HERRP) and policy of hospital, covering all-hazard approach based on their risk assessment.

Keywords: knowledge of nurses in hospital preparedness

Cite This Article: Medina J, Aljohani M, and Alhefnawy K, “Knowledge of Nurses in Hospital Preparedness in Emergency Response in Saudi Arabia: Basis for Staff Program Development.” American Journal of Nursing Research, vol. 9, no. 3 (2021): 85-93. doi: 10.12691/ajnr-9-3-3.

1. Background of the Study

Hospital is an institution with twenty - four hours of health services for injured and sick people. The healthcare provider's role is limited to treating injured and ill people and during a disaster with Mass Casualty Incident (MCI). In these incidents, their knowledge and skills are essential in providing their services in the community. All healthcare providers that include the nurses who occupy a significant number of employees in the health care institution must be aware of their roles during disasters. Knowledge in hospital emergency response is vital to prepare them for any disaster that may arise.

There is a global issue regarding disasters. Other researchers stated that climate change influences the different disasters that occur in different countries. Ghazali et al. [1] noted that climate change hampered inflation in the normal temperature to the oceans' troposphere, which influences the weather phenomena. Climate change affects natural disasters and is expected to induce a rise in humanitarian crises. Likewise, the given report of Extreme Events and Disasters (SREX) by international panel climate change (IPCC) forecast a further increase in the twenty-first century, that includes the increasing frequency of heat waves, ascending wind speed of tropical cyclone, and expanding density of droughts.

Saudi Arabia is one of the countries that experienced the effect of climate change. The said country recently experienced severe flooding. According to Asia News (2019), Saudi Civil Defense report flooding in Madinah Region the civil defense team rescued last February 8, 2019, 111 people. Moreover, last January 27, 2019, 12 people died; 271 people rescued 137 were evacuated from Tabuk Region.

In other areas, 50 homes in Iraq's Najaf province have been swept away by severe floods. The Iranian Red Crescent Society (RCS) gave emergency shelter for 800 people after heavy rain in Southern and Western provinces. Saudi Arabia experiences not only floods; Riyadh and Jeddah have also experienced strong winds and sandstorms.

Furthermore, Saudi Arabia also experienced a human-made disaster. According to world news (2015), 107 people died in the collapse of a crane in Mecca's Grand mosque. Likewise, in the world-middle east news, last September 24, 2015, 717 died in Saudi Arabia because of Hajj stampedes. Another deadliest occurred in the pilgrim incident, where 863 people were injured during the incident at Mira, which occurred during Hajj.
With this different incident in Saudi Arabia, both natural and human-made disasters, the nurses’ knowledge in hospital emergency response is strongly important and necessary for every health institution. Abdelalim & Ibrahim [2] cited a lack of knowledge and practices but a respectable level of attitude regarding disaster preparedness and neutral familiarity with emergency preparedness. Likewise, Alzahrani & Kyrtatsu [3] stated high clinical role awareness among emergency nurses. Still, they have limited knowledge and awareness on the broader emergency and disaster preparedness plan, including the key elements of their hospital strategies for managing mass gathering.

Alraga [4] mentioned that in contempt of the number of disasters that have already happened, Saudi Arabia's kingdom still no multi-sectorial state department that facilitates effective health management. Nofal, Alfayyad, Khan, Azeri and Abu-Shareen [5] the level of knowledge of healthcare providers was satisfactory, and the level of attitude, practice, and familiarity in preparedness during the disaster was neutral. Shabbir, Afzal, Sarwer Gilani, and Waqas [6] nurses’ knowledge on disaster management and emergency preparedness were good, but practices were lacking in the hospital setting. Thus, the hospital has deficiencies in practices in disaster management and emergency preparedness.

With this issue, the researchers’ interest is timely because of the different incidents that happened in the Kingdom of Saudi Arabia. Both human-made and natural disasters include the global pandemic of COVID 19. Assessing the nurses’ level of knowledge in hospital emergency management may determine what program development may propose to enhance the readiness of nurses during MCI.

2. Significance of the Study

According to the World Health Organization (WHO) [7], Globally, many countries experience emergencies and disasters. Thus, to ensure that health sectors are resilient to the effect of such an emergency, an effective national emergency program is important and paramount to disaster preparedness. Bin Shalhoub, Khan, and Alaska [8] most of the weaknesses were apparent in education, training, and monitoring of hospital staff preparedness for disaster emergency occasions. In Saudi Arabia, Alsaidi [9] stated during the world quality day, one of the strategic objectives of the national transformation program 2020 vision is to adopt a national plan for an emergency response to public health threats according to international (WHO) standards. The study will assess the level of knowledge of nurses in hospital emergency response based on WHO standards and determine what staff program development may propose to enhance the knowledge of nurses in hospital preparedness in emergency response. With this study, hospital administrators may analyze the importance of hospital preparedness. Thus, this study may guide the administrator and education department to develop a program for all healthcare providers in preparing health institutions for any kind of Mass Casualty Incident (MCI) related to man-made or natural disasters. Furthermore, a policymaker may be used as a basis for policy improvement on the hospital preparedness in emergency management.

