



# A Study of Saudi Arabian Military Hospitals and Disaster Preparedness: An Examination of Emergency Units

405

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## Abstract

**Background:** There are various natural and human disasters in Saudi Arabia. Several of these disasters resulted in mass casualties. Disaster preparedness depends heavily on Emergency Medical Services (EMS). Disaster response and management in in-hospital emergency services is considered inefficient and inadequate. Saudi Arabia has few data on disaster preparedness and response (EMS and hospitals). To identify disaster preparedness and response strategies for military hospitals, this study evaluated emergency and disaster preparedness. **Methods:** In order to assess the effectiveness of disaster response using survey-based data, we have conducted a prospective cross-sectional, descriptive study. Using quantitative methods, the research will collect and analyse data. At each of the 3 Medical Services Directorate (MSD) hospitals, we requested all disaster plans and standard operating procedures (SOPs). Using this tool, we gathered quantitative data using close-ended questions and open-ended commentary regarding a hospital's disaster response. **Results:** In the survey, hospitals showed wide variation across 22 themes. Most hospital emergency centres (ECs) have well to excellent disaster plans. Radiology, Occupational Health, Critical Care, Respiratory Therapy, Pastoral Counselling, and provisions for preservation of forensic evidence were the only areas of concern. Internal traffic flow and elevator prioritization issues. A lot needs to be done in media liaison. Also, casualties and victims need to be received and finally, patients and staff need to be relocated. **Conclusion:** According to the study, there are a number of strengths in disaster preparedness at facilities and some areas where work needs to be done to improve them. There were generally good disaster plans in place at most hospitals, though few included all of the recommended areas in sufficient detail.

**Keywords:** Emergency Medical Services, Disaster preparedness, Medical services directorate, Critical care.

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## Introduction

Globally, natural and man-made disasters have increased in frequency in recent years (Shammah A, 2018, AlShammari T *et al.*, 2017, and Ezreqat S *et al.*, 2017). Therefore, disaster experts have placed a greater emphasis on planning: each nation should establish and maintain preparedness for a wide range of anticipated emergencies (AlShammari T *et al.*, 2017; Bajow N *et al.*, 2014). Natural hazards have increased

because of climate change, rapid demographic growth, and significant urbanization. Similarly, human habitation has increased in low lying or subsiding coastal areas in parts of the Netherlands as a result of population pressure (Leroy, 2013). The hazards are further increased by human-related activities like terrorist attacks, motor vehicle crashes (MVCs), or large public gatherings, such as during Ramadan and Hajj. The term hazard refers to a potential risk to the environment, property, human health, or human



life. It is possible to predict most natural hazards because they occur repeatedly at the same geographic location and are related to weather patterns or physical characteristics of the area. Natural hazards were relatively prevalent in Saudi Arabia. Groundwater and natural resources have been contaminated in recent years. In order to mitigate these hazards and educate the public, different government agencies and universities have worked on these issues. At King Saud University, the Saudi Geographic Survey (SGS) Chair on Natural Hazards was established in order to address this issue. Over the last decade, Saudi Arabia has experienced many major incidents - sudden, unexpected mass casualty events, smaller than disasters. There were 22 people killed and 111 injured in a gas tanker explosion in Riyadh in 2012 (Shammah, 2018); 25 people lost their lives in a fire in a hospital in Jazan in 2015. While disaster planning seems to be undertaken in Saudi Arabia in some detail, medical responses to disasters are fragmented with multiple agencies involved and no central coordination. It would be beneficial to improve disaster response efficiency by adopting a centralized command and control structure - a practice used by many other countries (Alrazeeni D (2015), Bajow N, & Alkhalil S. (2014)). During disasters, hospitals provide life-saving treatment to ill and injured individuals (Alshehri B, 2017; Naser, W, et al., 2017). Ambulances are also essential to accessing patients in the field as part of emergency medical services (EMS). As part of the care, illnesses and injuries are treated pre-hospital and transported to a hospital for definitive treatment. The British Major Incident Medical Management and Support (MIMMS) system was adopted by most (Alshehri, 2017) for pre-hospital response. In addition to improving a health system's resilience, MIMMS prepares medical staff to deal with disasters effectively (Alsaad et al 2017). A major goal of this study was to improve Saudi Arabian military health services' preparedness and response to disasters and mass casualty situations.

## Methodology

This study employed the WHO Hospital Emergency Unit Assessment Instrument questionnaire and the disaster assessment tool created by the South African National Department of Health to gather and analyse data

for a prospective cross-sectional, descriptive, survey-based assessment of disaster response. The researcher requested all disaster plans and SOPs from management and emergency unit (EU) leadership at each of the three (3) MSD hospitals in order to review them. (Population Study)

406

## Study Protocol

Divided into 2 sections: Emergency care and Disaster preparedness

### 1. Emergency care

Using the WHO HEAT, data were prospectively obtained using a standardised questionnaire. General information, command and control, communication, safety and security, triage, surge capacity, human resource and training, logistics, equipment and supplies, and post-disaster recovery are the nine major subsections of the questionnaire. Data were analysed, contrasted, and evaluated for capacity variations between various facility types.

### 2. Disaster Preparedness

To review the standard operating procedures, we sought all disaster plans and SOPs from management and EU leadership at each of the hospitals.

## Data Collection and management

Col. Dr. Ziad Kattb, an emergency physician with expertise in disaster medicine in Saudi Arabia, and the main researcher assessed each facility's plans using the disaster planning evaluation instrument. In Microsoft Excel for Windows (Microsoft, Richmond, WA), all data were typed into encrypted files before being posted to Google forms.

## Data analysis

Using Excel, a simple descriptive analysis was conducted. For the majority of the data, we gave frequencies, medians, and ranges; open-ended comments was compiled by topic and utilised to illustrate recurring problems raised by respondents.

## Inclusion and exclusion

The heads of the EUs, matrons (head nurses), and medical officers from the three (3) major hospitals were identified as the respondents of the study, which made use of as many of the EUs'

workers involved in crisis management as possible.

**Ethical approval**

Prior to conducting the study, the researcher received ethical approval from the Human Research Ethics Committee and the relevant Institutional Review Board (IRB). All participants having the knowledge necessary to give informed, freely given permission.

**Research question**

This study addressed the following questions:

- What is the current capacity of facility-based emergency unit care in Saudi Arabia’s military hospitals?
- Are Saudi Arabia’s military hospitals adequately prepared for disaster management?