3. Objective of the Study

The study assessed the level of knowledge of nurses in hospital emergency response based on WHO standards and determine what staff program development may propose to enhance the knowledge of nurses in hospital emergency response.

4. Methods of the Study

The study utilized quantitative method, specifically, the researcher used descriptive-evaluative design. This was used to evaluate the assessment of the respondents on their level of knowledge in hospital emergency response system. Furthermore, the researchers used questionnaires adapted from World Health Organization (WHO) Emergency response checklist. The instrument was translated in Arabic for clear understanding and reliability test was done using Cronbach’s alpha.

| Category                      | Cronbach's alpha | Cronbach's alpha based on standardized items | N of items |
|-------------------------------|------------------|--------------------------------------------|------------|
| Command and control           | 0.966            | 0.969                                      | 6          |
| Communication                 | 0.976            | 0.965                                      | 7          |
| Safety and security           | 0.976            | 0.965                                      | 9          |
| Triage                        | 0.876            | 0.865                                      | 8          |
| Surge capacity                | 0.835            | 0.840                                      | 13         |
| Continuity of essential service| 0.892           | 0.896                                      | 6          |
| Human resource                | 0.884            | 0.851                                      | 11         |
| Logistics and supply          | 0.893            | 0.907                                      | 6          |
| Post recovery                 | 0.926            | 0.941                                      | 8          |

5. Sample and Setting

The study was conducted in one city of Saudi Arabia with selected hospitals. The respondents were nurses; the total participants were 286 nurses from different hospitals. Purposive sampling was used based on the inclusion criteria, both male and female are included in the study, at least 6 months and above working in their own institution, all positions are included, technician, staff nurses, head nurse and supervisors, as long that they are assign at ER, general ward, critical care units, operating and recovery area. The nursing administrators and chief nurse, and other nurses assigned at the ancillary department were excluded in the study.

6. Ethical Consideration

The study was submitted in the researchers’ institution, the study passed the ethical requirements of Ethics Review
Committee (ERC). The ERC allowed the researchers and conducted the survey in selected hospitals in one city of Saudi Arabia.

7. Data Analysis

The researcher utilized both online survey and actual distribution of questionnaires.

The level of knowledge was assessed using four (4) point Likert scale, 4 is very knowledgeable (VK), 3 knowledgeable (K), 2 not knowledgeable (NK) 1 very not knowledgeable (VNK). Data gathered were analyzed using SPSS, frequency and percentage were used to interpret the profile of the respondents, Weighted mean and standard deviation was used to determine the level knowledge of the respondents on the hospital. ANOVA test was utilized to identify the significant difference between profiles of the respondent when compared with the assessed knowledge on hospital preparedness in emergency management.

- 1 – 1.74 Very not knowledgeable
- 1.75 – 2.49 Not knowledgeable
- 2.5 – 3.24 Knowledgeable
- 3.25 – 4.0 Very knowledgeable

8. Results of Analysis

8.1. Frequency and Percentage of Respondents’ Profile

Table 1 revealed the statistical analysis of the profile of the respondents was based on the area of assignment, years of service, highest educational attainment, and the training attended related to hospital preparedness in emergency response. The total respondents were 286; 25.9% were assigned to the emergency room (ER), 39.5% were assigned general ward unit, 27.6% were assigned from the critical care unit, 7% were from the operating room.

In terms of their years of service, 38.8% were 6 to 10 years, 30.1% has 2 to 5 years of service, 17.5% has 11 to 15 years of service, 9.4% has 6 months to 1 year of service, and 4.2% has 16 years above of service, with regards to their highest educational attainment, 85.7% were bachelor’s degree holder, 9.8% has master’s degree units, 7% were graduated of master’s degree, and there are 3.8% who were diploma holder.

The statistical result in terms of the seminar attended, 25.5% attended the mass casualty incident drill, 8.7% attended the emergency management, 5.6% attended the hospital incident command system, 2.8% attended the biohazard risk disaster, no one attended the rapid damage assessment, contingency planning, and critical stress management.

| Area                        | Frequency | Percent |
|-----------------------------|-----------|---------|
| ER                          | 74        | 25.9    |
| Ward Unit                   | 113       | 39.5    |
| Critical care               | 79        | 27.6    |
| OR/RR                       | 20        | 7.0     |
| Total                       | 286       | 100.0   |

| Years of Service           | Frequency | Percent |
|-----------------------------|-----------|---------|
| 6 months to 1 year          | 27        | 9.4     |
| 2 years to 5 years          | 86        | 30.1    |
| 6 years to 10 years         | 111       | 38.8    |
| 11 years to 15 years        | 50        | 17.5    |
| 16 years above              | 12        | 4.2     |
| Total                       | 286       | 100.0   |

| Highest Educational Attainment | Frequency | Percent |
|--------------------------------|-----------|---------|
| Diploma                        | 11        | 3.8     |
| BSN                            | 245       | 85.7    |
| with Masters units             | 28        | 9.8     |
| Master Degree                  | 2         | .7      |
| With units PhD                 |           |         |
| PhD                            |           |         |
| Total                          | 286       | 100.0   |

| Trainings Attended             | Frequency | Attended | Did not Attended |
|--------------------------------|-----------|----------|------------------|
| Hospital Incident command System| 16        | 5.6      | 270              | 94.4 |
| Biohazard Risk Disaster        | 8         | 2.8      | 278              | 97.2 |
| Emergency management           | 25        | 8.7      | 261              | 91.3 |
| Mass casualty incident drill   | 73        | 25.5     | 211              | 74.5 |
| Rapid damage assessment        | 0         | 0        |                  |
| Contingency planning           | 0         | 0        |                  |
| Critical Incident Stress management | 0   | 0        |                  |
8.2. What is the Level of Knowledge of the Respondents in Hospital Preparedness on Emergency Response?