**Results**

According to the study, the participants from the three hospitals were issued the research questionnaire, and a total of forty-four responses were obtained. There was no need to discard any incomplete data because every questionnaire that was returned was filled out completely.

**Table: 1 Submitted responses**

Hospital	No. of responses	Emergency Unit	Disaster Team
Al Kharj Armed Forces Hospital (KAFH)	35	26	9
Prince Sultan Military Medical City (PSMMC)	5	4	1
Al-Hada Armed Forces Hospital	4	2	2
<b>Total</b>	<b>44 (100%)</b>	<b>32 (72.7%)</b>	<b>12 (27.3%)</b>

Table 1 reveals that of the 44 replies, 12 (27.3%) came from the Disaster Team and 32 (72.7%) were from the EU. Table 2 shows hospital emergency care for handling communicable illness response as well as disaster planning and emergency management.

**Table: 2 Foundations of Disaster Preparedness and Emergency Management and Hospital Emergency Care Capability in Handling Communicable Diseases and**

**Foundations of Disaster Preparedness and Emergency Management**

Question	Total	Central	Western
1) Does the facility have a disaster plan?	97.7	97.5	100
2A) Is there a disaster planning committee?	100	100	100
2B) Is it multi-disciplinary and include administrative members?	93.2	92.5	100
3A) Is there currently a collaborative relationship as part of the planning operating with:- Local EMS	93.2	95	75
3B) Local Red Crescent	90.9	90	100
3C) Local Emergency Management	93.2	92.5	100
3D) Local Health Department	86.4	87.5	75
3E) Does the plan detail actions to be taken for both internal and external disasters?	93.2	92.5	100



<b>4) Does the plan detail how it links with the local EMS Agencies and local Emergency Management Agency?</b>	95.5	95	100
<b>5) Is the plan widely distributed and readily available throughout the hospital/healthcare facility?</b>	90.9	92.5	75
<b>6) Does the plan set out the responsibilities of the chief executive?</b>	97.7	97.5	100
<b>7) Does the plan set out the mechanism for consultation across the Trust and with external agencies?</b>	97.7	97.5	100
<b>8) Have the plan version controls within it to ensure that the user has the latest version?</b>	88.6	90	75
<b>9) Does the plan state clearly the circumstances that would constitute a major incident for the hospital?</b>	97.7	97.5	100
<b>10) Does the plan provide an assessment of local hazards and risks?</b>	88.6	90	75
<b>11) Does it address how the hospital will manage a mass casualty incident where routine emergency resources and facilities are inadequate?</b>	90.9	97.5	75
<b>12) Does it cover specific arrangements for dealing with a chemical / biological / radiation incident</b>	100	100	100
<b>Hospital Emergency Care Capability in Handling Communicable Diseases</b>			
<b>13A) Does the facility currently have: A baseline established for numbers of patients seen in the facility Emergency unit, outpatient clinics, or via direct admission, stratified according to clinical symptoms?</b>	100	100	100
<b>13B) Does the facility currently have: A database of its emergency care capability and additional capacity?</b>	84.1	97.5	75
<b>14) Is there currently a process to evaluate and track 100% of all microbiology results and stratify according to organism?</b>	90.9	97.5	75
<b>15) Does a process exist to notify infection control 24 hours a day/7 days a week?</b>	100	100	100
<b>16) Does the plan specify the number and location of isolation or protective environment rooms? Are their locations clearly identified in a document readily available to the disaster coordinator or command team? Are isolation facilities monitored to insure adequate airflow?</b>	97.7	97.5	100

**Answered as Yes (%)**

Hospitals are included in 97.5% of disaster plans for the central region and 100% of those for the western region. Every hospital has a catastrophe preparation committee, which includes 93.2% of the administrative and supervisory employees. Western is 100% and the central 92.5%. 93.2% of other healthcare services work together. The Western Region only has 75% of hospitals having positive interactions with neighbourhood organisations, compared to the Central Region's 92.5%. 93.2% of hospitals (92.5% in the central

region and 100% in the western region) have comprehensive plans in place for both internal and external calamities. The majority (95%) talk about the hospital's response to a mass casualty incident. In 90% of the cases (92.5% in the central region and 75% in the western region), hospitals are broadly disseminating and easily accessible the plan. In all hospitals, there are 97.7% chief executive duties, and in the western region, that number is about 100%. The majority of respondents, 97.7% (western region: 100%,



central region: 97.5%), claimed to have a reliable channel of communication with outside organisations. The majority of structures (88.6%) had the most recent disaster plan. 75% of hospitals in the western region have good version access, compared to 90% in the central region. In 97.7% of cases, hospitals determined what constituted a serious incident, and in 88.6%, hospitals evaluated regional risk and hazards. 90.9% of hospitals will be impacted by a mass casualty incident, with 75% of hospitals in the western area handling incidents. Every hospital has a plan in place for radiological, chemical, and biological emergencies. Based on a baseline of patients treated in the EU, outpatient

clinics, or via direct admission, data demonstrates that all respondent-hospitals have these aforementioned services. An established database of emergency care and additional capacity does not exist in 84.1% of hospitals. (The western region only contains 75%; the central region has 97.5 %.) In the central region, 97.5% of hospitals have the capacity to evaluate, track, and stratify 100% of microbiology data by organism. Almost all hospitals alert infection control seven days a week, around-the-clock. Plans for 97.7% of hospitals provide information about the locations of isolation or protective environments.

**Table: 4 Processes of Identification of Authorised Personnel during Disaster and Activation of the Hospital Disaster Preparedness Plan**

<b>Processes of Identification of Authorised Personnel during Disaster</b>			
<b>Question</b>	<b>Total</b>	<b>Central</b>	<b>Western</b>
<b>17) Is there an individual designated as a disaster coordinator on a 24-hour per day basis?</b>	90.9	92.5	75
<b>18) Has the facility designated a medical commander who will be responsible for the hospital’s medical responses during the time the plan is activated?</b>	90.9	90	100
<b>19) Have other key position holders who have a role in disaster management been identified? This should be identified in the disaster plan.</b>	90.9	90	100
<b>20) Is a notification system in place that can alert personnel to a potential disaster situation?</b>	88.6	90	75
<b>21) Does the plan include lines of authority, role responsibilities, and provide for succession?</b>	95.5	95	100
<b>22) Are those who are expected to implement and use the plan familiar with it?</b>	93.2	92.5	100
<b>23) Have action cards been developed for all personnel involved in disaster response?</b>	95.5	95	100
<b>24) Does the plan designate how people will be identified within the facility (e.g. staff, news media, and visitors)?</b>	88.6	90	75
<b>Activation of the Hospital Disaster Preparedness Plan</b>			
<b>26) Does the plan specify the circumstances under which the plan can be activated?</b>	93.2	95	75
<b>27) Have activation stages been established and roles outlined with each stage?</b>	95.5	100	50
<b>Alert: Disaster situation possible: there is an increased level of preparedness. Stand by: Disaster situation probable: available for immediate deployment. Call out: Disaster situation exists: deployment. Stand down: Disaster situation is contained</b>			





<b>28) Does it set out the mechanism for informing upwards that the plan has been activated?</b>	86.4	87.5	75
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**Answer as Yes (%)**

In Table 3, it is described how to identify authorised people in the event of a disaster and how to activate the hospital's disaster plan. Disaster coordinators are present in 92.5% of hospitals in the central region and 75% of hospitals in the western region. 90.9% of organisations have designated a medical commander and a disaster management key person, and 88.6% have a staff notification mechanism. In hospitals in the western area, staff notification systems are less widespread (75%). Hospitals in 95.5% of cases have a succession plan that outlines authority structures, duties, and tasks. All emergency

response employees have action cards at 95.5% of hospitals, and 93.2% are familiar with the plan. 88.6% of hospitals have specified how patients would be identified. Only 75% of facilities in the western region have a plan for identifying people. 95% of hospitals have laid down the procedures for each stage and the duties that need be played, and 93.2% have identified the situations in which the hospital disaster plan should be triggered. The system for alerting higher up that the plan has been activated has been set up in 86.4% of hospitals, compared to 87.5% in the central region and 75% in the western region.

**Table: 4 Disaster preparedness and Emergency Alerting System, Hospitals' Disaster Preparedness and Response.**

**Disaster Preparedness and Emergency Alerting System**

Question	Total	Central	Western
29) Does the plan provide for activation within 1 - 2 hours during normal as well as off-hours?	88.6	90	75
30) Does the plan specify how notification within the facility will be carried out?	90.9	90	100
31) Does the plan specify the chain of command to notify internal staff and appropriate external personnel indicating the status of the facility?	86.4	85	100
32) Does the plan detail responsibility to initiate a system for recalling staff back on duty?	95.5	95	100
33) Does the plan provide for alternative systems of notification that considers people, equipment, and procedures?	95.5	97.5	75
34) Does the plan provide mechanisms to ration staffing according to their skill levels and availability?	100	100	100

**Hospitals' Disaster Preparedness and Response**

35) Has the facility developed internal disaster plans for internal emergencies (Including a hospital fire, bomb threat, and evacuation)?	100	100	100
36) Has the facility developed internal plans to respond to an external disaster? Does this plan indicate how the hospital will respond to an abnormally large (greater than >10% of the beds) influx of patients?	93.2	92.5	100
37) Has the facility developed plans indicating how it will be able to supply resources and personnel in response to an external disaster? Is there an evaluation of current supply and equipment levels that are kept on hand during normal facility operation?	90.9	95	50



<b>38) Have provisions been made for activating a disaster medical team in response to both internal and external disasters?</b>	93.2	92.5	100
<b>39) Does the plan include procedures for incorporating and managing volunteers and unexpected medical services responders who want to help?</b>	88.6	92.5	50
<b>40) Has each department developed standard operating procedures to reflect how the facility will continue to provide services in a timely and 24 hour manner? These services may include:</b>			
<b>40A) Administrative</b>	93.2	92.5	100
<b>40B) Emergency</b>	100	100	100
<b>40C) Nursing</b>	100	100	100
<b>40D) Radiology</b>	79.5	82.5	50
<b>40E) Infection Control / Hospital Epidemiology</b>	93.2	95	75
<b>40F) Occupational Health</b>	75.0	77.5	50
<b>40G) Laboratory</b>	97.7	100	75
<b>40H) Pharmacy</b>	100	100	100
<b>40I) Critical Care</b>	79.5	77.5	100
<b>40J) Central Supply</b>	81.8	82.5	75
<b>40K) Maintenance and Engineering</b>	93.2	92.5	100
<b>40L) Biomedical Engineering</b>	93.2	97.5	50
<b>40M) Respiratory Therapy</b>	79.5	80	75
<b>40N) Security</b>	100	100	100
<b>40O) Food and Nutrition</b>	90.9	90	100
<b>40P) Housekeeping</b>	90.9	92.5	75
<b>40Q) Social Services</b>	81.8	82.5	75
<b>40R) Pastoral Counselling</b>	65.9	70	25
<b>40S) Mortuary</b>	97.7	100	75
<b>41A) In the Emergency unit section of the plan, are the following detailed? Is there a separate entry to the Emergency unit for contaminated patients, if necessary?</b>	93.2	97.5	50
<b>41B) Is there a dedicated facility, area, or portable device for decontamination, if necessary?</b>	88.6	90	75
<b>41C) Is there a hot and cold water supply to the decontamination area?</b>	86.4	87.5	75
<b>41D) Can water run-off from the decontamination area be contained?</b>	86.4	87.5	75
<b>41E) Can the ventilation system in the Emergency unit be isolated from the rest of the facility, if necessary?</b>	88.6	90	75
<b>41F) Is a communication method established within the Emergency unit so communication can be established and maintained with the local EMS Agencies, Disaster Management, and the local Health Department?</b>	100	100	100

<b>42) Has jurisdictional control been discussed and staff informed of the hierarchy in the event outside law enforcement assistance is requested or required?</b>	97.7	100	75
<b>43) Has it set out the arrangements for accommodating the ambulance liaison officer?</b>	97.7	100	75
<b>44) Have arrangements been set out for accommodating the police documentation team?</b>	95.5	100	50
<b>45) Have arrangements been set out for deployment of a mobile medical team to the scene of an incident?</b>	86.4	90	50
<b>46) Does it include arrangements for keeping staff informed of the incident response?</b>	100	100	100
<b>47) Does it make provision for additional mortuary facilities?</b>	84.1	82.5	100
<b>48) Is provision made for preservation of forensic evidence?</b>	77.3	80	50
<b>49) Does it cover special arrangements needed in the event that children are involved in an incident? (Especially uninjured or minor injured children)</b>	90.9	90	100
<b>50) Does it cover arrangements and facilities for decontamination of casualties where potential contamination is identified before entry to the hospital?</b>	86.4	87.5	75
<b>51) Are there set out arrangements for accessing stocks of antidotes / vaccines?</b>	86.4	90	50