As of the knowledge of the respondents in hospital preparedness, using weighted mean and standard deviation, the respondents were assessed based on nine categories, command control during mass casualty, communication during mass casualty, safety and security during mass casualty, triage during mass casualty, surge capacity during mass casualty, continuity and essential services during mass casualty, continuity of essential services during mass casualty, logistic and supply management during mass casualty and post-disaster recovery. Among the nine categories, respondents are knowledgeable in two areas in safety and security during mass casualty, human resource during mass casualty, while the seven categories such as command control, communication, triage, surge capacity, continuity of essential services, logistics, and supply management and post-disaster recovery during mass casualty were answered not knowledgeable.

Furthermore, as revealed in Table 2, that command control during mass casualty has a total grand mean of 2.4837 and standard deviation of .18608, which means that the respondents are not knowledgeable in command control during mass casualty; among the variables, respondents are knowledgeable in 4 areas, strategies related to planning and implementing hospital incident action plan, (WM = 2.8462, SD = .18608) staff role in emergency response activities (WM = 2.6748, SD = .55174) contingency plan for hospital command control if a local person is not available (WM = 2.6678, SD = .57870) and appropriate coordination related to response activities, (WM = 2.65503, SD = .49924) vis-a-vis the respondents are NK on three areas the designated hospital command center for effective means of communication (WM = 2.0035, SD = .42301) and the structure of hospital command control system or the hospital command system (2.0594 SD = .48843). Facilitation of hospital incident command system or command control will be more effective and efficient during mass casualty incidents if staff nurses are knowledgeable. According to Bahrami et al. [10], to improve hospital readiness and response appropriately during accidents and disasters, the decision-makers should increase the knowledge of the hospital incident command system. Likewise, Shooart et al. stated that with the facilitation of hospital incident command system management will have an appropriate and efficient in controlling events and disaster because of avoidance of confusion and undecidedness during the events.

In communication during mass casualty, the weighted mean was 2.2446 with a standard deviation of .17543, which means that the respondents are NK. Moreover, with variables the said category respondents were knowledgeable in 2 areas the spoke person appointed to coordinate hospital communication (WM = 2.8322, SD = .40151) and availability of back-up system (WM=2.9231, SD= 0.27977) 5 areas were NK, the designated space for a press conference, key messages in preparation for disaster scenarios (WM=2.2867, SD = 0.49732) mechanism of information exchange (WM = 2.3392 SD = 0.49732) roles and responsibilities within incident action plan (WM = 2.1503, SD=0.46087) and mechanism for the appropriate processing and information (WM=2.2483 SD= 0.55396). Ow Yong, Xi n, Wee [11] mentioned that a critical component of planning and response during the pandemic, which is considered as biological incidents, was the emergency risk communication. Likewise, Kapur, Bezek, and Dyal [12] stated that communication is a vital component of response and recovery during and after a disaster situation.

For the safety and security during MCI, the grand mean was 2.5442 with a standard deviation of 0.13295. This means that the respondents are knowledgeable. With the areas of variables, respondents were VK in 2 areas, three areas were responded as knowledgeable, and five areas were NK. Respondents are VK in management of hazardous material and infectious control (WM=3.2727, SD 0.44614) and implemented procedures to secure collection of confidential information (WM=3.4545, SD= 0.50579) with this result of very knowledgeable of respondents in hazardous materials and infectious control just because the 97.2% of nurses attended Biohazard risk disaster. Moreover, respondents are knowledgeable about facility access points, triage sites, and other areas of patient flow (WM=2.5874, SD= 0.52754) and mechanism of escorting medical personnel (WM=2.9266, SD= 0.30049) on the other way they are NK in appointed hospital security team (WM= 2.2343, SD= 47130 defined measures for safe and efficient hospital evacuation (WM = 2.3601 SD=..50230) procedures for integrating law enforcement radioactive (WM=2.0629, SD= 0.29539) and biological decontamination (1.9615, SD= 0.19264). Safety and security have significant factors in crowd control. If more people are involved or victims during MCI, both victims and health providers are not safe in many ways. Therefore, to ensure safety and security, crowd control must be facilitated during MCI.

Crowd control is important in all kinds of disasters, either natural disasters or human-made disasters. Yamin M, Basahel A, and Abi Sen A. [13] stated that the management of crowd must take measures in all hospitals or health institutions to prevent the spreads of contagious diseases and viruses; this is very timely with the global pandemic of coronaviruses. Likewise, the nurses and other healthcare providers must know any decontamination procedures to prevent spreads, either chemical or biological incidents. Fentman [14] mentioned that to destroy infectious agents or other organic matter or any contaminants decontamination process can effectively remove the harmful agents and prevents the spread of infection.