422

**Answer as Yes (%)**

The table displays the hospitals' disaster preparedness and response plans as well as the emergency alerting system. In all, 88.6% of hospitals (75 % in the western area and 90 % in the central region) activate their emergency plan within 1-2 hours of both normal business hours and off-hours. With central region hospitals establishing the chain of command in 85% of cases, the hospital notification plan details how internal personnel and external employees will be contacted. Staff can be called back to duty using a thorough system in 95.5% of hospitals, and additional notifications that take into account personnel, equipment, and procedures are also available. In hospitals, all emergency plans include a method of hiring personnel based on their qualifications and availability. 100% of hospitals have internal catastrophe plans, while the majority (93.2%) have devised plans to react to external calamities. Furthermore, 90.9% of hospital has strategies in place for providing personnel and equipment in the event of an outside calamity. 93.2% of hospitals have crisis medical teams for both external and internal calamities. About 50% of hospital in the western region has a system in place to control volunteers

and responder who want to assist. Standard operating procedures (SOPs) describe how services will be delivered promptly and around-the-clock in the majority of hospitals. 100% in the areas of emergency services, nursing, pharmacy, and security; 97.7% in the areas of laboratory and mortuary; 93.2% in the areas of administration, infection control/hospital epidemiology, biomedical engineering, and maintenance and engineering; 90.9% in the areas of food and nutrition; 81.8% in the areas of central supply and social services; 79.5% in the areas of radiology, critical care, and respiratory therapy; 75% in the area of occupational health; and 65.9% Only 50% of hospitals have separate EU entrances for polluted patients in the western region. Seventy-five percent of hospitals in the western region have a decontamination space, hot and cold water supply, and containment for water runoff from it. According to estimates, 88.6% of hospitals in the EU, including 75% in the western region, have an isolated ventilation system. In all hospitals in the EU, communication with local EMS agencies, disaster management teams, and health departments can be established and maintained. In every single





instance, hospitals inform their workers of incident responses. Jurisdictional control has been discussed and staff members are aware of the hierarchy in 97.7% of the hospitals in case outside law enforcement aid is required. Only 75% of hospitals that can accommodate ambulance liaison personnel are in the Western area. 95.5% of hospitals can accommodate police documentation teams, compared to 50% in the west. Hospitals that treat children involved in accidents cover 90.9% of them. In the western

region, only 50% of hospitals have plans for deploying mobile medical teams to an incident site and facilities for decontaminating casualties if potential contamination has been recognised prior to entrance into the hospital. In the central region, just 82.5% of hospitals offer additional mortuary services. While just 50% of hospitals in the west have measures for the preservation of forensic evidence, 80% of hospitals in the central region do.

**Table: 5 Hospital Disaster Operations Centre, Hospital Disaster Preparedness and Emergency Security Protocol and Hospital Communications System**

<b>Hospital Disaster Operations Centre</b>			
<b>Question</b>	<b>Total</b>	<b>Centra l</b>	<b>Western</b>
<b>52) Does the plan indicate where the Hospital Disaster Operation Centre is to be located (with preference given to an area away from the Emergency Unit)?</b>	86.4	87.5	75
<b>53) Has an alternate location been determined?</b>	81.8	82.5	75
<b>55) Do the procedures for the Operation Centre specify chain of command and communication channels for the key position holders within the Operation Centre?</b>	90.9	92.5	75
<b>56) Is there provision for alternative communication arrangements in the event the hospital communication system fails or is overloaded?</b>	95.5	95	100
<b>57) Have special communication networks been established and tested that will maintain communication between the facility and the local Disaster Management?</b>	97.7	100	75
<b>58) Have provision been designated (e.g. space, equipment, communications) for extra people who may come to the hospital to provide services (e.g. volunteers and outside agencies) should assistance be requested by the local, or other agencies responding for disaster assistance?</b>	84.1	87.5	50
<b>59A) Does the plans contain arrangements for: promptly alerting and establishing a control team?</b>	90.9	92.5	75
<b>59B) Pre-allocated communication lines/telephones, known to those departments?</b>	88.6	92.5	50
<b>Hospital Disaster Preparedness and Emergency Security Protocol</b>			
<b>60) Does the facility have the ability to lock down so entry and exit to all parts of the facility can be controlled? Has this process been tested?</b>	100	100	100
<b>61) Have steps been taken to minimize and control points of access and egress in buildings and areas without utilization of lock down procedures?</b>	97.7	100	75
<b>62) Is there a plan to control vehicular traffic and pedestrians?</b>	93.2	97.5	50



<b>63) Have arrangements been made to meet and escort responding emergency service personnel?</b>	86.4	85	100
<b>64) Does the facility have the ability to communicate with individuals immediately outside the facility in the event lock down is initiated?</b>	88.6	90	75
<b>65) Does the facility security plan recognize the extent of the security problems for the individual facility?</b>	88.6	90	75
<b>66) Does the facility have an established process to credential healthcare workers from outside the individual network in order to facilitate safe and qualified patient care?</b>	97.7	100	75
<b>Hospital Communications System</b>			
<b>67) Is there provision for alternative communication arrangements in circumstances where the communication system fails/overloads (e.g. unlisted numbers, pay phones, walk ie-talkie sets)?</b>	81.8	82.5	75
<b>68) Is there an organized runner, messenger system as back-up for communication system and power failures?</b>	88.6	90	75
<b>69) Has a plan been developed to utilize runner personnel and have they been provided with schematic area layout maps showing key areas for disaster operations?</b>	86.4	90	50
<b>70) Has the facility established communication networks with the local EMS Agency and Disaster Management?</b>	97.7	97.5	100
<b>71) Are cover arrangements for recording messages received, management decisions, and actions taken during a major incident in place?</b>	90.9	90	100

**Answer as Yes (%)**

The Hospital Disaster Operation Centre will be located in one of the 86.4% of hospitals listed in this table, with 87.5% of those in the hospitals in the central region and 75% in those in the western region. Hospitals' alternate locations are 82.5% in the central region and 75% in the western region. In the central region, 92.5% of hospitals have Operation Centre protocols in place, and in the western region, 75% do. In the event of communication breakdowns or overloads, 95.5% of hospitals have alternative communication procedures. For keeping in touch with the local Disaster Management, 75% of the hospitals in the western region have dedicated communication networks designed and tested. Should the local or other agencies respond to a crisis, more staff members (e.g., volunteers and outside agencies) may be able to give services in 84.1% of hospitals (87.5% of central and 50% of western hospitals). Plans for quickly alerting and forming a control team are present in 90.9% of the hospitals, 92.5% at hospitals in the central

region and 75% at hospitals in the western region. 92.5% of hospitals in the central area and 50% of hospitals in the western region have pre-allocated communication lines or telephones that are known to those departments. Every facility has a mechanism for regulating entry and exit. Compared to 75% in western regions, 97.7% of hospitals have taken action to reduce and manage ports of access and egress. Only 50% of hospitals in the western region have a plan for regulating traffic in an emergency, compared to the majority (93.2%) of hospitals nationwide. In 86.4-88% of circumstances, people can contact with each other outside the facility in the event of a lockdown, emergency professionals responding to the scene are met and escorted, and facility security procedures take into account the security issues present in each facility. Hospitals in the western region only have a 75% percentage. In order to provide safe and competent patient care, only 75% of hospitals in the western region have procedures for



credentialing healthcare professionals from outside their network. Although 75% of hospitals in the western region have catastrophe plans, there are backup plans for 81.8% to 97.7% of them. In case of failure or overload, alternative communication arrangements are provided in 81.8% of hospitals. Organized runners are utilised as a backup for communication and

power outages in hospitals in 86.4–88.6% of cases; runner staff are given schematic area layout maps depicting essential locations for disaster operations, with the exception of the western region, where this percentage lowers to 50%. 90.9-97.7% of hospitals have networks of contact with the regional EMS service and Disaster Management in place for big incidents.

**Table: 6 Hospital Internal, External Traffic Flow and Control, Hospital Visitor Policy During Disaster, Hospital Media Protocol: Information Dissemination Process**

<b>Hospital Internal Traffic Flow and Control</b>			
<b>Question</b>	<b>Total</b>	<b>Central</b>	<b>Western</b>
<b>72) Have provisions been made for internal traffic that allow for movement of patients through corridors and staff movement throughout their areas?</b>	95.5	97.5	75
<b>73) Have egress routes for patients and staff been provided for evacuation purposes?</b>	88.6	90	75
<b>74) Will elevators be manned and controlled?</b>	79.5	80	75
<b>75) Has elevator usage been prioritized (e.g. casualties, supplies)?</b>	79.5	82.5	50
<b>76) Have movement routes been designated within the hospital and have traffic flow charts been prepared and posted?</b>	88.6	92.5	50
<b>Hospital External Traffic Flow and Control</b>			
<b>77) Have arrangements been made for both vehicular (including helicopter) and people entrance to and exit from the hospital premises?</b>	86.4	87.5	75
<b>78A) Have the following been established: A) Uninterrupted flow of ambulances and other vehicles to casualty sorting areas or emergency room entrances</b>	93.2	92.5	100
<b>78B) Access and egress control of authorized vehicles carrying supplies and equipment to a dock area</b>	90.9	92.5	75
<b>78C) Authorized vehicle parking</b>	97.7	97.5	100
<b>78D) Direction for authorized personnel and visitors to proper entrances</b>	90.9	90	100
<b>78E) Emergency parking for key personnel</b>	90.9	92.5	75
<b>78F) Are these areas accessible for large disaster vehicles such as disaster busses?</b>	84.1	85	75
<b>79) Have arrangements been made for police support in maintaining order in the vicinity of the facility?</b>	88.6	92.5	50
<b>80) Does the plan include a method to impact the management of vehicle and people convergence upon the facility?</b>	88.6	92.5	50
<b>Hospital Visitor Policy During Disaster</b>			



<b>81) Does the plan include mechanism to deal with anticipated increases in visitors and curious onlookers seeking to gain entrance during disasters?</b>	86.4	90	50
<b>82A) Has provision been made to establish: Waiting areas, with supportive counselling, away from the Emergency unit to minimize unwanted access to the relatives and friends of disaster victims?</b>	88.6	92.5	50
<b>82B) Area to re-unite discharged patients and uninjured patients with their family</b>	90.9	92.5	75
<b>82C) Area of privacy to inform family member of their loved-ones death</b>	84.1	85	75
<b>83) Has provision been made to handle medical and emotional situations resulting from the anxiety and shock of the disaster situation? This includes dealing with the worried well.</b>	90.9	92.5	75
<b>84) Has a position holder been designated to control and take care of housekeeping issues that arise due to visitors?</b>	88.6	90	75
<b>85) Does the plan contain arrangements for dealing with VIP visits following a major incident?</b>	88.6	87.5	100
<b>Hospital Media Protocol: Information Dissemination Process</b>			
<b>86) Do the media have a designated area?</b>	68.2	72.5	25
<b>87) Has this been located as not to be in close proximity to the Emergency unit, Command Centre, and waiting area for relatives, family, and friends?</b>	75.0	77.5	50
<b>88) Has a position holder been designated to control and take care of the housekeeping needs of the media?</b>	63.6	65	50
<b>89) Does the plan designate an internal spokesperson as a media contact?</b>	70.5	72.5	50
<b>90) Does the plan determine the communication tree connecting the internal spokesperson with the external spokespersons for Disaster Management or other lead agency?</b>	70.5	72.5	50
<b>91) Have provisions been made to identify the procedures for handling requests for information from the media?</b>	75.0	75	75
<b>92) Have locations been identified for press briefings?</b>	63.6	65	50

**Yes Answer (%)**

In 85.5% of hospitals, internal traffic flow controls are in place to regulate staff and patient movement. Western hospitals have 50% fewer traffic flow diagrams and movement routes, and in 88.6% of hospitals, patients and employees may readily exit during evacuations. In the western region, 50% of hospitals have plans to monitor, prioritise, and man the elevators. Ambulances, supply vehicles, authorised staff, authorised vehicle parking, and emergency parking are all labelled in between 84.1 and 97 percent of structures. In 88.6% of hospitals, there is a police presence, and there are measures to

control the concentration of people and vehicles near hospitals. After a tragedy, 90% of hospitals are able to reconcile released and unharmed patients with their families, and arrangements have been made to handle medical and emotional issues. In order to limit unauthorised access by family members and friends of catastrophe victims, waiting areas with supportive counselling are available in 88.6% of hospitals. Plans cover VIP visits and housekeeping difficulties brought on by visitors in 88.6% of cases. In 84.1-86.4% of hospitals, there is a plan in place for how to handle visitors and observers



during emergencies. Only 25% of hospitals in the Western area have media rooms. There is only a dedicated media housekeeper in 63.6% of hospitals. Hospitals have plans for contacting the

media in the range of 70.5-75%. The internal and external spokespersons of Disaster Management or other key agencies respond to media inquiries.