Regarding the triage, during MCI, the total grand mean was 2.3750 with a standard deviation of 0.12739, which means that nurses were NK. With this category, respondents assessed that they NK in 5 areas and K in 2 areas. The respondents are knowledgeable on the triage officer who are designated to oversee the operations during mass casualty (WM=3.1888, SD= .39204) and the triage area with a proximity to essential resources MCI (WM = 3.0000 SD= 0.53639). Furthermore, the areas wherein they are not knowledgeable are identified entrance and exit routes from triage (WM= 2.3357, SD= 0.53566), identified contingency site for triage and MCI (WM= 2.0734 SD =0.26129) identified alternative.
waiting area (WM = 2.0874 SD = 0.29507), established protocol of MCI triage (WM = 2.1678 SD = 0.39267), mechanism of hospital emergency response plan used in triage (WM = 2.1049 SD = 0.30696) protocols on hospital process when disaster plan is activated (WM = 2.1094 SD = 0.33244). Clarkson & Williams [15] cited that during MCI triaging is a vital and fluid process which adjure a certain degree of pre-incident training. The study of Lampin [16] cited that physicians are lacking in performing triage skills. With the resulting study, health worker providers should be knowledgeable in triage skills during mass casualty incidents to rapidly classify the most injured victim and able to assure timely and appropriate management for those who need urgent care.

For the surge capacity during mass casualty, the total grand mean was 2.3004 with a standard deviation of 0.12162, which means that the respondents are NK in surge capacity of the hospital during mass casualty incidents. But on the other way, with variables of surge capacity during MCI, respondents were knowledgeable about three areas, the designated areas for patient overflow (WM = 3.2028 SD = 0.47476), available vehicles and resources required for patient transport (WM = 3.1713 SD 0.39561), and the available treatment capacity and demand (WM = 2.7036 SD = 0.59985). Smithith & Gehhart [17] stated that to manage supply and demand in the hospital, developing a surge capacity makes a difference. Therefore, health institutions' employees and staff must be knowledgeable in hospitals' surge capacity programs during mass casualty to mitigate the number of patients seeking services. Shen, Jiang, and He [18] mentioned that reshape standards of care centralize response precision support for medical surge capacity from external efforts and advance the level of response that can be utilized to achieve surge capacity.

Regarding continuity of essential services during MCI, the grand mean was 2.3700 with a standard deviation of .9829, which means that the respondents are NK in this aspect of action during mass casualty incidents. In the said category, two aspects were respondents are K and 5 were NK. Vis- a- vis respondents are knowledgeable in some part to facilitate the continuity of care, the list of hospitals services ranked in order of priority (WM = 3.0385 SD= 0.19264), and how to coordinate with authorized health personnel and neighboring health institution and private practitioner on defining roles and responsibilities to ensure continuous provision of services. (WM=2.9895, SD =0.10206). During mass casualty incidents, hospital services must be continued no matter how many patients were admitted. Feizolahzadeh, Vaezi, Mirzaei, and Khankeh [19] Hospital commonly encountered barriers in providing services, to name such was the accost in the pre-hospital system, deficient of disaster paradigm, poor coordination and cooperation, lack of hospital preparedness, incapable of using available resources and capacities, and inadequate planning. Overall, good hospital preparedness has a better continuity of services during mass casualty incidents.

In terms of human resource during mass casualty, the grand mean was 2.9266 with standard deviation of 0.13901 which means that the respondents are knowledgeable. Despite of knowledgeable is some aspects, respondents were VK in some areas, on the updated contact numbers of staff contact list (WM = 3.3147, SD = 0.48731) clear policy on staff sick leave (WM = 3.3462, SD= 0.47658) contingency plan for life saving needs (WM = 3.3497 SD= 0.47770) staffing requirements and distribution of personnel (WM= 3.31839, SD = .46659) and the provided training in areas of potential increased clinical demand (WM= 3.2972 SD= 0.45783). Therefore, with this result hospital were prepared in human resource and staffing system during MCI. This was similar with the study of Gabbe et. al [20] that hospitals are prepared regarding human resource, and they have the data base of trained staff in emergency management.

For the logistics and supply management during mass casualty the grand mean was 2.4569 with standard deviation of 1.3852 which means that the respondents were NK. With the variables of the given category despite of being not knowledgeable in some variables, vis – a vis they are knowledgeable in 2 areas, provision of essential medication supplies (WM=3.0140, SD= 0.4101) and hospital storage and essential stockpiling of supplies. (WM= 2.9650 SD= 0.24866) This knowledge was essential to provide a timely management for the patients who need immediate care, this was in line with the study Gabbe et al [20] during mass casualty incident, 55% of the staff reported that they are aware of the presence of stored resources.

Furthermore, in post disaster recovery during MCI the grand mean was 1.8151 with standard deviation of 0.13560 which means that the respondents were NK. All areas in this category were NK. With this result in compliments with the study of Gabbe e.t.al wherein 74 % of staff involved in mass casualty incident had training and education on professional debriefing. In any traumatic event debriefing is helpful for the individual more advantage for the healthcare provider who is at service to the patients in the hospital. Ibrahim, Kamsani, and Arnialshak [21] cited that, debriefing was designed to facilitate typical recovery, resilience, and personal development.

| Command Control                                                                 | Mean   | Std. Deviation | Qualitative Interpretation |
|--------------------------------------------------------------------------------|--------|----------------|---------------------------|
| 1. Designated hospital command center and communication                        | 2.0035 | 0.42301        | NK                        |
| 2. Appropriate and coordination of related response activities.                 | 2.6503 | 0.49924        | K                         |
| 3. Structure of hospital incident command system.                              | 2.0594 | 0.48843        | NK                        |
| 4. Staff roles in emergency response activities.                               | 2.6748 | 0.55174        | K                         |
| 5. Contingency plan for hospital command control                                | 2.6678 | 0.57870        | K                         |
| 6. Implementation hospital incident command action plan                          | 2.8462 | 0.37101        | K                         |
| Grand Mean                                                                     | 2.4837 | 0.18608        | NK                        |
| Communication during MCI | Mean | Std. Deviation | Qualitative Interpretation |
|--------------------------|------|----------------|----------------------------|
| 7. Appointed public information spoke person | 2.8322 | 0.40151 | K |
| 8. Designated space for press conferences | 2.1923 | 0.50410 | NK |
| 9. Key messages in preparation for disaster scenarios. | 2.2867 | 0.49732 | NK |
| 10. Mechanisms of information exchange. | 2.3392 | 0.50298 | NK |
| 11. Roles and responsibilities within incident action plan | 2.1503 | 0.46087 | NK |
| 12. Mechanisms for the appropriate processing and reporting of information | 2.2483 | 0.55369 | NK |
| 13. Availability back-up systems | 2.9231 | 0.27977 | K |
| Grand Mean | 2.4246 | 0.17543 | NK |

| Safety and Security during MCI | Mean | Std. Deviation | Qualitative Interpretation |
|-------------------------------|------|----------------|----------------------------|
| 14. Appointed hospital security team | 2.2343 | 0.47130 | NK |
| 15. Facility access points, triage sites and other areas of patient flow | 2.5874 | 0.52754 | K |
| 16. Mechanism for escorting emergency medical personnel. | 2.9266 | 0.39049 | K |
| 17. Defined measures for safe and efficient hospital evacuation | 2.3601 | 0.50230 | NK |
| 18. Defined rules for engaging crowd control | 2.0385 | 0.24117 | NK |
| 19. Management of hazardous materials and infectious control | 3.2727 | 0.44614 | VK |
| 20. Implemented procedures to ensure the secure collection confidential information. | 3.4545 | 0.50579 | VK |
| 21. Defined procedures for integrating local law enforcement. | 2.0629 | 0.29539 | NK |
| 22. Established area for radioactive, biological and decontamination and isolation | 1.9615 | 0.19264 | NK |
| Grand Mean | 2.5443 | 0.13295 | K |

| Triage during MCI | Mean | Std. Deviation | Qualitative Interpretation |
|------------------|------|----------------|----------------------------|
| 23. Designated triage officer | 3.1888 | 0.39204 | K |
| 24. Triage area in close proximity to essential resources | 3.0000 | 0.53639 | K |
| 25. Identified entrance and exit routes from triage | 2.3357 | 0.53566 | NK |
| 26. Identified contingency site for receipt and triage of mass casualty | 2.0734 | 0.26129 | NK |
| 27. Identified alternative waiting area for green cases | 2.0874 | 0.29507 | NK |
| 28. Established protocol on mass casualty triage | 2.1678 | 0.39267 | NK |
| 29. Mechanism of hospital emergency response plan used in triage. | 2.1049 | 0.30696 | NK |
| 30. Protocols on hospital process when disaster plan is activated | 2.0420 | 0.33244 | NK |
| Grand Mean | 2.3750 | 0.12739 | NK |

| Surge capacity during MCI | Mean | Std. Deviation | Qualitative Interpretation |
|--------------------------|------|----------------|----------------------------|
| 31. Maximal capacity required for patient admission. | 2.0315 | 0.21124 | NK |
| 32. Available tools and assumption for the increase in demand for hospital services. | 2.0769 | 0.26694 | NK |
| 33. Methods of expanding hospital inpatient capacity. | 2.1364 | 0.34378 | NK |
| 34. Designated care areas for patient overflow. | 3.2028 | 0.47476 | K |
| 35. Outsource of care of non-critical patient to alternative treatment sites. | 2.2483 | 0.44868 | NK |
| 36. Availability of vehicles and resources required for patient transportation. | 3.1713 | 0.39561 | K |
| 37. Established contingency plan for inter-facility patient transfer. | 2.0664 | 0.30051 | NK |
| 38. Provisions of medical care on critical and emergent surgical care. | 2.0664 | 0.34406 | NK |
| 39. Identified additional sites that may convert to patient care units. | 2.0559 | 0.29680 | NK |
| 40. Protocols on prioritizing and cancelling non-essential services | 2.0769 | 0.58732 | NK |
| 41. Available treatment capacity and demand. | 2.7063 | 0.55985 | K |
| 42. Designated area for temporary morgue | 2.0734 | 0.31039 | NK |
| 43. Contingency plan for post-mortem care | 1.9930 | 0.33501 | NK |
| Grand Mean | 2.3004 | 0.12162 | NK |