**Table: 7 Reception of Casualties and Victims, Hospital Evacuation, Relocation of Patients and Staffs, Hospital out of communication or cut off from resources and Equipment, Services, Facility, and Laboratory Assessment**

**Reception of Casualties and Victims**

Question	Total	Central	Western
93A) Is there a precise plan of action whereby at short notice (within 1 hour), multiple casualties can be received and: A) Identified	90.9	92.5	75
93B) Triage	100	100	100
93C) Personnel are familiar with triage tags	90.9	90	100
93D) Registered	100	100	100
93E) Treated in designated treatment areas	95.5	100	50
93F) Admitted or transferred	88.6	90	75
93G) Transported as needed	95.5	100	50
93H) A pre-numbered system be used	81.8	82.5	75
93I) Routes to designated areas from triage area marked for untrained porters	81.8	85	50
93J) Admission wards versus distribution to empty beds?	90.9	92.5	75
94A) In the confirmation notification of a disaster, does the plan provide for: A) Clearance of all non-emergency patients and visitors from the emergency unit	93.2	92.5	100
94B) Cancellation of all elective admissions and elective surgery	88.6	90	75
94C) Determination of rapidly available or open beds	90.9	92.5	75
94D) Determination of space that can be converted to patient care areas	81.8	82.5	75
94E) Determination of number of patients who can be transferred or discharged	97.7	100	75
94F) Plan to assemble discharged patients, screen/re-evaluate them, record all information/ plan transport and accommodation	77.3	80	50
95) Is the receiving and sorting area accessible and in close proximity to the areas of the hospital in which definitive care will be given?	90.9	92.5	75
96) Is the reception area equipped with portable auxiliary power for illumination and other electrical equipment, or can	90.9	92.5	75





<b>power be supplied from hospital emergency power (generator) circuits?</b>			
<b>97) Does the reception area allow for retention, segregation and processing of incoming casualties?</b>	88.6	90	75
<b>98) Are sufficient equipment, supplies, and apparatus available, in an organized manner, to permit prompt and efficient casualty movement?</b>	93.2	92.5	100
<b>99) Can radiological monitors and radiation detection instruments be assigned to the area, if required?</b>	86.4	85	100
<b>100A) Has provision been made for a large influx of casualties to include such factors as: A) Bed arrangements</b>	84.1	82.5	100
<b>100B) Personnel requirements</b>	88.6	87.5	100
<b>100 C) An extra resource such as interpretive services, linen, pharmaceutical needs, dressings, etc.?</b>	93.2	92.5	100
<b>101) Are the medical records and admission departments organized to handle an influx of casualties</b>	88.6	90	75
<b>102) Is there a system for retention and safe-keeping of personal items removed from casualties?</b>	88.6	90	75
<b>103) Is there a plan to segregate/isolate disaster victims from the rest of the hospital if those victims are contaminated (e.g. hazardous materials)?</b>	97.7	100	75
<b>104) Does the plan consider the need for a single entry point for all casualties of the incident?</b>	97.7	100	75
<b>105) Does it identify the receiving wards that may need to be used?</b>	88.6	90	75
<b>Hospital Evacuation</b>			
<b>106) Is there an organized discharge routine to handle large numbers of patients upon short notice?</b>	88.6	90	75
<b>107) Is it detailed that a position holder is responsible for removal and control of patient records and documents?</b>	97.7	100	75
<b>Relocation of Patients and Staffs</b>			
<b>108) Has provision been made for the movement of patients and staff to an immediate area of safe refuge within the hospital in the event the area must be evacuated or staff and patients relocated?</b>	90.9	92.5	75
<b>109) Have arrangements been made with other healthcare facilities for the relocation of patients should the facility be unable to support patient care?</b>	81.8	82.5	75
<b>110) Have satellite locations been pre-determined and confirmed for the housing of patients and staff in the event of an evacuation?</b>	95.5	100	50
<b>111) Have transportation requirements been pre-designated for the movement of people?</b>	95.5	100	50

<b>112) Have transportation resources been identified for patients that must be moved in hospital beds, on ventilators, and connected to specialized equipment?</b>	88.6	92.5	50
<b>113) Has provision been made for the movement of patient records and documents?</b>	95.5	100	50
<b>114) Is there a time sequence built into the plan designating appropriate moving times, assigned personnel including profession staff assignment, and priority of patients when moving to specific locations?</b>	88.6	92.5	50
<b>115) Is there a sequence for patient transfers along pre-established routes?</b>	90.9	92.5	75
<b>116) Are procedures established for the orderly disposition of patients to their homes, if applicable?</b>	79.5	85	25
<b>117) Has provision been made for immediate refuge, care and comfort for the patients and staff on the hospital grounds during inclement and winter weather?</b>	86.4	90	50
<b>Hospital out of communication or cut off from resources</b>			
<b>118A) In the event the hospital/healthcare facility is completely out of communication or cut off from resources, has the plan assigned position holders responsible for the following A) Auxiliary power</b>	88.6	92.5	50
<b>118B) Rationing of food and water</b>	95.5	97.5	75
<b>118C) Waste and garbage disposal</b>	100	100	100
<b>118D) Rest and rotation of staff</b>	86.4	87.5	75
<b>118E) Rationing of medication and supplies</b>	90.9	90	100
<b>118F) Medical gas supply</b>	93.2	92.5	100
<b>118G) Laundry</b>	90.9	90	100
<b>118H) Staff and patient morale</b>	100	100	100
<b>119) Has consideration been given to utilization of patients and visitors to assist staff with duties?</b>	97.7	100	75
<b>120A) Generators: A) Are critical areas identified?</b>	93.2	92.5	100
<b>120A) Generators: B) Are power points supplied by generator marked?</b>	90.9	90	100
<b>120A) Generators: C) What is the duration the generator can function before additional fuel is required?</b>	88.6	92.5	50
<b>120B) Food &amp; Water: A) Has the time the hospital can be self-sufficient on its own water reserves/tanks and food resources been pre-determined?</b>	97.7	97.5	100
<b>120B) Food &amp; Water: B) Can the water tanks be filled from a portable source such as a tanker or by?</b>	90.9	90	100
<b>120B) Food &amp; Water: C) Are there boreholes close to the hospital?</b>	97.7	97.5	100