| Continuity of Essential Services of MCI | Mean | Std. Deviation | Qualitative Interpretation |
|---------------------------------------|------|----------------|----------------------------|
| 44. List of hospital services ranked in order of priority. | 3.0385 | 0.19264 | K |
| 45. Available resources need to ensure the continuity of essential hospital services, | 1.9895 | 0.10206 | NK |
| 46. Systematic and deployable evacuation plan | 2.0035 | 0.05913 | NK |
| 47. Coordinate with the health authorities, neighboring hospitals and private practitioner | 2.9895 | 0.10206 | K |
| 48. Availability of back-up arrangements for essential resources | 2.1014 | 0.37491 | NK |
| 49. Contingency mechanism for the collection and disposal | 2.0979 | 0.33118 | NK |
| Grand Mean | 2.3700 | 0.09829 | NK |

| Human resource during mass casualty | Mean | Std. Deviation | Qualitative Interpretation |
|-------------------------------------|------|----------------|----------------------------|
| 50. Updated hospital staff contact list | 3.3147 | 0.48731 | VK |
| 51. Clear policy on staff sick-leave, | 3.3462 | 0.47658 | VK |
| 52. Contingency plan for the provision of food, water and living space for hospital personnel. | 3.3497 | 0.47770 | VK |
| 53. Staffing requirements and distribution personnel | 3.3182 | 0.46659 | VK |
| 54. Recruitment and training of additional staff | 3.0839 | 0.27775 | K |
| 55. Address liability, insurance and temporary licensing issues for additional staff | 3.1573 | 0.36476 | K |
| 56. Systems on rapidly providing healthcare workers | 2.1538 | 0.44022 | NK |
| 57. Provided training and exercises in areas of potential increased clinical demand, | 3.2972 | 0.45783 | VK |
| 58. Domestic support measures | 2.1678 | 0.37437 | NK |
| 59. Adequate shift rotation and self-care for clinical staff | 3.0804 | 0.47072 | K |
| 60. Availability of multidisciplinary psychosocial support teams | 1.9231 | 0.35692 | NK |
| Grand Mean | 2.9266 | 0.13901 | K |
8.3. Using ANOVA to Determine the Significant Difference between Level of Knowledge of the Respondents on the Hospital Preparedness Compare to Their Profile?

Based on the Table 3, revealed that all 9 categories of hospital preparedness in emergency response compare to area of assignment the 8 categories the command control, (p-value = 0.0295) communication (p-value =0.1554) triage (p-value = 0.8557) surge capacity, (p value= 0.3495) continuity of essential service (p value= 0.4653) human resource (p value= 0.1457) logistics and supply (p value= 0.2963) and post-disaster recovery (p-value = 0.9530) only safety and security (p-value = 0.0295) which is less than p-value of 0.05 therefore, safety and security compare to area of assignment has significant difference. This means that knowledge on safety and security may differ from the area of assignment. All members of health institutions, despite your area of assignment, must be aware of safety and security, not only for the patient but also for themselves and their co-worker. Salamati & Kulatunga [22] mentioned that during a disaster, there would be a rapid increase of patients. Therefore, to provide the services needed, security and safety are the utmost priority.

Regarding years of service compared to the level of knowledge of respondents on the hospital preparedness in emergency response, only one category has less than 0.05 p-value the logistics and supply (p-value = 0.0075), which means they have a significant difference. Furthermore the 8 categories such as the command and control (p-value = 0.2239) communication (p-value = 0.1100) safety and security (p value= 0.7699) triage (p value= 0.1839) surge capacity (p value= 0.2094) continuity of essential services (p value= 0.5231) human resource (p value= 0.0719) and post-disaster recovery (p value= 0.2524) wherein all the category has more than 0.05 p-value, therefore there are no significant difference in all of these category when compare to years of service in the institution. The level of knowledge on triage and human resource has a significant difference on the highest educational attainment. The knowledge on logistics and supply may affect the respondents' years in service stay, the longer the service, the more knowledgeable in logistics and supply. Adiguzel [23] mentioned that during disaster events flow of patient's increases; therefore, as the supply and demand increases, the logistics department and supply chain network must be able to provide the need of the hospital. Nurses must know whom to approach and where to avail to provide the continuity of service needed.

For the highest educational attainment compared to the level of knowledge of the respondents on hospital preparedness, the two categories, triage (p value= 0.0057) and human resource (p value= 0.0189), presents a lower p-value than 0.05; therefore, there is a significant difference, on the other way the seven categories such as command control (p value= 0.6959) communication (p-value =0.9540) safety and security (p value= 0.5900) surge capacity (p value= 0.8875) continuity of essential services (p value=0.6537) logistics and supply (p value=0.8960) and the post-disaster recovery (p value= 0.2697) has more than p-value of 0.05 which means that there significant difference when to compare to the knowledge and highest educational attainment. The level of knowledge on triage and human resource will vary from highest educational attainment. The more they had a higher education decision making may enhance likewise if they had a degree of master specifically major in emergency management may enhance decision making during triage. Afaya, Azongo, and Yakong [24] stated that nurses improved their triage knowledge through experienced, training, and education.
Table 3. Significant difference between level of knowledge in hospital preparedness when compare the profile of the respondents

| Area                          | Area | Years of Service | Highest Educational Attainment |
|-------------------------------|------|-----------------|--------------------------------|
| command control during MCI    | F    | 1.4663          | 1.9828                         | 0.4808 |
|                               | p-value | 0.2239          | 0.0973                         | 0.6959 |
|                               | VI    | NS              | NS                             | NS     |
|                               | DECISION | A              | A                              | A      |
| communication MCI             | F    | 1.7583          | 1.9035                         | 0.1103 |
|                               | p-value | 0.1554          | 0.1100                         | 0.9540 |
|                               | VI    | NS              | NS                             | NS     |
|                               | DECISION | A              | A                              | A      |
| safety and security MCI       | F    | 3.0365          | 0.4534                         | 0.6398 |
|                               | p-value | 0.0295          | 0.7699                         | 0.5900 |
|                               | VI    | S               | NS                             | NS     |
|                               | DECISION | R              | A                              | A      |
| triage during MCI             | F    | 0.2578          | 1.5646                         | 4.2761 |
|                               | p-value | 0.8557          | 0.1839                         | 0.0057 |
|                               | VI    | NS              | NS                             | S      |
|                               | DECISION | A              | A                              | R      |
| surge capacity during MCI     | F    | 1.1001          | 1.4766                         | 0.2129 |
|                               | p-value | 0.3495          | 0.2094                         | 0.8875 |
|                               | VI    | NS              | NS                             | NS     |
|                               | DECISION | A              | A                              | A      |
| Continuity of Essential Services MCI | F | 0.8468          | 0.8045                         | 0.5424 |
|                               | p-value | 0.4693          | 0.5231                         | 0.6537 |
|                               | VI    | NS              | NS                             | NS     |
|                               | DECISION | A              | A                              | A      |
| human resource MCI            | F    | 1.8091          | 2.1755                         | 3.3728 |
|                               | p-value | 0.1457          | 0.0719                         | 0.0189 |
|                               | VI    | NS              | NS                             | S      |
|                               | DECISION | A              | A                              | R      |
| logistics and supply management | F | 1.2376          | 3.5551                         | 0.2005 |
|                               | p-value | 0.2963          | 0.0075                         | 0.8960 |
|                               | VI    | NS              | S                              | NS     |
|                               | DECISION | A              | R                              | A      |
| post disaster recovery        | F    | 0.1120          | 1.3477                         | 1.3152 |
|                               | p-value | 0.9530          | 0.2524                         | 0.2697 |
|                               | VI    | NS              | NS                             | NS     |
|                               | DECISION | A              | A                              | A      |

9. Conclusions

The study's findings revealed that the majority of respondents attended three pieces of training related to hospital preparedness in emergency response the incident command system, biohazard risk disaster, and emergency management. Moreover, with the result of the knowledge of the respondents in hospital preparedness in emergency response, they are knowledgeable in 2 categories the safety and security during MCI and the human resource during MCI. The other seven categories need to enhance their knowledge to strengthen the hospital's capacity in preparedness in emergency response. Hospitals' readiness and preparedness in emergency management will not only for a natural disaster but also emphasize biological hazards like the COVID 19 pandemic.

With regards to significant differences in the knowledge of respondents when compared to their profile, the area of assignment has a significant difference with safety and security; the year of service has significant difference on the logistics and supply, and education with the triage. Thus, all employees working in the hospital, including the newly hired, must have training and education through staff development not limited to safety and security but related to overall hospital preparedness in emergency management. The training should focus on an incident command system, communication, triage during MCI, surge capacity during MCI, continuity of essential service, logistics and supply, and post-disaster recovery. It should situate the Health Emergency Response Recovery Plan (HERRP) and policy of the hospital, covering all-hazard approach based on their risk assessment.

10. Limitation

The study's sample size was only limited to few hospitals that may influence the findings of the study. Likewise, the study participants were only limited to nurses, wherein during a disaster and emergency response, doctors and other medical health team are a vital part of the response team. Therefore, the researcher recommended that the study should include all teams responsible for emergency response during MCI.
References

[1] Ghazali DA et al. (2018). Climate change impact on disaster and emergency medicine focusing on mitigation disrupter effects? An International perspective. International Journal of Environmental Research and Public health.

[2] Abdelalim F A, & Ibrahim A. (2014). Nurses Knowledge Attitudes Practices and Familiarity Regarding Disaster and Emergency Preparedness in Saudi Arabia. American journal Of Nursing science. Vol 3, no.2. 2014. pp18-25.

[3] Alzahram F & Kyristis N. (2014). Emergency Nurse disaster preparedness during mass gathering: Cross sectional survey of emergency nurses’ perception in hospital Mecca, Saudi Arabia.