<b>120B) Food &amp; Water: D) Can mass food freezer facilities be supplied by portable generators/ connections available/ parking space?</b>	90.9	92.5	75
<b>120B) Food &amp; Water: E) Is rationing of water planned?</b>	93.2	92.5	100
<b>Equipment, Services, Facility, and Laboratory Assessment</b>			
<b>121A) Current number of the following pieces of equipment readily available within the facility: A) Ventilators (adult)</b>	100	100	100
<b>121B) Ventilators (neonate)</b>	68.2	65	100
<b>121C) Incubators</b>	68.2	65	100
<b>121D) IV pumps</b>	100	100	100
<b>121E) IV poles</b>	88.6	87.5	100
<b>121F) Suction Machines</b>	100	100	100
<b>121G) Beds</b>	100	100	100
<b>121H) Linen</b>	100	100	100
<b>121I) Spinal boards</b>	100	100	100
<b>121J) Stretchers</b>	100	100	100
<b>121K) Wheelchairs</b>	100	100	100
<b>122) Current level of medical supplies maintained and readily available within the facility (days), particularly items that provide personal protection (i.e. masks, gloves, eye protection)</b>	93.2	92.5	100
<b>123) Are local suppliers of medical equipment identified? Are there 24-hour contact numbers for these suppliers?</b>	93.2	92.5	100
<b>124) Current level of linen maintained and readily available (days)</b>	90.9	90	100
<b>125) Does the facility have the ability to shut down air intakes?</b>	90.9	90	100
<b>126) Does the plan include measures to insure the ability to provide hand washing/hand sanitizing measures?</b>	97.7	100	75
<b>127) Does the plan include measures to insure adequate amounts of personal protective equipment?</b>	90.9	92.5	75

**Answered as Yes (%)**

88.25% of hospitals compel all non-emergency visitors and patients to depart the emergency room as soon as a disaster has been confirmed. Elective procedures and admissions must be postponed, and available beds must be identified. Determine the number of patients who can be shifted or discharged, and make plans for how to gather, screen, re-evaluate, and manage patients who are being discharged. A receiving and sorting room is accessible and adjacent to the location where definitive care will be given in 90.9% of hospitals. Most hospitals postpone

operations and adjust their equipment to accommodate the influx. When catastrophe victims are polluted, 97.7% of hospitals separate or isolate them from the rest of the facility (e.g. hazardous materials). 88.6% of hospitals have a strategy in place to help patients get discharged quickly. 97.7% of hospitals erase and control patient records and papers. 95.5% of hospitals have pre-planned transportation for patients and personnel as well as satellite locations for lodging patients and staff in the event of an evacuation. In roughly 90.9% of hospitals, patients and



employees can be moved to a safe room during an evacuation or move if necessary. 86.4-88.6% of hospitals transfer patients who are on hospital beds, attached to specialised equipment, and on ventilators. When moving to particular sites, relocation schedules were planned, staff was assigned, and patients received precedence. In 79.5% of hospitals, patients are discharged in a timely way to their homes. Auxiliary power, food and water rationing, garbage and waste disposal, staff rotation, drug and supply rationing, medical gas supply, laundry, and morale during communication gaps are all common tasks assigned to positions in hospitals. 90% of

hospitals have generators, and 94% have implemented food, water, and waste disposal rationing. Hospitals have 68.2% incubators and ventilators and 88.6% IV poles. Measures for hand washing and hand sanitization are present in 97.7% of hospitals. 93.2% of hospitals have medical supplies on hand. a directory of nearby vendors of medical equipment, their telephone numbers, and personal safety information (masks, gloves, eye protection). In 90.9% of cases, hospitals offer personal protective equipment, shut off the air intakes, and give linen (days).

**Table: 8 Pharmaceuticals, Hospital Post Disaster Recovery Protocol, Hospital Personnel Education and Trainings on Disaster Preparedness and Disaster Plan Drill and Simulations**

<b>Pharmaceuticals</b>				
<b>Question</b>	<b>Total</b>	<b>Centra I</b>	<b>Western</b>	
<b>128A) What is the current level of stock for the following pharmaceuticals: A) Atropine</b>	100	100	100	
<b>128B) IV fluids</b>	100	100	100	
<b>128C) Morphine</b>	100	100	100	
<b>128D) Bronchial dilators</b>	100	100	100	
<b>129) Does the pharmaceutical allocation plan make provision for prophylaxis of care giving staff and their immediate family?</b>	95.5	97.5	75	
<b>130) Has the plan identified and established relationships with another facility outside the immediate region as a means to identify potential sources of needed pharmaceuticals as well as equipment, supplies, and staff.</b>	97.7	100	75	
<b>131) Does the plan identify pharmaceutical warehouses within the local areas?</b>	90.9	92.5	75	
<b>132) Does the plan outline how pharmaceuticals can be procured, transported, and delivered to the facility while within a secure environment?</b>	90.9	92.5	75	
<b>Hospital Post Disaster Recovery Protocol</b>				
<b>133) Does the plan designate who will be in charge of recovery operations?</b>	86.4	87.5	75	
<b>134A) Does the plan make provision for the following during recovery? A) Documentation</b>	90.9	92.5	75	
<b>134B) Financial matters</b>	93.2	92.5	100	
<b>134C) Inventory and re-supply</b>	100	100	100	
<b>134D) Record preservation</b>	90.9	92.5	75	
<b>134E) Clean-up</b>	100	100	100	
<b>134F) Hazard removal and cleanup</b>	100	100	100	

<b>134G) Garbage and waste disposal</b>	100	100	100
<b>134H) Utility and equipment servicing</b>	100	100	100
<b>135A) Does the plan address the following programs? A) Critical Incident Stress Debriefing Program</b>	86.4	87.5	75
<b>135B) Employee Assistance Program</b>	84.1	87.5	50
<b>135C) Group/Individual counselling services</b>	88.6	90	75
<b>135D) Family Support Program</b>	81.8	82.5	75
<b>Hospital Personnel Education and Trainings on Disaster Preparedness</b>			
<b>136) Does the plan specify who is responsible for the training program?</b>	97.7	100	75
<b>137) Does the plan include methods for ramp up and extemporaneous training for new and altered roles?</b>	93.2	92.5	100
<b>138) Does the facility have on going, mandatory disaster training programs?</b>	95.5	97.5	75
<b>139) Has the facility considered adapting disaster procedures for application when dealing with routine procedures so personnel can become familiar with them?</b>	86.4	90	50
<b>140) Does the program provide disaster education material at staff orientation to facilitate staff awareness?</b>	88.6	92.5	50
<b>141) Does the program provide on-going disaster education to facilitate staff awareness and currency of procedures?</b>	88.6	92.5	50
<b>142) Does the program have inter-organization joint training sessions that deal with common aspects of disaster response?</b>	88.6	92.5	50
<b>143) Does the plan set out appropriate Health and Safety measures that staff should be aware of?</b>	93.2	95	75
<b>Disaster Plan Drill and Simulations</b>			
<b>144) Does the facility program conduct an annual exercise?</b>	88.6	90	75
<b>145) Does the exercise ensure all key participants are familiar with the contents of the plan?</b>	88.6	92.5	50
<b>146) Does the exercise ensure all key participants are familiar with the contents of the plan?</b>	88.6	92.5	50
<b>147) Is a formal critique performed with results distributed to all key individuals and participating groups?</b>	90.9	92.5	75
<b>148) Does it identify somebody responsible for ensuring that the plan is updated, distributed and tested on a regular basis?</b>	97.7	100	75

**Yes Answer (%)**

Most hospitals have an adequate supply of the fundamental emergency medications (atropine, morphine, adrenaline, and bronchodilators). Pharmaceuticals, equipment, supplies, and personnel are brought into 97.7% of hospitals from locations outside their immediate area. Pharmaceutical allocation strategies are used by

the majority of hospitals as preventative measures. 90.9% of hospitals have a plan detailing pharmaceutical distribution centers and addressing the safe acquisition, delivery, and transportation of medications. Plans for hospitals state recovery operations in 86.4% of cases. Inventory and restock, hazard elimination,





garbage clearance, and utility servicing are all included in all hospital recovery programmes. 90.9–93.2% of hospital plans addresses paperwork, financing, and record keeping. Critical Incident Stress Debriefing, Employee Assistance, and Group/Individual Counselling are provided by 81.8–86.4% of hospital plans. Through a dedicated disaster plan training programme, hospitals instruct their new employees on their disaster plans. 93.2–97.7% of hospitals' training programmes include extempore training for new and changing responsibilities as well as ramp-up techniques. Staff members must also participate in on-going, compulsory catastrophe training. In 86.4–88.6% of cases, hospitals thought about converting emergency protocols into standard operating procedures to enable staff members become accustomed to them. Disaster education is included in staff induction and is continued to raise staff awareness. Inter-organizational cooperative training sessions on common elements of disaster response are part of the programme. 88.6% of hospitals hold annual drills to make sure all significant players are aware of the plan. After a formal criticism, 97.7% of hospitals make sure the strategy is updated, circulated, and tested.

## Discussion

The goal of this study was to assess the emergency response capabilities and catastrophe readiness of a few Saudi military hospitals. Numerous studies have examined the emergency supplies, roles, and actions in hospitals worldwide, as well as in Saudi Arabia. Although there was a paucity of information about Saudi Arabian military hospitals, 92.3% of hospitals admitted experiencing a disaster plan, however these plans were hampered by a lack of training of staff, education, and disaster response simulation, according to the study (Bowling A, 2014). A study emphasised the significance of emergency unit nurses' awareness and education (Bruria Adini *et al*, 2006). The current study sought to assess Saudi military hospitals' levels of EMS preparedness for disasters and to pinpoint tactics for enhancing disaster management. Despite having a disaster plan in place, 6.8% of the hospitals did not have a mutually beneficial relationship in place with outside health authorities, which are crucial for the transfer and

care of patients in both external and internal disasters. Just 93.2% of hospitals distinguished between exterior and interior catastrophes. An integrated multidisciplinary approach is necessary for both internal and external disaster assessment, and the disruption of integration in the contingency plan may have a detrimental effect, especially in hospitals susceptible to internal disasters (Chester, D. K., *et al*, 2000). In both the central and western regions, there is now a 13.6% shortfall of cooperative relationships with the neighbourhood health department. Regarding the assessment of regional risks and hazards as well as the updating of the most recent edition of the plan, there is a small concern of 11.4%. Understanding the function of disaster response in risk management is essential for effectively reducing the losses and damage brought on by a calamity (Lunayyir, 2021). Since it is unclear how individuals would be recognised inside the building, it is difficult to inform personnel and other parties who may greatly aid in disaster preparedness. The majority of hospitals in this survey have plans for external disasters, such as the availability of resources and employees, and all hospitals in this survey have plans for internal disasters. Only 88.6% of hospital had strategies that included outside resources like volunteers and emergency medical responders; in the western region, this number fell to only 50%. With 81.5% of the hospital having an alternative location, 86.4% of the hospitals have established standard operating guidelines for a medical operations centre. Except for the western section, which has half of it, most of the hospitals lack the provisions for police assistance in preserving order in the building. The plan also includes a way to effect the management of vehicles and people converging upon the facility. Because of this, just a quarter of the hospital in this survey (68.2%) had assigned a space for the media, and few hospitals had appointed a spokesperson for the hospitals, with half of them in the western region. (Ingrassia P, *et al*, 2017). According to this survey, 90–95% of emergency rooms in hospitals had a mechanism in place for triaging patients, identifying them, directing their movement through the unit, and transporting them outside the facility within an hour. Hospital surge capacity was planned for in over 84% of hospitals; it is 100% in the western area. With the exception of the western region, where only 25%

of hospitals have created processes for the proper disposition for patients to their homes, the majority of facilities in the central portion do. Nearly one-third of the hospitals responding to the questionnaire did not have access to training and disaster programmes, despite their importance for enhancing disaster response (Jaharudin Padli, *et al*, 2018).

## Conclusions

This study is distinctive since it focuses on the military hospitals run by the Saudi Arabian Ministry of Defence and examines the problem of disaster management in emergency care. The best-case scenario for this research is that it is based on an identity questionnaire. While the majority of the disaster plans' components are in place, we were able to identify numerous positives in the study's facility disaster readiness. These include having a readily available plan, staff members who are familiar with it, and regular plan simulation and exercises. The implementation of the existing plan as well as training and education are essential. Overall, the majority of hospitals had sound catastrophe plans in place, however none adequately addressed all the suggested categories.

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