[4] Alraga SM. (2017). An investigation into disaster health management in Saudi Arabia. Journal of Hospital and medical management vol. 3.

[5] Nofal A, Alfayyad I, Khan A, Azeri Z and Abu-Shareen. (2018). Knowledge, Attitudes and Practices of emergency department towards disaster and emergency preparedness at Tertiary healthcare hospital in central Saudi Arabia. Saudi med J. 2018: vol 39 (11):1123-1129.

[6] Shabbir R, Arzal M. Server H, Gilane SA, and Waqas A. (2017). Nurses knowledge and practices Regarding disaster management and emergency preparedness. Saudi Journal of Medical and Pharmaceutical sciences.

[7] World Health Organisation (WHO). (2018). Global assessment of National Health sector emergency preparedness and response.

[8] Bin Shalhoub A, Khan A, and Alaska Y. (2016). Evaluation of Disaster preparedness for mass Casualty incident in private hospital in Saudi Arabia. Saudi Med J 2017 vol 38(3): 302-306.

[9] Assaei. (2017). Saudi Vision for healthcare. Saudi arabia 2030 vision for health care.

[10] Bahrami P, Adalca A, Nejati A, Ostadaghizadeh A, and Yari A. (2020). Factors affecting the The effectiveness of hospital incident command system, findings from systematic review Bulletin of Emergency Trauma, 2020;8(2) 6276;

[11] Ow Yong, L.M., Xin X., Wee J.M., et.al. (2020). Perception Survey of crisis and emergency risk Communication in acute hospital management of COVID 19 pandemic in Singapore BMC Public health. 1920, 19 (2020).

[12] Kapur GB, Bezek S, Dyal S. (2017). Effective communication during disaster. First edition Taylor And Francis ebook ISBN 978177885119.

[13] Yamin M, Basahal A.M and Abi Sen A.A.. (2018). Managing crowds with wireless mobile Technologies, wireless communication and mobile computing vol 2818 Article ID 7361597 15 pages.

[14] Fentiman R. (2020). The decontamination process for infection control, Inovos.

[15] Clarkson L., & Williams M., (2020). EMS mass casualty, Stat pearl Publishing.

[16] Lampin M. (2017). Triage management of the trauma patient, Lincoping University ISSN 0345-0082 ISBN 978-9107685-574-4.

[17] Smithe J.E., & Gebhart M.E., (2016). Patient Surge Cottones Disaster Medicine. Second Edition.

[18] Shen W, Jiang L, He X, (2020). Previous augmentation of medical Surge capacity for disaster Response. Emergency Medicine International vol 2020 Artele ID 5387043 6 pages.

[19] Feizolahzadeh S., Vaezi A, Mirzaei M., Khan Keh H.R., (2019). barriers and facilitators to provide Continuity of care to dischargeable patient in disaster: A Qualitative survey. Research Gate.

[20] Gabbe et.al. (2020). Survey of major trauma center preparedness for mass casualty incidents in Australia, Canada, England and New Zealand Eclilnical medicine, lancet vol 21 100322.

[21] Ibrahim N, Kamsani S.R & Arzinalshek N. (2016). Psychological Debriefing model: Post disaster Intervention. G; lobal Academic Excellence, International journal of education Psychology And counseling Vo1 issue 2 pp 24-30 ISSN: 128-164.

[22] Salamati Nia S.P & Kulatunga U. (2017). Safety and Security of hospital during natural disaster: Challenges of disaster managers. Int. J. of Safety and Security Eng., Vol. 7, No. 2 (2017) 234-246.

[23] Adiguzel, S. (2019). Logistics management in disaster. Journal of Management, Marketing and Logistics (JMML), V. 6(4), p.212-224. Copyright: Published by Press Academia and limited licenced re-use rights only.

[24] Afaya A., Azongo T.B., and Yakong V., (2017). Perception and Knowledge on triage of nurses working in emergency department of hospitals in the Tamale Metropolis, Ghana. Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320-1959 p. ISSN: 2320-1940. Volume 6 Issue 3 Ver VI (may-June 2017) PP59-65.

[25] Alsheri B. (2016). Emergency Nurses preparedness for disaster in the kingdom of Saudi Arabia Journal of Nursing Education and practices 7(3) 101-114.

[26] Bartholzer S, Kossin J, and Simon D. (2014). The impact of climate change on natural disaster Springer science business media.

[27] Davies. (2019). Asia News retrieved February 22, 2019.

[28] https://www.bbc.com./news/world-middle-east 34346446.

[29] Deeman C . (2017). Extreme Cyclone in Arabia Sea result of climate change on natural disaster Springer science business media.

[30] Elazeem H., Mostafa A.; Tantawi H., Hassan H. (2018). Developing and Validating an Evaluation Tool for Evaluating Nursing Faculty Staff Assistants’ Performance by the Students. International Journal of Novel Research in Healthcare and Nursing. Vol 5 Issue 1 pp: (128-137) month January April 2018.

[31] Shooster S., Tofighi S., Abbasi S., (2017). Benefi ts and Barriers and limitations on the use of Hospital incident command system. Journal of Research in medical Silences.

[32] World Health Organisation (WHO). (2011). Hospital emergency response checklist.